INDIAN TARIFF BOARD

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Volume I.

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Report

on the

Sugar Industry.

CHAPTER I.

The World Position.

Brief survey of world sugar industry.

1. Like the last Tariff Board on sugar, we propose to begin by a brief survey of the Sugar Industry throughout the world. This will, we hope, make for a better appreciation of the position in India.

Production.

2. The following are the figures of world production for the last seven years:—

TABLE I.—*Estimate of the world sugar production by Dr. Gustav Mikusch—Campaign year September to August.*

(In 1,000 metric tons raw sugar value.)

——	1931-32.	1932-33.	1933-34.	1934-35.	1935-36.	1936-37.*
A.—BEET SUGAR.						
(*a*) *Europe.*						
Germany	1,596	1,091	1,428	1,673	1,676	1,800
Danzig	22	22	26	33	..	8
Czechoslovakia . . .	814	634	517	638	571	725
Austria	163	165	170	223	206	145
Hungary	125	103	136	120	117	137
France	874	1,022	946	1,223	924	910
Belgium	205	265	247	269	241	245
Netherlands	172	240	200	243	236	245
Poland	493	417	342	447	444	460
Denmark	122	192	254	90	245	220
Sweden	144	235	305	272	295	305
Italy	363	319	300	345	321	328
Spain	402	260	242	349	198	250
Jugoslavia	82	85	74	63	90	98

* Figures for the year 1936-37 have been taken from Dr. Gustav Mikusch's forecast of the world sugar production, Facts about Sugar, February 1937.

ORDER.—Ordered that a copy of the above Resolution be communicated to all Local Governments and Administrations, all Departments of the Government of India, the Central Board of Revenue, the Director General of Commercial Intelligence and Statistics, the Indian Trade Commissioner, London, the Secretary, Tariff Board, His Majesty's Trade Commissioner in India, all Chambers of Commerce and the Canadian Government Trade Commissioner in India.

Ordered also that it be published in the *Gazette of India*.

J. A. WOODHEAD,
Joint Secy. to the Govt. of India.

Press Communiqué issued by the Tariff Board on the 24th August, 1928.

The attention of manufacturers of chemicals and consumers of chemicals which are used as materials in Indian industries is drawn to the Resolution of the Government of India in the Commerce Department No. 199-T(8), dated the 16th July, 1928, under which the question of granting protection to the manufacture of certain chemicals and the removal of duty on others has been referred to the Tariff Board for examination. Eleven acids and heavy chemicals have been expressly mentioned in the Resolution, but the scope of the Board's enquiry is not limited to these, and those interested in the manufacture of similar chemicals are at liberty to submit representations to the Tariff Board for investigation. Manufacturers who propose to apply for protection are requested in the first instance, to obtain from the Secretary, No. 1, Council House Street, Calcutta, a copy of the questionnaire prepared by the Board and to submit their replies with six spare copies to the Secretary not later than the 30th September, 1928. After their replies have been received, they will be notified as to the dates on which their oral examination, if any, will take place.

Consumers of chemicals used as materials in industries are also requested to submit representations stating (*a*) the kinds of chemicals used by them and the purposes for which they are used and (*b*) the amount of extra burden thrown upon the industry by reason of the Customs duties now leviable upon chemicals used. These representations (with six spare copies) should reach the Secretary not later than the 30th of September, 1928.

Messrs. Dharamsi Morarji Chemical Co., Ltd., Bombay.

Letter, dated 27th January, 1925, to the Government of India, Department of Commerce, Delhi.

We the undersigned manufacturers of Acids and heavy chemicals beg to address you on the subject of an imposition of protective duties on acids and heavy chemicals, and beg to submit the following facts for the Board's consideration.

It is a universally admitted fact that Checimal Industry is essentially a "Key Industry". Almost all other industries, the Textile Industry, the Leather Industry, the Paper Industry, the Glass and Procelain Industries, the Rubber Industry, the Soap and Candle Manufacture, the making of Paints and Varnish, purification of Mineral and Vegetable Oils, Explosives, Drugs and Medicines and smaller crafts and trades too numerous to mention are directly or indirectly connected with chemical science. In fact, the industrial and more or less even the agricultural prosperity of a nation is the result of a flourishing condition of its chemical industry. In Western countries the economic prosperity of a nation is measured by the quantities of Sulphuric Acid and Alkali it manufactures and consumes. The following table would give an idea of the production and consumption of the different manufacturing countries of the world.

WORLD'S CONSUMPTION AND PRODUCTION.

The world's consumption of Sulphuric Acid in 1910 is estimated by Caspari (Chemcial Trade Journal, 1914, page 234) in tons strength not given, but presumably 100 per cent. Sulphuric Acid):—

	For Super-phosphates.	For other purposes.	Total.
Great Britain . .	350,000	650,000	1,000,000
Germany . . .	530,000	850,000	1,380,000
United States of America	1,120,000	480,000	1,600,000
France	650,000	250,000	900,000
Italy	320,000	80,000	400,000
Austria	87,000	213,000	300,000
Belgium	155,000	95,000	250,000
Russia	35,000	115,000	150,000
Japan	...	...	80,000
		TOTAL .	6,060,000

It will be noted that India is not even mentioned in this list. But, as far as our information goes, India consumes about 20,000 tons of Sulphuric Acid per annum, and almost the whole quantity is supplied by the existing factories in the country.

The following quotation from the Industrial Handbook of the Indian Munition Board (a Government of India publication of 1919) will also give an idea as to the production of Sulphuric Acid in the most important manufacturing countries of the world:—

"Some idea of the quantities produced in Europe and America may be gathered from the fact that the United Kingdom and France each manufactured about one million tons a year, while Germany produced about 1,650,000 tons in 1912 and the United States of America about 2,876,000 tons in 1912 and 3,765 tons in 1914, the latter figure including about one million tons from Zinc works. Since 1914 these figures must have been increased to an enormous extent, as very large quantities were required for producing phenol, trinitrotoluol, nitrocelluloses, and other explosives. The

output of the United States of America for 1917 is given as 7 million tons. In France, Italy and the United States of America the great bulk (about 70 per cent.) of the acid produced prior to 1914 was used in the manufacture of Superphosphates for fertilising puropses.

As regards Alkali, it is one of the most important industries but we are not touching the subject at present, as our Works are not in a position to take up the manufacture of this branch of the Chemical Industry at present. However the magnitude of this trade can be judged from the following.

According to Lepsins (Industrial Chemistry Inorganic, Vol. I, by Martin in 1908, the world's consumption of Soda Ash alone amounted to 2,000,000 tons.

In 1913 world's production stood at 3½ millions of tons of Soda Ash—share of different countries being (Ullaman's Encyklopadic der Technischen Chemic, Vol. 8):—

	Tons.
England	750,000
Germany	550,000
France	350,000
United States of America	780,000
Japan	150,000
Other countries the balance.	

(2) The natural advantages which a country must possess for the development of any of its industries consist in an abundant and cheap supply of raw materials, of labour and power; also there must be market for the consumption of the manufactured products. That India pre-eminently possesses all these essentials cannot be gainsaid. A galance at the tables of the export trade of India reveals the fact that a number of our articles of export are the raw materials that the chemical manufacturers of the world are utilising. Our labour is annually emigrating in such numbers to all the corners of the world that several nations have to enact and enforce new laws to prevent the imigration of this cheap labour.

TABLE A.—*Import of Chemicals in India.*

——	1919-20.		1920-21.		1921-22.		1922-23.		1923-24.		1924-25.	
	Cwts.	Rs.	Cwts	Rs.	Cwts	Rs.	Cwts.	Rs.	Cwts.	Rs.	Cwts.	Rs
Copperas												
Ferrous Sulphate . . .	30,610	2,10,950	24,336	1,17,870	8,669	47,992	17,046	82,006	17,224	68,500	9,127	39,662
Iron Sulphate . . .												
Copper Sulphate . . .	11,884	3,38,460	8,185	2,11,170	2,795	73,008	9,713	2,37,894	11,134	2,27,949	9,040	1,64,196
Aluminium Sulphate . .	64,013	4,33,670	101,961	8,43,420	51,932	45,873	47,745	3,68,616	71,038	4,86,013	56,634	2,81,783
Alum	64,119	6,97,060	72,293	9,37,880	55,104	7,09,917	70,599	7,95,479	72,776	6,89,448	61,656	4,96,559
Zinc Chloride . . .	8,197	1,82,190	16,788	5,62,530	18,774	5,16,702	18,371	3,80,636	25,099	5,09,845	21,206	3,91,418
Soda Sulphide . . .	2,332	41,260	19,861	7,05,450	14,808	3,23,151	17,214	2,91,008	19,982	2,58,505	33,072	3,35,014

TABLE B.—*Import of Chemicals in the Bombay Presidency.*

Copperas											
Ferrous Sulphate . . .	16,514	1,13,767	14,000	61,252	5,240	27,055	9,286	37,196	9,910	36,979	Not available
Iron Sulphate . . .											
Copper Sulphate . . .	6,012	1,53,848	4,217	98,282	1,440	38,948	4,441	1,05,839	6,253	1,22,319	
Aluminium Sulphate . .	2,292	32,486	6,078	79,850	8,753	1,08,052	8,097	70,315	12,667	1,03,656	
Alum	29,813	2,58,500	32,985	4,42,565	30,737	3,84,700	32,292	3,47,287	40,337	3,70,478	
Zinc Chloride . . .	5,895	1,19,716	14,664	5,00,762	17,464	4,69,730	17,208	3,46,860	22,137	4,47,185	
Soda Sulphide . . .	1,392	21,954	19,165	6,81,525	13,887	3,05,348	15,734	2,62,670	18,759	2,36,515	

That India possesses enormous quantities of coal is known to all. In addition to this source of power there are immense possibilities of the cheapest power—the water power—being developed. The import tables of the Indian trade incontestably prove that India is one of the largest market for all finished products of the Chemical Industry. We attach for ready reference tables showing the imports of some of the finished chemical products into India and into the port of Bombay (our nearest market), the products that we have commenced manufacturing (Table A & B).

(3) When it is proved that India possesses all the essentials of a sucessful Chemical Industry, the question naturally arises, why capital has been shy, and is even yet so, in connection with this industry. To our mind the following are the main reasons for this state of things:—

(*i*) Want of practical and scientific knowledge of the Industry amongst the middle and the higher classes, the result being the almost total absence of the experts of the trade in the country, paucity of trained efficient labour, and a general lack of interest on the part of the capitalist class towards the industry.

(*ii*) The cold apathetic attitude of the Government of the country towards the industry being the result of its free trade policy, which has allowed all the manufacturing countries of the world to have an absolute control of the Indian markets.

(4) On account of these main reasons and others of less importance, Chemical Industry was almost completely neglected in India till about the time of the last Great War. It was the exigencies of the times that opened the eyes of the Government as well as of the Industrialist to the necessity of giving the industry a start and had it not been for the very serious difficulties of obtaining and transporting machinery and plant, a number of chemical factories would have risen up in the country. But as it happened, just the time, when the industry had the one chance of its life to receive an impetus both at the hands of the Government and the Capitalist, it only passed away in the hatching of schemes, big and small, only a few factories having actually materialised, ours being one of these.

(5) But since the close of the War, the few chemical concerns that were slowly raising their heads as a result of the impetus they received during the War, and the fewer concerns that were started in the hope of the approaching good times, are all passing through a very anxious and critical period The following are some of the reasons:—

(*a*) The foreign producer who had to some extent receded from the Indian market on account of very great local demand and equally great difficulties of transport, has been since the close of the War, trying with renewed vigour to recapture the Indian market. The table given below shows how some of the chemicals the imports of which had gone down very much during the War, have not only again reached up to the pre-war years, but have in many cases much gone up (Table C).

TABLE C.—*Imports of Chemicals into India.*

	1913-14.	1916-17.	1923-24.
	Tons.	Tons.	Tons.
Copperas (Iron Sulphate) . . .	724	5,105	861
Copper Sulphate	...	...	587
Aluminium Sulphate, Alum . . .	4,504	5,704	3,552
Zinc Chloride	1,034	872	1,255
Sodium Sulphide	...	...	999
Ammonium Chloride	53 Except Bombay	314 Except Bengal	...

TABLE C.—*Imports of Chemicals into India*—contd.

	1913-14. Tons.	1916-17. Tons.	1923-24. Tons.
Ammonium Carbonate	43 Except Bombay	37	...
Sodium Carbonate	13,856	26,639	...
Caustic Soda	4,912	2,855	...
Bleaching Materials	3,781	5,473	...
Disinfectants	1,260	1,479	...
Sodium Sulphate	18 Except Bombay	...	...

(*b*) There is in fact a dumping in operation during the first two or three years. This has been the result of several untoward circumstances, the depreciated currency of certain countries, the sudden and abnormal growth of chemical factories for purposes of the manufacture of explosives and other war materials, which factories are now after the war utilising their enlarged machinery and plant to the production of chemicals useful in the industries of times of peace, more cheaply than before. The following two tables will show how the prices of certain of the chemicals have been decreasing year by year both in average Indian markets as well as in the Bombay market.

The average prices per cwt. for the five successive years are:—

TABLE D.—*For India.*

	1919-20.	1920-21.	1921-22.	1922-23.	192324.
Iron Sulphate	6·8	4·8	5·0	4·8	4·01
Copper Sulphate	28·3	25·7	26·2	24·5	20·4
Aluminium Sulphate	6·7	8·3	8·8	7·7	6·8
Alum	10·8	12·8	12·8	11·2	9·4
Zinc Chloride	22·2	33·5	27·5	20·2	20·3
Soda Sulphide	17·6	35·5	21·8	16·9	12·9

TABLE E.—*For Bombay Presidency.*

Iron Sulphate	6·8	4·3	5·0	4·0	3·7
Copper Sulphate	25·5	23·3	27·0	23·8	19·5
Aluminium Sulphate	14·1	13·1	12·3	8·6	8·1
Alum	8·7	13·4	12·5	10·6	9·1
Zinc Chloride	20·3	34·1	26·7	20·1	19·2
Soda Sulphide	15·7	35·5	22·7	16·6	12·5

(6) On the other hand the circumstances under which the few Indian Chemical factories have to work are quite the reverse. We have to contend against difficulties on all sides. While other producers of the world have their own shipping companies competing with each other and thus lowering their freights to the Indian Ports, we have to be at the mercy of monopolistic Railway Companies for inland traffic and similar Shipping Companies for even coastal traffic. What then of neighbouring market? These companies are not only averse to grant us suitable concessions for the transport of our raw materials and finished products but they increased their freights during the war and have stuck to them, though war conditions have now almost completely disappeared. The following table showing a comparison between the shipping freights for acids and chemical from Bombay to some

of the important ports of India and from the Continent and the U. K. to Bombay will show that our coastal freights are much higher than what the traffic can bear.

FREIGHT BY STEAMER.

Freight on Heavy Chemicals.

Bombay/Karachi . . . Re. 1 per maund of 82-2/7 lbs.
,, /Calcutta . . . Rs. 14 per ton of 40 c.ft. of 20 cwts.
,, /Madras . . . Re. 12 per ton of 40 cft. of 20 cwts.

1 gallon = 18·4 lbs.

Freight on Acid Cases.

Bombay/Karachi . . . Rs. 2 per case (holding 4½ gallons).
,, /Calcutta . . .
,, /Madras . . . } Re 1 per case.
,, /Tuticorin . . .

122 gallons = 1 ton (95 per cent. Acid).

Freight on Heavy Chemicals Acid Cases.

	From United Kingdom. Per ton. Rs. A.	From Continent. Per ton. Rs. A.
Glauber's Salt	40 0	23 9
Iron Sulphate	35 0	27 6
Lump Alum	22 6	20 0
Soda Sulphide	75 0	25 0
Alumina Sulphate	22 6	21 0
Zinc Chloride	65 0	23 9
Acid in Jars	120 0	95 0
Superphosphates	20 0	18 0

The rates from United Kingdom are subject to 10 per cent. primage. Continental rates bear no primage. Continental rates are from Hamburg and Antwerp; they usually apply to Rotterdam also.

In almost all the Western countries, transport companies on the contrary voluntarily give or are made to give all sorts of concessions to export trade.

In many of the manufacturing countries of the world inland freights for finished products as well as for raw materials are as far as possible so arranged as to bear a certain proportion to the values of the transported articles. In India the transport companies do not listen to such a reasonable proposition.

(7) The chemical industry in India being quite an infant industry all the sources of the raw materials which it requires are not yet tapped. Only such raw materials as are at present in demand with the foreign producer are more or less developed. Those that the foreign producer can get in his own country or in another country nearer home, he would not care to receive from India. Examples of the first kind are all the minerals, Manganese Magnesite, Chromite, Saltpetre, Wolfram, Monazite Sands, etc., and vegetable herbs and nuts, etc., *i.e.*, Nux Vomica, Myrabollams, etc.; to the second class belongs minerals like sulphur, copper and iron pyrites, Phosphatic minerals, and various potash and soda salts. The sources of this latter class of materials have some of them yet to be tapped, some to be properly opened out and others to be developed. This process of development of the indigenous supply of raw materials can only go space with the unfaltered development of the chemical industry of the country.

Another question that also depends in a great measure on the expansion of the industry is the creation of the practised trained foremen of factories and the menial labour disciplined and accustomed to methods of the work at such factories.

These matters will hamper, in a degree, a very speedy rise of the industry but they cannot affect its gradual and steady growth, other more serious impediments being removed.

(8) From what we have said above, it will be evident that all essential conditions laid down by the Tariff Board for entertaining an application for protection are existent in the case of this Industry. Abundance of raw materials, labour and cheap power are there in the country; the industry is in its infant state inasmuch as the sources of all the raw materials are not fully developed, and labour has to be trained. The whole of the Indian market and that of the neighbouring islands of Ceylon, Java and Borneo, etc., as well as the neighbouring countries such as Persia, Afghanistan, Mesopotamia, etc., would be ready to receive any amount of finished products. The burden of any protection given to the chemical industry will fall directly in the first instance only on other industries like the textile, tanning and soap industries and will not perceptibly affect the pocket of the impoverished ryot; the industry is sure to develop, within a reasonable period, into such proportions as will enable it to stand in the world market, with its competitors, only it must be so protected during its first stages of development as to allow it to reach its natural limits of growth.

(9) It may be asked why the present customs duties levied on chemicals should not prove a sufficient protection to the Indian Chemical Industry. Our answer is, the barrier is too low and the giant producer of the West can, with all the advantages in his position, easily stride over the barrier. He can secure in his country machinery and plant much cheaper than we can, experts of the trade and technically trained labour is at hand, his sources of raw materials are fully opened up to him and being in possession of all the world's markets, he turns out enormously large quantities of goods which enable him to reduce his unit costs to the utmost limits. We might in passing draw the attention of the Board to the fact that the import of machinery alone approximately raised our cost prices to at least 5 per cent., if not more, than those of our foreign competitors, who have always the advantages of getting the up-to-date machineries almost at their doors.

It is on account of these advantages and those mentioned in the previous paragraph that the foreign manufacturer has been able to dump his finished products into Indian markets during the past two or three years absolutely defying the prevailing customs duties of India.

The New Indian Tariff.

Duties on Chemicals.

The revised schedules of tariff valuations issued by the Department of Commerce of the Government of India for the purpose of levying customs duties in British India during the twelve months January—December 1925 contain the following figures relating to chemicals:—

Chemicals & Drugs.	Tariff Valuation.	Duty.
	Rs. A.	Per cent.
Copperas, green—		
(1) Imported in bulk (cwt.) . . .	5 0	2½
(2) Imported otherwise	*ad valorem*	2½
Opium and its alkaloids, and their derivatives (seer of 80 tolas) . . .	...	Rs. 24 or 15 per cent. *ad valorem*, whichever is higher.

Chemicals & Drugs.	Tariff Valuation. Rs.	A.	Duty. Per cent.
Cinchona Bark and the alkaloids extracted therefrom, including quinine, chemicals, drugs and medicines, all sorts not otherwise specified.			Free
Alkali, Indian (Sajji-khar) (cwt.)	3	8	15
Alum (lump) (cwt.)	8	0	15
Ammonium Chloride (Muriate of Ammonia, crystalline) (cwt.)	28	0	15
Salammonic sublimed (cwt.)	30	0	15
Other sorts, including compressed (cwt.)	32	0	15
Arsenic (China Mansil) (cwt.)	80	0	15
Arsenic, other sorts	*ad valorem*		15
Bleaching Powder (cwt.)	11	0	15
Carbide of Calcium (cwt.)	20	0	15
Carbonate of Ammonia (cwt.)	36	0	15
Epsom Salt (cwt.)	4	8	15
Peppermint crystals (lb.)	30	0	15
Potash Bichromate (cwt.)	34	0	15
Silicate of Soda (cwt.)	9	8	15
Soda Ash including calcined natural Soda and manufactured sesquicarbonates (cwt.)	6	8	15
Soda Bicarbonate (cwt.)	9	0	15
Soda, Caustic, solid (cwt.)	12	8	15
Soda, Caustic, flake (cwt.)	18	0	15
Soda, Caustic, powdered (cwt.)	18	8	15
Soda, crystals (in bulk) (cwt.)	7	0	15
Soda Sulphide	12	0	15
Sulphate of Copper (cwt.)	18	0	15
Trona, or natural soda, uncalcined (cwt.)	3	8	15
All other sorts of chemical products and preparations not otherwise specified	*ad valorem*		15
Camphor, refined, other than powder (lb.)	2	12	15
Camphor powder from China including Hong-Kong (lb.)	2	0	15
Camphor powder from Japan	2	6	15

(10) There has been over-production and over-stocking of finished products in all the manufacturing countries of the West and they are vieing with one another to capture the Indian market. Our ports are wide open to all, and the result naturally is that the Indian manufacturer goes to the wall.

(11) We attach herewith a chart copied from the Industrial and Engineering Chemistry (Vol. 16, No. 8 of 1924) published by the American Chemical Society. It shows how the prices of chemicals have fluctuated in a downward direction from the year 1920 to 1924 almost month by month. This continuous downward motion of prices can denote nothing but over-production and over-stock. When the country's market was over-stocked, goods had to go to any available market. The markets of Canada, Australia and Japan nearer home were closed by high tariff walls and in some cases abundant local production. The European continent has its market overful

and there was again the bar of depreciated currencies, the United Kingdom was in the very same condition as America. Poor India and perhaps some of its little neighbours had their markets open receive these over-stocks. If we have not given similar charts for England and Germany, it is because it would only be a repetition. As regards England we may however mention one typical instance. During 1923-24, the manufacturers of Ammonium Sulphate in the United Kingdom, whose Government had controlled the export of the chemicals during and for some time after the war, put during 1923-24 the export price of the stuff £1 lower than the price for local consumption, seeing that they were losing their overseas markets for that article.

The fall in price from 11 dollars per 100 lbs. to 5·40 dollars as shown in the chart can by no stretch of imagination be construed into cutting down of profits only. It clearly denotes reaching down to the production cost and going down below that also. And now look at the situation. When the giant producer of America comes with his goods, the prices of which are cut below their unit costs, how is the infant Indian producer to meet him? We have already shown in our table D, how the prices in the Indian market have been going down. We will prove before the Board by facts and figures the reasons why our manufacturing costs are higher than the ruling prices.

(12) If with the help of protection the chemical industries already started in India are allowed to grow to their fuller limits, new industries will come into existence giving work to the increasing population of the country, the agricultural industry of the country which is the most important will see much better days, some industries which are only eking out a miserable existence to-day will be revived and a general economic prosperity of the country will be attained.

(13) As regards the period during which this protection may be made to operate, we believe a period of 15 to 20 years should in normal condition be enough to put the indigenous chemical industry to so develop as to stand world competition, as far at least as the Indian markets are concerned. They will at the end of the period be much better equipped and will gather the necessary strength to meet the foreign producer on an equal footing.

Before we conclude, we would like to put forth our views as to how far existing factories are in a position to meet the demands of the country. The chemical industry in the land is in its infancy. The number of factories which manufacture articles on a commercial scale can be counted on fingers' end. They are all fighting against various odds and under adverse circumstances beyond their control. The requirements of the country are not small, and the supplies which are too numerous and varied, are coming in from all corners of the world. Nobody can therefore expect that we would immediately replace these foreign supplies and be self-supporting. This might take a quarter of a century or more. The rise and growth of this industry in Japan is an example.

The growth of the industry is therefore only expected to be gradual and slow, and much depends on the protection we get and the encouragement we receive from the Government.

In India all the provinces are not equally fortunate in starting and developing this industry. Some possess a considerable amount of raw materials but no ready market, others have good markets but no materials. Moreover chemical industries naturally advance *pari passu* with the scientific progress of the people, conditions differ enormously throughout the country and therefore each province should be left to work out its own salvation. Selection of sites is therefore an important factor which goes a long way in deciding the future prospects of this industry.

We have chosen Ambernath for our factory. The main reason being that we have within a few miles the biggest market in India for the consumption of the chemicals we have intended to manufacture. In the supplies of raw materials we are not at present very fortunate. But the Presidency is not poor as regards the raw materials we want. Government, therefore, we believe, will do everything in their power in giving us proper facilities. So far we are receiving ample water supplies. Roads for transport are not

enough yet, neither the Railway Station properly developed to deal with the requirements of an industrial area. Much is still to be done for the sanitation of the place. We have every hope however that all this will come round gradually to strengthen our existence and brighten our future prospects.

The Managing Agents of this Company have had an experience of other industrial concerns and they know that the beginnings of an industry have their own nascent difficulties. They know that as pioneers of a new industry they cannot expect to have quite a fair weather sailing. During the past three years the Company has continuously made losses. The shareholders have borne them and would perhaps bear them a little longer if they see that fairer prospects are in view. Such fairer prospects seem impossible unless an effective ban is put against the import of at least some of the most important chemicals that are manufactured in India to-day and those that are likely to be manufactured in the near future.

In conclusion, we beg to inform you that we shall feel pleased to supply you supplementary statements or any further information the Board may require and we shall feel happy to send our representatives to be orally examined by the Board.

The Eastern Chemical Company, Limited, England.

(1) *Letter, dated 1st August, 1925, to the Secretary, Government of India, Department of Commerce, Simla.*

We have the honour to address you in the above connection with further reference to your letter No. 192/T/2, dated Simla, 18th April 1925.

2. We thank you for advising us that our application for protection has been noted by the Government of India but that at the present time the Tariff Board is fully occupied with other enquiries and it is not possible to refer the case for protection for acids and sulphates to the Board at the present time.

We venture to express the hope that our case will be remitted to the Tariff Board in due course more particularly as the report of the Indian Fiscal Commission would appear to have definitely required some such investigation in connection with the Indian Chemical Industry both on the grounds of general utility and also for purposes of national defence.

3. We regret to note that the Government of India are not satisfied that a "*primâ facie*" case has been made out for these chemical products in view of the fact that Sulphuric Acid has to be made in India from imported sulphur.

In this connection we would particularly invite your attention to the fact that the first work of importance referred to the Tariff Board was the question of the abolition of the import duty on sulphur.

In referring this matter to the Board the Government of India admitted *ipso facto* the great importance of Sulphuric Acid in Indian Industry and we shall stress this point again later.

We appeared before the Tariff Board in October 1923 and as a result of the evidence we were able to lay before them a strong report was forwarded to Government which resulted in the abolition of the sulphur duty in June 1924.

In paragraph 97 of the Indian Fiscal Commission Report to which you are kind enough to refer us, 3 conditions are laid down by the Commission and we deal with these seriatim:—

(1) *The first condition is briefly natural advantages.*

We hold that we fulfil this condition to a marked degree.

In the first place Sulphuric Acid and its products is an essential for many industries. If there were no Sulphuric Acid Plants in India these industries would be entirely dependent on the imported article.

In the case of the Textile Industry and Allied industries the difficulties and added expense of using imported acid are no difficult to conceive. Shipping Companies are naturally adverse to accepting acids as freight and merchants experience heavy loss in handling this type of business. All this added expense is passed on directly to the consumer.

(2) *The next item laid down by the Commission is the abundant supply of raw material.*

India has an abundant supply of raw material which might be used in the manufacture of Sulphuric Acid. We refer to pyrites of which there is almost inexhaustible supply in India but it is impossible to exploit these deposits on account of high railway freights and the distances separating the place of origin from their respective markets.

As the Government of India have not been able to give Chemical Manufacturers such concessions as would enable them to produce Sulphuric Acid from pyrites the latter have been driven to develop their industry by the manufacture of Acid from sulphur imported from Italy and America.

In these circumstances we feel that Government would be very reluctant to specifically cite the lack of abundant supply of raw material as the principal consideration which prevented them from referring our case to the Tariff Board.

(3) *The further 2 items, viz., Cheap Fuel and Sufficient supply of labour* are complied with in the case of the Chemical Industry and we think these points need no elaboration.

A further condition laid down in paragraph 1 is the need of a large home market.

There is a large market for acids and their products in the Indian Empire and there is no doubt that if acid could be produced more cheaply this market would expand very considerably and this is one of the points we urge in support of our claim that the Chemical Industry is deserving of some degree of protection.

With regard to the Indian Chemical Industry being able to compete with World Industries on equal terms we claim that we do possess comparative advantages such as are detailed in the Commission's report.

In the first place our geographical position gives us a marked advantage and we have already referred to the difficulties experienced in handling imported acid.

Another comparative advantage that we enjoy is the fact that we have a large market for our products at our very doors and we are able to supply users of our acids, etc., with the different grades to which they are accustomed and which are most utilised in their respective industries.

The last requirement of paragraph No. 1 refers to the *undesirability of protecting any industry which will become a permanent burden to the community.*

We hold that some degree of protection for a comparatively short period would render the Chemical Industry at most a temporary and insignificant burden on a community which will be recompensed for bearing this small burden by the expansion of our industry and the consequent ultimate reduction in prices for various chemicals.

The added advantage of home manufacture as against dependence on imported goods is another very important point which should not be lost sight of.

This is of particular importance in the case of Railways, other large Public Bodies and Industries as when it is possible to obtain ample stocks of home manufactured goods at short notice the relative Store Department can release large sums of money which would otherwise be locked up in carrying heavy stocks of imported stores and this money is available for extending and developing their respective businesses.

Indian Fiscal Commission Report, Paragraph 2.—In our preliminary statement we dealt with the difficulties with which our industry is faced and we claim to very closely comply with all the conditions of paragraph 2.

Unless we receive the assistance of some degree of protection there is very little likelihood of our industry developing at all and there is no doubt that in the interests of the country it is desirable to give every facility to Heavy Chemical Manufacturers to develop and extend their business with greater rapidity.

Indian Fiscal Commission Report, Paragraph 3.—The Commission specially laid down that any industry receiving protection must be one which will eventually be able to face world competition without protection.

Here again we claim to fully comply with the requirements laid down by the Commission in their report.

At the present time we are facing world competition without protection but the increased severity of this competition more particularly in regard to dumped German manufactures is that the Indian Heavy Chemical Manufacturer is practically limited to the *production of acids for sale* as such and he can find little or no outlet for chemical manufactures which are directly dependent on large and cheap supplies of Sulphuric Acid.

In Europe and America the sale of Acid as such is limited to a very small proportion of the total output of a Sulphuric Acid Plant and Manufacturers regard this section of their trade as the least important and certainly as the least profitable. By far the greater portion of their output is used for working up profitable secondary manufactures and bye-products.

In other words the advantage we enjoy by reason of our geographical position and the difficulty of handling imported acids enables us to manufacture and sell these same acids in India but when we come to chemicals which can be transported more easily than acids such as Epsom Salt or Iron Sulphate, the advantages which we enjoy by reason of our geographical position are nullified and we are unable to compete.

In these circumstances it is obvious that Chemical Manufacturers in India will not lay down new and expensive plant for the production of chemicals which are required in India but which are now imported from the Continent unless they have some assurance that they will be able to work such plant at a profit.

We maintain that it is necessary for some degree of protection to be extended to this industry for a number of years to encourage manufacturers to lay down plant and produce these heavy chemicals under circumstances which will allow them some return for their enterprise and expenditure.

When the Indian article becomes a standard in the market there is no doubt whatever that protection could be gradually withdrawn with the result that a new and powerful Indian Chemical Industry could then face world competition unaided.

We further note the Government of India ask for information regarding 6 other points, *viz.*, item A to F in paragraph 3 of your letter under reply.

(*a*) The articles for which protection is required were enumerated in our preliminary statement forwarded you under cover of our letter No. E. C. L. 398 of the 23rd of January 1925, but for easy reference we reiterate briefly the articles for which we require protection:—

Acids,
Sulphates, and
Chlorides.

Under Acids the 3 principal products are:—

(1) Sulphuric Acid or Refined oil of Vitriol.
(2) Hydrochloric or Muriatic Acid or Spirits of Salts.
(3) Nitric Acid or Aqua Fortis.

We dealt with these at length under the heading of " Bye-products of Sulphuric Acids " in our preliminary statement to which we would refer you as under:—

Epson Salt or Magnesium Sulphate, pages 9 to 10.

Green Copperas or Ferrous Sulphate, page 11.

Potash Alum and Alumina Sulphate, page 13.

With regard to Chlorides any large increase in the Hydrochloric Acid Industry in India would bring Zinc Chloride and Soda Sulphide into prominence.

(*b*) With regard to the rates of protection desired on each of the above articles we are hardly in a position to formulate any detailed statement in this connection.

We feel that it will be for the Tariff Board to investigate our claim for protection in the first place and should they satisfy themselves on this point we consider that the Board would be more competent to give expression to their findings in consultation with His Majesty's Customs.

We may say, however, that in every case all we shall ask for will be the minimum protection which will enable us to compete with the imported and dumped articles.

In our preliminary statement we referred to the question of the amount of duty when dealing with Epsom Salt on page 11, where we suggested that " the protection should take the form of an increased duty on the imported article which would stabilise the selling price of German Epsoms at not less than Rs. 5 per cwt."

On page 13 we suggested " that Tariff Valuation be imposed on Ferrous Sulphate so as to render it impossible to sell Green Copperas at less than Rs. 5 per cwt. in Bombay ".

In both cases we endeavoured to point out that these prices would impose very little, if any, hardship on the industries requiring these 2 sulphates and a similar regard to the requirements of the other industries will no doubt influence the Tariff Board in arriving at the degree of protection they will be willing to recommend for these and other sulphates.

(*c*) *The Approximate Extent of and the Indian market for each of the articles for which protection is required.*—We referred to this matter in our preliminary statement at some length but for easy reference we attach schedule " A " showing the extent of the Indian market for each of these chemicals in each case stating our authority for our estimate.

(*d*) *The capacity and outturn of the factories for each of the articles mentioned in A.*—It will be readily understood that there are objections to our revealing the full capacity of our plant to our competitors at the present stage but we have endeavoured to overcome this by giving details of our outturn and the capacity of our plant for the various items in the attached statement " Z ".

In our own case we have been in the unique position of being able to supply the whole of the demand of the local industries during the war period and we are therefore able to state quite definitely from experience, which we can support by figures in our possession, that our plant can easily comply with the whole requirements of India for Epsom Salt and Copperas while our Acid Plant is large enough to supply the whole of Western India with its present requirements of acids several times over.

It will be understood that we exclude the East and South of India by reason of the fact that there are other factories established there and Steamer and Railway freight render it impossible for us to sell acid in this territory.

(*e*) *Cost of Production of each Article.*—Here again we find ourselves in difficulties in our endeavour to comply with your requirements. The cost of production of each item varies with the cost of raw materials and any

figures which we may put on record at present might need modification in 6 months' time. We fully appreciate that this fact may vitiate the value of any degree of protection which the Tariff Board may advise but this factor is constant in all Indian industry and has been dealt with exhaustively by the Fiscal Commission and the Tariff Board from time to time.

(*f*) *The position in regard to obtaining the articles from which each product is manuafctured.*—We endeavoured to give this question some prominence in our preliminary statement and would refer you to the following items for fuller information:—

Sulphur: Particulars have been laid before the Tariff Board and some of these were recapitulated on pages 4 and 5 of our preliminary statement.

Epsom Salt: The sources of the articles required in the manufacture of Epsom Salt both in Germany and India are dealt with at some length on pages 9 and 10 of our preliminary statement.

Ferrous Sulphate: Similarly the materials required in the manufacture of Ferrous Sulphate are dealt with at length on pages 11 and 12 of our preliminary statement.

Nitric Acid: The source of the Nitrate of Soda used is Chile and stocks of Chilan Nitrate are carried by Continental suppliers from whom the Indian market obtain their requirements.

Hydrochloric Acid: The material (salt) used in the manufacture of the Hydrochloric acid is obtainable locally in large quantities.

Paragraph 106—Report of the Indian Fiscal Commission.—We would invite your kind attention to this paragraph which deals with the possibility of protecting certain industries on the grounds of national safety and the commission stated that they had no hesitation in affirming the principle that any industry which is essential for purposes of national defence and for which the conditions in India are unfavourable should, if necessary, be adequately protected *irrespective of the general conditions which they have laid down for the protection of these industries.*

We feel that there is no doubt that the Fiscal Commission had in mind the desirability of protecting the Indian Chemical Industry when this paragraph was incorporated in their report and we further believe that it was included with the specific intention of according some degree of protection to potential producers of the bases of explosives if it were not possible to accord the same manufacturers some degree of protection for purely industrial general principles.

Nevertheless we maintain that our industry can claim protection on the grounds of general industrial principles but the importance of the Heavy Chemical Industry in regard to explosives cannot be overlooked.

We have a large plant capable of producing the required quality of acid for the manufacture of explosives quickly and efficiently and there is no doubt that a plant of this sort is an asset to Government in times of National emergency and we have been called upon to divulge this information from time to time to confidential representatives of the Indian Government Arsenals.

Paragraph 108, Report of Indian Fiscal Commission.—In this paragraph the Commission referred to the military value of certain articles which they consider of sufficient military importance to warrant special consideration. Prominent amongst them is Sulphuric Acid which is the basis of our whole industry and consequently every article manufactured from Sulphuric Acid may be said to come within the purview of this paragraph of the Commission's report.

Conclusion.—In conclusion we venture to express the hope that these supplementary remarks taken in conjunction with our preliminary statement will be considered sufficient to establish a "*primâ facie*" case for protection which will enable your Department to refer this matter to the Tariff Board.

Finally we would again reiterate the policy and ultimate objective of the Indian Chemical Industry referred to on page 3 of our Preliminary Statement.

"We desire to use every effort in our power to so reduce the cost per unit of Sulphuric Acid that Indian industries dependent on this product will be enabled to compete with foreign manufacture so that ultimately the off-take of acid will be great enough to enable us to produce fertilisers in this country at a price which will compete with imported fertilisers."

It is our sincere belief that protection to our industry is absolutely essential at the present time but is only considered as a stepping stone to the establishment of a very much larger and more important Heavy Chemical industry within the Indian Empire.

SCHEDULE "A."

Approximate extent of the Indian market.

Name.	Quantity.	Remarks.
	Cwts.	
Sulphuric Acid. . .	78,400	Note (*b*). These figures are based on the following data :— (1) Average figures of imports for Bombay and Bengal as shown in the Indian Government Returns for these Presidencies for the years 1920-21, 1921-22, 1922-23 *plus*
Nitric Acid . . .	10,200	(2) Average sales of country manufactured goods in the Bombay Presidency for the same years *plus*
Hydrochloric Acid . .	6,300	(3) Allowances for Manufactures in Bengal and Madras.
Epsom Salt . . .	37,300	
Green copperas . .	16,200	Note (*c*). Figures for imports into Madras are not included.
Alum	34,900	Note (*d*). *Hydrochloric Acid :* Figures for this acid are included in the group of other acids in the Government Returns and therefore the imports of Bombay, Bengal and Madras have been omitted in the case of this Acid.
Aluminium Sulphate .	64,800	Note (*e*). All the markets of the above commodities are increasing in extent, some of them very rapidly and the above average figures may therefore be taken as a very conservative estimate for current markets. Note (*f*). *Sulphuric Acid :* The production of sulphuric acid by the Steel industry is not included in these figures. Such production would add some 50 to 60 tons *a day* to the Sulphuric acid figures.

For the Eastern Chemical Company, Limited.
For E. D. Sassoon and Company, Limited.

(Sd.)
Managing Agents.

Strictly Private and Confidential.

STATEMENT "Z."

Eastern Chemical Company, Limited, Capacity of Plant.

(1) Chamber Acid	450 tons per month.
(2) Concentrated Sulphuric Acid . .	300 tons per month.
(3) Nitric Acid	45 tons per month.
(4) Hydrochloric Acid	75 tons per month.
(5) Copperas	150 tons per month.
(6) Epsoms	200 tons per month.
(7) Glaubers	50 tons
(8) Soda, Crystals	50 tons.

N.B.—Items 6, 7 and 8 constitute our "Crystals Plant" with a maximum production of 300 tons per month. The figures shown above are therefore interchangeable and we could, for instance, make 300 tons of Epsoms in one month and no Glaubers or Soda Crystals.

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(2) *Letter No. E. C. P.-59, dated the 13th August, 1928.*

In accordance with your request we have the honour to send you herewith five copies of each of the following:—

1. Our preliminary statement to Government, dated the 23rd January, 1925.
2. Letter No. 199-T., from the Government of India, Department of Commerce, Simla, dated the 18th April, 1925.

If copies are required of the rest of the correspondence with Government in this connection we shall be pleased to furnish them. The above, however, will give you, we believe, all the essential information in connection with our application.

Enclosure No. 1.

PRELIMINARY STATEMENT OF THE EASTERN CHEMICAL CO., LD.

Managing Agents:
E. D. SASSOON & CO., LD., BOMBAY.

PROTECTION OF CERTAIN SULPHATES.

The position of the Sulphuric Acid Industry in India has been dealt with by no less an authority than Professor Sir Thomas Holland in a pithy paragraph in the "Record of the Geological Survey of India (Vol. XLVI, page 295)" and we can do no better than to reproduce this instructive paragraph *in extenso* (See I).

Extracts from records of the Geological Survey of India, Vol. XLVI, pp. 295-296.

"Seeing practically at the end of the review this is a convenient place to point the lesson taught by a general survey of progress.

Sulphuric acid is the key to most chemical and to many metallurgical industries; it is essential for the manufacture of superphosphates, the purification of mineral oils, and the production of ammonium sulphate, various

acids, and a host of minor products; it is a necessary link in the chain of operations involved in the manufacture of the alkalies, with which are bound up the industries of making soap, glass, paper, oils, dyes and colouring matters; and as a bye-product, it permits the remunerative smelting of ores which it would be impossible otherwise to develop.

During the last hundred years the cost per ton of sulphuric acid in England has been reduced from over £30 to under £2, and it is in consequence of the attendant revolution in the European chemical industries, aided by increased facilities for transport, in India the manufacture of alum, copperas, blue vitriol, and the alkalies have been all but exterminated; that the export trade in nitre has been reduced instead of developed; that copper and several other metals are no longer smelted; that the country is robbed every year over 90,000 tons of phosphatic fertilisers; and that it is *compelled to pay over twenty millions sterling for products obtained in Europe from minerals identical with those lying idle* in India.

Although sulphuric acid and the alkalies are essential to so many other industries, the conditions of their profitable manufacture will balance the "protective" effect of transport charges only when there is a market in the country for the bye-products which are now essential parts of the cycle of operations in a chemical industry.

These conditions, as shown by the import statistics, are rapidly ripening, but the enterprising capitalist should remember also that the present requirements of India represent but a fraction of the consumption that will follow any material reduction in prices by local production".

We would particularly stress the reference to the fact that the cost of sulphuric acid in England has been reduced from over £30 to under £2 per ton while if we compare it with corresponding costs in India a figure of somewhere round £15 a ton is applicable.

The importance of cheap sulphuric acid is amply illustrated by the following tables:—

TABLE I.

Nitric . . .	1 ton	requires	1·62 tons of chamber acid (sulphuric acid sp. gr. 1·5).
Muriatic . .	1 ,,	,,	0·72 tons.
Acetic . .	1 ,,	,,	1·25 ,,
Epsom Salt (Mag Sulph) . .	1 ,,	,,	0·60 ,,
Copperas (Iron Sulph) . .	1 ,,	,,	0·55 ,,
Alum . . .	1 ,,	,,	0·64 ,,
Alumina Sulphate	1 ,,	,,	0·61 ,,

TABLE II.

On Raw Material, plus *Coal and Depreciation*.

Nitric acid	Average cost of sulphuric acid represents 55 per cent. of the total cost.
Muriatic	
Acetic	
Epsom	
Iron Sulph	
Alum (K_2O) 30 per cent. . .	
Alumina Sulphate . . .	

These figures suffice to show the part played by acid costs and held to explain the higher relative working costs in India to-day.

Policy and ultimate aim of the Indian Chemical Industry.

Before passing to a detailed consideration of the various primary products and by-products for which we now ask protection we take this opportunity of enunciating our policy in regard to sulphuric acid :—

> " We desire to use every effort in our power to so reduce the cost per unit of sulphuric that Indian industries dependent on this product will be enabled to compete with foreign manufactures so that ultimately the off-take of acid will be great enough to enable us to produce fertilisers in this country at a price which will compete with imported fertilisers ".

Our case for protection differs somewhat from similar requests emanating from other Indian industries in several respects. We do not hold out nebulous promises of becoming self supporting at some far distant date.

We are already an established and self-supporting industry, able to market our products in India and to compete with imported chemicals to a strictly limited extent and we only need a comparatively small margin of protection to help us to compete in much larger number of chemical products to the ultimate benefit of Indian industry in general.

There is an undoubted possibility of an export trade in certain heavy chemicals manufactured in India but we do not desire to stress this point unduly at the present juncture but rather to confine our remarks to showing that the effect of protection would be to benefit our own industry immediately and as a direct result other Indian industries such as cotton and steel would benefit in turn at no far distant date.

With these preliminary remarks we now pass to the consideration of the commodities for which we ask protection.

Sulphur.—We recently laid a case before the Tariff Board for the abolition of the Sulphur Import duty and we were successful in proving our argument that this duty was an undue burden on the Indian Chemical industry which was passed on directly to other allied industries.

It is not necessary for us to recapitulate our evidence in regard to the removal of the Sulphur duty, but it is necessary to give a brief and up to date precis of the particulars relating to the supply of sulphur to the Indian market so as to enable Government to fully comprehend the position of our Industry.

India is entirely without supplies of indigenous sulphur and can offer no alternative pyrites or other ferrous ores. For this reason all the sulphur needed for the manufacture of sulphuric acid has to be imported from abroad and the two main sources of supply are Sicily and America.

Both these sources of supply are controlled by a syndicate which has limited the annual deliveries to various countries including India in accordance with a schedule agreed upon by producers in Sicily and America.

In accordance with this arrangement the Indian consumer is forced to purchase sulphur from Sicily but should the Indian demand exceed a particular figure (believed to be in the neighbourhood of 12,000 tons per annum) Sicilian producers would be unable to supply in accordance with the Combine agreement and the Indian Chemical Industry would be forced to buy American sulphur of a similar grade at a price about 50 per cent. above that paid for Sicilian.

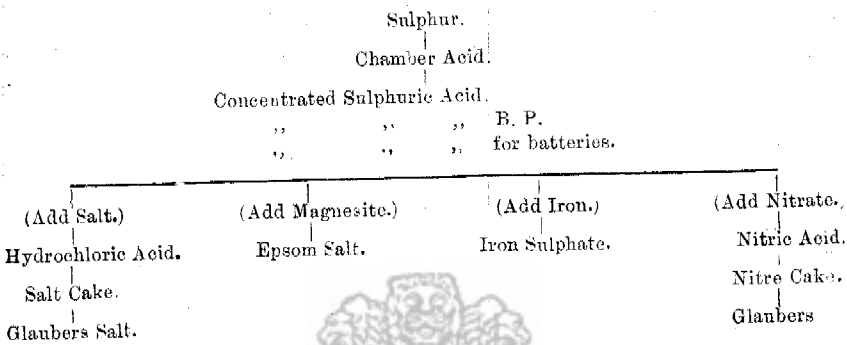
The Americans could undoubtedly compete in the Indian market if they so desired but they prefer to adhere to the combine agreement and therefore the Indian manufacturer is almost entirely in the hands of the Sicilian supplier with the result that the landed price of sulphur is about £6 a ton in India whereas in Europe and other more fortunately situated countries the corresponding price is £3-15-0 to £4 per ton.

The factor governing the price of sulphur in European countries is the price of Pyrites which contains about 45 per cent. of sulphur from which sulphuric acid can be manufactured easily.

Where Pyrites is plentiful and cheap the price of sulphur has to be regulated accordingly and a country with ample Pyrites supplies can therefore also obtain sulphur at reasonable prices.

Unfortunately India has no such alternative to force suppliers to keep prices below these limits and it will thus be seen that the Indian manufacturer starts from the very commencement with a considerable handicap which might possibly be considered a sufficient reason in itself for the chemical manufacturers of this country to put forward a plea for protection for their products but this is not our main argument and we only advance it here as a contributory cause.

We now append a diagram showing various products of sulphur and then proceed to deal with each item seriatim :—



Sulphuric acid.—Sulphur is burnt and gives off a gas which is collected and converted into sulphuric acid and this primary product is intimately bound up with practically every commodity needed in modern civilisation and we refer briefly to a number of these :—

Cotton.—Very large quantities of acid are supplied to the cotton mills in India for the preparation of cotton while still larger quantities are supplied to the allied dyeing industry.

Steel.—Our new steel industry also depends to a great extent on the supply of cheap acid and were the steel industry able to obtain cheap sulphuric acid the cost of production of steel would be lessened with a consequent increase in demand. This in turn would lead to an increased demand for sulphuric acid, and the cycle would be completed by the reduction in the unit cost of manufacture.

Sir Thomas Holland points out in his able summary already quoted that every product and by-product of sulphuric acid should be utilised and if we were able to increase the demand for such by-products the immediate effect is to increase the demand for sulphuric acid and any such increase leads immediately to decrease cost of production and we particularly desire to emphasize this point throughout our evidence.

The following list shows in some detail the uses to which sulphuric acid is put in modern industry :—

Acid sulphuric—

(1) Process Engraving and Litho Trades.
(2) Mineral Waters.
(3) Accumulators.
4 Photography.
5 Fertilizer making.
6 Tanning Industry.
(7) Oil and Grease Refining.
(8) Chemical Industry.
(9) Textile Trade.
(10) Electro Plating.
11 Drying Purposes.
12 Sulphonation.
(13) General Acid Properties.
(14) Manufacture of Alum.
15 Artificial Silk.
(16) Manufacture of Turkey Red Oils.

17 Bleaching Barytes.
18 Celluloid.
(19) Dyeing Industry.
(20) Dehydrating Agent.
(21) Explosives.
22 Bleaching Powder.
(23) Iron and Copper Pickling.
(24) Precious Metal refining.
25 Tar Washing.
(26) Copper Iron and Magnesium.
(27) Sugar Refining.
28 Paper Making.
29 Candle manufacture.
30 Ceramic Industries.
31 Manufacture of Reclaimed Rubber.
(32) Medicine.

( )=Acid supplied for this purpose by Eastern Chemical Co.

Manufacture of fertilisers.—As we have previously stated the " Ultima Thule " of the Indian chemical industry is to so increase production (and consequently to reduce costs) as to enable us to manufacture fertilisers in this country at a cost sufficiently low to enable the smallest ryot to purchase them and so produce a maximum return from his land.

It is an established fact that modern agriculture depends increasingly upon the use of cheap fertilisers and it is almost impossible to force the great results which their use would bring about among the agrarian peoples who inhabit the Indian Empire.

Oil and grease refining.—Enormous refineries exist in Burma and Persia which consume large quantities of acid. Were the price of sulphuric acid to be reduced to any appreciable degree there would be a corresponding margin which would enable these companies to reduce the price of petrol, oils and grease if they so desired.

Explosives.—Sulphuric and nitric acids are the essential starting points of all modern nitro-explosives and during the war we supplied very large quantities of these acids to the Indian Government arsenals and we are therefore proud to be able to claim to have been of some small assistance to the Empire during the world wide upheaval of 1914-18.

Sulphuric Acid plants continue to be an asset to the Indian Government because the supply of the basic materials for the manufacture of explosives is assured and on these grounds alone we could prefer a claim for sympathetic consideration and there is no doubt that Government are fully aware of the necessity of keeping a sufficient number of such commercial factories in regular operation.

Electrical installations: Pure sulphuric acid.—An interesting point in connection with sulphuric acid will indicate the progress that has been made in the manufacture of this product in India, during recent years.

We refer to the production of a very pure acid for use in electric accumulators which is known to the trade as " Pure Brimstone Acid " for accumulators.

For a long period such acid was imported from England because it is well known that it must be of a very high grade as the use of inferior acid might result in many thousands of rupees worth of damage to valuable plant in a very short space of time.

Our Company has fostered this branch of our trade to the utmost until at the present time our " Sun Brand " battery acid is acknowledged to be the equal of the imported article and we are suppliers to the Indian Government, the Principal Battery Makers, Railways, Tramways and public utility companies throughout the length and breadth of India at prices that compare very favourably with the cost at which such acid is available in England and on the Continent.

By-products of sulphuric acid.—At the outset of our remarks on by-products we cannot emphasize sufficiently strongly the fundamental principle that a market for any such by-product has the immediate effect of increasing the demand for sulphuric acid which in turn reduces the unit cost of production of this acid.

It is only by enormously increasing this demand in India that the price of sulphuric acid can be reduced to such a level as to even approach the cost of production in England and continental countries.

Epsom Salt or Magnesium Sulphate.—Epsoms is a by-product of the Potash Industry in Germany and is there mined in the form of Kieserite. The treatment of this product is quite simple involving only washing followed by a concentrating and crystalizing process.

In India it is possible to produce a grade of Epsoms Salt quite equal to the German variety which is made from Madras Magnesite, but the process is slightly more complicated than that which is required for the German article.

The magnesite is crushed and mixed with dilute sulphuric acid and the resulting liquor drawn off, concentrated and crystalized.

The principal difficulty of the Indian manufacturer is the great distances which separate the sources of supply of Magnesite from the chemical factories and markets and also the terrific Railway freight levied by the Railway Authorities.

Indian Magnesite originally costs about Rs. 7 per ton at the mine head but when railway freight to Bombay was added the cost into our Works was about Rs. 40 per ton; the actual figures being as under:—

MAGNESITE.

COST PER TON.

At mine head.	*Railway freight to Bombay.*	*Arrived at Works.*
Rs. 7-0-0	Rs. 33-10-0	Rs. 40-10-0

The present position (December 1924) is that Magnesite of suitable quality has nearly doubled in price at mine head and it is only after prolonged negotiations that we have been able to secure a concession from the Railways which will enable us to manufacture Epsoms from time to time and sell this Indian made article direct to the Indian consumer at rates which show us a small return over and above the cost of the raw material.

We ourselves have ample experience of manufacturing Epsoms and we have a large plant capable of producing very nearly the total requirements of the Bombay Presidency and were we assured of the continued possibility of selling our product in competition with the German article we could easily increase the capacity of this plant to fully supply the demand of Industry in the Bombay Presidency and even leave a balance for export.

Instead of being able to produce Epsoms and utilise our plant profitably we were gradually forced out of the market very shortly after the War ended and from 1922 to June 1924, it was impossible for us to work our Epsoms Plant at anything other than a heavy loss.

In June 1924, some difficulty was experienced by the German Potash Industry which tended to reduce supplies of Epsoms available for export to India.

This together with a tendency towards a stable exchange increased the price of Epsoms from about £2-17-6 per ton c.i.f. Bombay (about Rs. 2-2½ per cwt.) to £5 (about Rs. 3-12 per cwt.) and a temporary shortage in the market caused the price of Epsoms to rise to Rs. 7 per cwt.

This indent price of Epsoms has already begun to weaken and we fear that we will not be able to produce any further supplies of Epsoms in this country, unless we receive some protection which we suggest should take the form of an increased duty on the imported article which would stabilise the price of German Epsoms in Bombay at not less than Rs. 5-8 per cwt.

Medical Epsom Salt.—Epsom Salt for medical purposes is imported into India in wooden boxes each containing 1 oz. packets of salts. These are largely sold in the bazar to the labouring classes and in an endeavour to

obtain a part of this trade, we have installed machinery for filling such packets but we find that the low duty levied on the imported article leaves us no margin of profit on this commodity and we consider that an increased duty on imported medical Epsom Salt is desirable in order to foster this section of Indian Industry.

Copperas or Ferrous Sulphate: is essentially a by-product of two industries (*a*) the chemical industry and (*b*) the Iron Industry.

On the Continent this crystal is made with spent acid, *i.e.*, from acid which has already served some useful purpose and is therefore practically without value.

Again, the Iron used is often the unsaleable residue left after recovering the tin from tin scrap. It is, therefore, apparent that with its constituent raw materials available at a very low price indeed Green Copperas can be produced at a cost but little in excess of the value of the labour involved in manufacture.

In India, little or no spent acid is available and therefore the acid used to produce Green Copperas must be the costly Sulphuric originally manufactured from Imported Sulphur.

The other constituent (scrap iron) is obtainable at a moderate price and we have a plant sufficiently large to turn out more than the entire requirements of India in a normal year.

We have before us the Tariff Schedule of 1924 in which the rate of duty on Green Copperas is set forth on page 8.

Green Copperas imported in bulk is liable to duty at a rate of 2½ per cent. at the Tariff valuation of Rs. 5 per cwt. " Imported otherwise " it is subject to duty on 2½ per cent. *ad valorem*.

We have always been at a loss to understand why Green Copperas should enjoy this concessional rate of duty when practically every other chemical imported into India pays 15 per cent. duty either on an " *ad valorem* " or on a " tariff " valuation.

Varying theories have been advanced and prominent amongst them is that this concession is a remnant of some tariff arrangement with France and if this is indeed the fact we cannot see how it can help France at the present time as practically all the imported Copperas is made in and exported from Germany.

Green Copperas is largely used in :—

(1) Dyeing,
(2) the manufacture of Inks,
(3) the preparation of Chemical compounds and
(4) the leather and Tanning Industries,
(5) water purification,
(6) sewage purification,

and the imports into India in the year 1920-21 reached a maximum of 14,000 cwts. which declined to 5,420 cwts. in 1921-22.

The latest figures available are those for 1922-23, when 9,286 cwts. were imported into India nearly all of which came from Germany.

It will be seen that it is not a very large trade and the total imports into India in an ordinary year may be estimated to be worth roughly half a lakh of rupees.

Nevertheless we maintain that even this small trade should be reserved to the Indian Manufacturer provided he is able to produce Copperas at rates which will not inflict hardship on any other Indian Industry if a protective tariff is enforced on the imported articles.

Were a duty based on a Tariff Valuation imposed so as to render it impossible to sell Copperas at less than Rs. 5 per cwt. in Bombay very little hardship would be imposed on Indian manufacturers while it would

enable us to find an outlet for an additional 100 tons of Sulphuric acid per annum.

Potash Alum and Alumina Sulphate.—In order to make our evidence a little more complete we now deal briefly with Potash Alum and Alumina Sulphate from figures provided by our friends who have manufactured these products in other parts of India.

The present inability of the Indian Chemical Manufacturer to compete with the German Potash Alum and Alumina Sulphate is largely due to their depreciated exchange coupled with State subsidised Railways and ships which enable the German manufacturer to dominate the market and sell these chemicals in India at a rate below the actual cost of production.

We append actual costs of some of these items, and compare c.i.f. prices quoted by German and Continental Manufacturers :—

Potash Alum costs Rs. 125 per ton without packages or profit on purety Indian raw material.

The price of Potash from entirely Indian sources cost is now approximately 40 per cent. of the cost of Alum.

Competition is entirely from German Alum imported on a depreciated exchange; and with low internal Potash prices, Germany has quoted us as low as £9·5 per ton c.i.f. less 2 per cent. to 5 per cent., with English prices at £11-10 to £12 per ton.

The case of Alumina Sulphate is also difficult. Within the last two years, prices have slumped to £4-12-6 per ton, c.i.f., while Indian Manufactured Alumina cost Rs. 92 per ton in Factory and England quotes £6-10 to £7 per ton. It is obvious therefore that the Indian produced article could with very slight assistance be able to compete under normal exchange conditions with the Continental product.

Hydrochloric Acid.—This acid is manufactured by treating common salt with weak sulphuric acid applying heat and then distilling the mixture. (Hydrochloric or Muriatic Acid is very largely used by the Dyeing Industry in the Bombay Presidency.)

On completion of the reaction a residue known as Salt cake remains which is the base of the manufacture of *Glaubers Salt.*

Glaubers Salt.—The process of manufacture is roughly to dissolve the salt cask and neutralise it with some alkaline substance such as soda ash.

The neutral product is then settled, concentrated and allowed to crystalise and the resulting crystal is the Glaubers Salt largely used by the Indian Mill Industry in connection with sizing and dyeing their products.

The Indian made Glaubers is in every respect equal to the imported article and indeed Glaubers is at present about the only chemical bye-product which we can utilise and sell at comparatively remunerative rates in competition with the imported article.

A certain proportion of Glaubers Salt is used medicinally and our factory at Rowlee Hill, Matunga, produces medical Glaubers Salt of a very high quality.

Nitric Acid: is made by treating Nitrate of Soda with Sulphuric Acid, applying heat and distilling the mixture.

On completion of the reaction a residue known as Nitrate Cake remains from which Glaubers Salt can be made by a similar process to that adopted with Salt Cake.

Refining of Precious Metals.—A large and increasing amount of Gold and precious metal refining was done in India up to the year 1921 which led us to anticipate a continued demand for Nitric Acid and we went to the expense of installing additional plant for the production of this acid.

About this period His Majesty's Mint undertook gold refining by the Chlorine process at cheap rates with the result that our trade in Nitric Acid

has decreased to an alarming extent and would appear to be languishing towards ultimate extinction.

Chemically pure and British Pharmacopeia Acid.—Quite a quantity of these acids are imported for fine chemical and other purposes and these usually enter the country in small glass stoppered bottles.

India's requirements of these high grade acids are at present comparatively small and with foreign supplies obtainable at cheap rates it has hitherto not paid the Indian Manufacturer to lay down the special plant necessary for the production of " Chemically Pure " Acids.

The position is a little better in regard to British Pharmocopeia acids which are made to a lower specification and we can easily produce acids superior in specification to that laid down by the British Pharmocopeia.

We, therefore, venture to suggest that the duty on B. P. and the C. P acids should be increased so that Indian Industry generally would become independent of improved acids of these two grades.

Duty on Acid.—Though there are several large chemical factories in India producing commercial acids in large quantities sufficient to supply the whole requirements of all Indian Industries yet a quantity of acid continues to be imported from the Continent and from England.

The great bulk of this commercial acid is imported solely by reason of the fact that its value is negligible owing to over production in the country of origin and the present low rate of import duty levied in India.

Conclusion—Increased Duty.—We therefore strongly recommend an increase of duty on all Acids and Sulphates which can be readily manufactured in India in order to enable the Indian Manufacturer to bring down the price of his principal products to such an extent that a largely increased demand for Sulphuric Acid and its products would follow naturally.

It is very important to note that such an increased duty would in all probability allow of some reduction after several years application while competition and the excess of output of Sulphuric Acid in India would be a powerful factor tending to preserve strictly equitable prices of those sulphates in the Indian market.

Enclosure No. 2.

Copy of letter No. 199-T.-(2), from the Government of India, Department of Commerce, Simla, dated the 18th April 1925, to the Eastern Chemical Company, Limited.

I am directed to refer to your letter No. Ecl.-398, dated the 23rd January 1925, forwarding a statement of the reasons why you consider that protection should be extended to certain sulphates and acids manufactured in India.

2. In reply, I am to say that your application has been noted, but the Government of India regret that for the present they cannot remit it to the Tariff Board, as the Board is fully occupied with other enquiries.

3. I am to add that the Government of India are not satisfied that a *primâ facie* case has been made out for referring the matter to the Tariff Board. In this connection, I am to invite attention to paragraph 97 of the Indian Fiscal Commission's Report and to express doubts whether in view of the fact that sulphuric acid has to be made in India from imported sulphur, the prescriptions of that paragraph are satisfied. The Government of India would, however, be glad to receive your remarks on this aspect of the question and also to be furnished with information on the following points :—

(*a*) the articles for which protection is required;

(*b*) the rates of protection desired on each of the articles;

(*c*) the approximate extent of the Indian market in each of the articles;

(*d*) the capacity for production and the outturn of the factories, for each article separately;

(*e*) the cost of production of each article and the reasons by which the degree of protection claimed is substantiated; and

(*f*) the position in regard to obtaining the articles from which each product is manufactured.

Bhavnagar Chemical Works, Vertej.

Letter, dated 10th September 1928.

We have read in the local papers that Messrs. Eastern Chemical Company and Dharamsi Morarjee Chemical Company, Limited, have requested the Government of India to give protection to the chemicals manufactured in their works, *viz.*, Acid Sulphuric, Acid Hydrochloric, Acid Nitric, Magnesium Sulphate, Ferrous Sulphate, Potash Alum, Aluminium Sulphate, Sodium Sulphide, Zinc Chloride, Copper Sulphate and Glaubers Salt.

We also find that firms or persons interested in these chemicals should address their representations to you.

In our works we use Sulphuric Acid for various purposes such as making Acetic Acid, Hydrochloric Acid, Nitric Acid, etc. The present price of Sulphuric Acid in London is about £6 per ton whereas the abovenamed two companies sell at about £18 per ton. It is very well known that Sulphuric Acid is a raw material for many industries so much so that it is a popular saying that the civilization of a country could be determined by finding out the quantity of Sulphuric Acid consumed in that country. The raw materials for making Sulphuric Acid, *viz.*, Sulphur and Pyrites when imported into India pay no duty from foreign countries, whereas Sulphuric Acid which is carried by steamers as dangerous acid, pay high freight and on which there is already an import duty of 15 per cent. This, therefore, ought to be more than enough protection to these companies. If further protection is given to these companies it will pay nobody to import sulphuric acid from abroad and the sulphuric acid producing companies will necessarily sell their acid at a much higher price than at present. We may be permitted to observe here that so long as these concerns were selling this acid at a regular price nobody in India was importing acid from abroad. But the abovenamed two companies of the Bombay Pesidency have combined since one year and as a result of their combination they have raised the price of the acid to about 75 per cent. Now it goes without saying that small industries using expensive Sulphuric Acid will necessarily get out of competition. In our opinion the Government should take such steps that an important substance like Sulphuric Acid should be made as cheap as possible. We are almost certain that if Sulphuric Acid could be made available in Bombay at £6 per ton (London price) many industries unknown to India will come into existence. We are writing from memory what the great Sir Alfred Mond said when the four great chemical companies of United Kingdom combined under the name and title of Imperial Chemical Industries, Limited. He said that chemicals are the foundation of very many industries and the object of forming a large combine is not to raise the prices of the chemicals but to lower them and thus always be in the front of the large manufacturers of the world.

When once the cheap Sulphuric Acid is available, all the chemicals mentioned by the two companies seeking protection could be manufactured in India. The real problem, therefore, before the Government should be how to help the Sulphuric Acid manufacturers to make it at a price at which it will compete with foreign acid but instead of doing that if protection is given to these companies manufacturing Sulphuric Acid by charging higher import duties, the Government will be killing many small industries which are unable to make their voice heard at Simla.

The Industrial Chemical Works, Kirloskarvadi.

Letter, dated 12th October, 1928.

As per your previous letter of 10th September, 1928, we are enclosing herewith a copy of our representation to Tariff Board and the remaining copies will follow very soon.

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Enclosure.

Representation of the Industrial Chemical Works, Kirloskarvadi.

INTRODUCTORY.

The Mill Industries in Bombay and elsewhere require the Chemical Formaldehyde in fairly large amounts in their dyeing processes and it is used in the after-treatment of the direct-cotton dyes. This chemical is being imported into India uptill now. The exact figures of the imported quantity of this stuff are not available, since this chemical has never been scheduled as a separate item under chemicals but is placed in the group of general and miscellaneous chemicals in the Tariff system. However we have investigated in course of the last two years the market trend in Bombay for this Chemical and we have reason to believe that the chemical could be marketed under suitable conditions, if the manufacture of same were undertaken. With this view in mind we have considered the possibilities of this substance being manufactured in India and hence of late we have imported a complete plant for the manufacture of this Chemical. This plant is at present well under construction and it is hoped that the production will begin by the commencement of the coming year, 1929. It must not be left unsaid here that the raw material for the manufacture of this substance is an entirely Indian product and the enterprise will be financed by Indian capital and worked by Indian labour and intelligence.

Immediately after the war in 1921 the price of Formaldehyde solution was something near £130 per ton. Within the period of last seven or eight years there have been brought into existence some new processes for the manufacture of the raw material of the Formaldehyde and as a result of this, the price of Formaldehyde has suffered a considerable drop. At present Formaldehyde is being imported into India at the rate of £48 per ton c.i.f. Bombay. Under such circumstances we are afraid we will have to face a keen competition with the foreign imported stuff especially the competition of the central European countries is bound to be felt when these countries are full of powerful chemical combines and cartels such as for example I. G. Farben-Industrie A. G Frank-furt O./M. Germany. Some of these manufacturers occasionally make use of unfair methods and dumping and force down the price of the commodity actually to a cost lower than that of cost production. This is possible for them because the number of chemicals they manufacture is usually fairly large and consequently they could afford to lose as much as they like in a few instances disposing off a few of their products at a loss. Any such procedure entailing a temporary loss does not count in their final object, it being compensated in their other products. Knowing all that we are going into this manufacture clearly with the idea that we will have probably to face a sort of this competition.

There are other points as regards the use of this chemical and it will be evident from what follows:

It is a well known fact that India is essentially an agricultural country and the prosperity of the country as such depends solely on the conditions of the yearly crops of the land. These crops are to a very great extent dependent on the timely rains. Next to the rains the cultivator has to consider and combat against the diseases and pests of the plants and crops. Now in some cases it has been found that the possibility of some of the diseases could be removed by preventive measures, such measures being the use of fungicides and insecticides. Formaldehyde possesses not an uncommon place among them and is used to a certain extent for the agricultural

purposes in the treatment of seeds, etc. It is a well known fact that Formaldehyde is a powerful disinfectant and deoderant and the agricultural use of the same depends on this particular property of this chemical. In fact in America and Germany use is made of this chemical on farm and in the field and obviously it lies in the highest interest of our country too that every effort be made in the direction of improving the agricultural status and prosperity of this land. We propose to introduce this chemical in agricultural practice where it is just and possible. However the public or the farmer will have to be educated before he could be expected to think in the modern way, that by utilising the scientific practice in his art of cultivation his yields could be bettered and increased. In our opinion this will require some time and we have every hope that our line of manufacture is essential and will bring forth some good to the farmers' cause.

Besides this, Formaldehyde is a raw material for the manufacture of synthetic resins, substances that possess remarkable mechanical and electrical properties and which are plastics capable of being moulded in a variety of forms at higher temperatures and pressures. The importance of this fact could easily be gauged, when it is seen that the coming age will make much use of electrical appliances such as radio, telephones, etc., where these resins are extensively used. Our Industry hence has a very promising future in store.

Under such circumstances what we expect of the Government is that to protect the manufacture of this stuff in India they modify and increase the Tariff rates, when necessary and our claim is this that generally the import duty in the case of the industrial chemicals that are already being manufactured or likely to be manufactured in the near future should be substantially increased so as to enable the home manufacturer stand on his own legs at first, if not anything better than that.

In conclusion, we do not believe, from the calculations we have made that the price of the foreign stuff now sold in India at present is not quite unremunerative. But as soon as the foreign companies find that there is a competitor in the home or local market there is every reason for us to believe that there will be a fall in price to wipe out of existance the local Indian industry and this fear alone practically makes us to approach you at present with a request to take our case into consideration, if at any future time it is found that the foreign stuff is being sold in India by dumping methods at a price lower than what is at present. And while making recommendations regarding the protection to the Indian Chemical Industries it is our request that the Board will make provisions to take our case into consideration immediately so soon as dumping or competition commences.

With this much introduction, we append* herewith the answers to such of the questions as we are at present in a position to reply.

The Indian Merchants' Chamber, Bombay.

Letter, dated 11th September, 1928.

With reference to the Resolution No. 199-T.-(8), of the Government of India, Department of Commerce, dated 16th July, 1928, on the above subject, I am directed by the Committee of this Chamber to submit hereby their views on the same:

My Committee are fully convinced that the conditions laid down in paragraph 97 of the Report of the Indian Fiscal Commission are fully satisfied generally in the case of the manufacture of chemicals in India. My Committee are aware of the many advantages offered by the country for the establishment and growth of chemical industries in India, but the development of chemical industries particularly in the case of acids and heavy chemicals made therefrom, require special consideration. It is true that the raw mate-

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* Printed separately along with the replies from other firms.

rials required for the manufacture of acids are available in the country or from abroad without any serious difficulties. The production of acids therefrom does not present any special technical difficulties, but my Committee would like to point out that any advantages which the country may offer for the production of acids *per se* are counteracted by the fact that the acids themselves have proportionately a lesser demand than the heavy chemicals made from them. The Indian manufacturers are unable to meet the foreign competition on account of their inability to produce the principal acids in sufficiently large quantities to lower their cost of production and also consequently lower the cost of salts and heavy chemicals made from them.

My Committee, in this connection, would like to lay stress on the fact that many of the heavy chemicals manufactured by the Indian chemical companies are produced at considerably higher costs than similar chemical operations in European and American factories and that when chemicals result as by-products, their value is necessarily much lower than their cost if made by the use of expensive raw materials such as acids, ores and metals. By-products of industries are best worked up if there is a well-established and developed chemical industry in the country but for lack of co-ordinated developed chemical industries in India and also for lack of large metallurgical industries, India is not able to produce heavy chemicals at competitive rates. When the question of making a comparatively small quantity of acids for the manufacture of heavy chemicals arises, our manufacturers are faced with a very difficult situation and it is then and not otherwise that they stand in special need of protection.

The necessity of making heavy chemicals in the country to meet the country's demands for them in other industries must be the prevailing reason for the grant of protection to her chemical industries. India imports large quantities of chemicals as such and also finished articles in which chemicals form an important part in their manufacture. Almost every article of commerce cannot be placed in its finished marketable condition without the use of chemicals, and as acids are the starting substances in the manufacture of all other chemicals, the manufacture of acids has been rightly recognised as the key industry.

The need of protection further arises in India from the fact that the manufacture of explosives which require the manufacture of large quantities of acids, is reserved by the Government as a State industry. If public chemical companies of recognised status were allowed to manufacture all chemicals required for national defence such as explosives, disinfectants, fuels, pharmaceuticals, drugs and fertilisers, etc., a larger production of chemicals would have been possible and economies in their production would have helped the country to stand in competition with foreign imported articles without the need of protection. A revision in the policy of the Government as regards the manufacture of explosives and other substances would, in the opinion of my Committee, partially help the manufacture of many of the chemicals required in India.

Protection may also take the form of prohibition or heavy duties on raw materials, ores and materials necessary for the development of our Home industries, finding their way out of the country. If there is an embargo on nitre, bones, chrome ores, manganese ores and other similar products, a new field for the development of acid industries would be opened out and the manufacture of acids in large quantities in such case would be for the production of heavy chemicals, manures and other substances required in this country and for abroad. Such embargo would materially help the country in the development of its chemical industries without the need of any special protection. It will also help in developing agriculture on which India's prosperity mainly depends, as it is a well-known fact that the land is being impoverished through want of proper manures.

My Committee, therefore, without going into technical and manufacturing questions of the costs of manufacture, would strongly recommend the grant of protection to the manufacture of acids in the form in which the Chemical

Companies have asked for, *viz.*, by the imposition of a protective tariff on imported heavy chemicals and the grant from the revenue thus realised, of bounties to the manufacture of acids. Protection in this form, my Committee feel, would help the expansion of our already existing chemical industries and the establishment of other chemical works most necessary for the manufacture of various articles of necessity required in the country, such as Match Industry, chemicals for which can be made easily in large quantities.

While we recognise the necessity of giving full protection to the manufacture of acids and heavy chemicals therefrom, my Committee would also press the attention of the Tariff Board to the case of certain other industries for which raw materials are found in abundance in this country and which can be worked into finished marketable products without the assistance of heavy acids.

As an instance, my Committee would like to point out the case of magnesium chloride, which is one of the most important chemicals required for sizing in textile industries. It seems that magnesium chloride is recovered as a by-product in German chemical works and the cost of manufacture, it being a by-product, in Germany, is so low that it is effectively able to stand in competition with Indian manufactured articles. In addition to this, two new factors have operated very seriously to determine the continuance and existence of this industry in India. German manufacturers have reduced their prices to such a low figure that fair competition has become an impossibility. It is a clear of dumping. Besides this foreign attempt to kill our nascent industry, the removal of import duty, this chemical being classed among stores for textile industry, has seriously threatened the continuance of its manufacture in this country. In this connection, my Committee would draw your attention to the fact that the cost of magnesium chloride to the total cost of finished piecegoods is so low that any protection granted to magnesium chloride would not, in any way, materially affect the cost of production of piecegoods in India.

My Committee, therefore, would emphasise the necessity of giving due and reasonable protection in such cases where large European and American combinations by reducing their prices to a lower figure than our cost of manufacture, force our home-made article to be sold at ruinous prices. Protection in such cases should be regardless of the magniture of an industry and regardless of its immediate purposes.

The most essential factor in the growth and development of chemical industries in this country is a co-ordination of all chemical industries. For in innumerable ways the protection of one chemical in smaller or larger quantities help the establishment, development and encouragement of other industries, arts and crafts in this country. The use of chemicals is absolutely necessary in almost all the industries and it may safely be said that on the development of chemical industry, depends the prosperity of the country; it has been time after time pointed out in Western countries that the measure of a country's prosperity is the measure of the development of its chemical industries. For this reason, my Committee are strongly of opinion that even at the cost of a sacrifice, if sacrifice is necessary, full protection should be granted to all chemical industries.

As a broad general principle, my Committee are against granting of protection to such chemical industries which can be established and developed in India with the help of raw materials available in abundance in India and in the development of which there is no dumping or running down of prices by the foreign manufacturers, but my Committee would point out that in certain cases even where abundant raw materials are available, new industries will require temporary protection if the case is made out by them that the training of men and general trained labour required for their particular industry, are not easily available in India.

A new industry until it has built up its reserves has also to consider the higher cost of imported machinery and plant. These factors must also be taken into consideration in determining whether any particular chemical industry stands in need of protection during its early career.

Another very important factor that operates against the development of Indian chemical industries is lack of transport facilities and high railway freight rates on chemicals. For the furtherance of chemical industry, special low rates must be given for the haulage of chemicals from the factories to the principal markets, particularly in the case of acids, explosives and fertilisers. My Committee would like to point out that in countries which own their own mercantile marine, the shipping companies have to carry the manufactures of the country at special rates fixed by the Chambers of Commerce or by Governments. If such facilities are granted and chemicals are carried by coastal steamships companies at lower rates, it would be possible for our chemical companies established at Ports to sell their product and stand effectively in competition in the market of entry of foreign chemicals.

Side by side with the acid industry stands the alkali industry which is also one of the most important chemical industry. It is the key industry on which depend many other industries such as textiles, glass, soap and paper. My Committee are not in a position to make any definite recommendations as regards the alkali industry, as they feel that as yet there is no case made out for its protection, but if unnatural competition is created and foreign alkalies are dumped into India, as in the case of magnesium chloride, at extremely low rates with only one view, *i.e.*, to make it impossible for the Indian industry to survive, then in that case only, protection should be granted to the alkali industry.

My Committee, in this connection, further point out that the case of alkali is entirely different from the acid industry. All raw materials required for the manufacture of alkali are available in India and the question of special transport facilities does not arise.

My Committee cannot help bringing to the attention of the Tariff Board the fact that the effect of the change in the Indian Currency Act made last year fixing the value of the Rupee at 1*s*. 6*d*. has been as in the case of other industries disastrous also with regard to Chemical Industries. An indirect protection of 12½ per cent. has been given to foreign imports at the expense of indigenous industries and my Committee urge very strongly that the Tariff Board will kindly make a close inquiry into this question of the effect of exchange on Chemical Industries.

In conclusion, my Committee would like to draw the attention of the Tariff Board to the second part of the resolution of the Legislative Assembly passed on 16th February 1923 in which opinions are invited as to the extent, if any, in respect of which articles or class or description of articles, protection should be afforded.

My Committee, in this connection, would urge the Tariff Board not to restrict the protection to the chemicals mentioned in Resolution No. 199-T. of the 16th July 1928, but to give the word chemicals, a wider meaning and include all chemical substances required in various industries. A broad classification of chemical industries would be necessary, more or less on the same lines as that adopted by the Society of Chemical Industries of Great Britain. If the wider classification and meaning of chemical industries is accepted, then, many other articles required in sizing, in the manufacture of paints and varnishes, the manufacture of soaps, in the manufacture of candles, in the manufacture of foodstuffs, in the manufacture of inks, etc., would also be incorporated in the generic classification of chemical industries.

In conclusion, my Committee point out that the list of heavy and fine chemicals including pharmaceuticals, drugs, intermediaries, dyestuffs and other materials, is so large, and as serious efforts are being made all over the country to gradually make a larger and larger number of chemicals in India, the purpose of the enquiry will not be served if the enquiry is limited to small number of chemicals only. Cases are bound to arise from time to time in the immediate future when protection for individual chemicals will be asked for. In this respect my Committee want to point out the essential difference between the chemical industry and other industries which have applied for protection. In their cases, the enquiry instituted at one time will hold good for a few years, but in the case of chemicals, the field is so

wide that unless a Standing Committee of the Tariff Board is appointed to go into the merits of cases which may arise as regards various new chemicals not included in the present inquiry, the Tariff Board will be called upon incessantly to enquire into individual cases of chemicals.

The Buyers and Shippers Chamber, Karachi.

Letter No. 163, dated 25th September, 1928.

Subject:—Protection to Indian Chemical Industry. Resolution No. 199-T. (8) of the Government of India, Commerce Department.

I have the honour to inform you that my Chamber has directed me to observe that:—

(1) There are materials available in this country for the

(*a*) Promotion.

(*b*) Development of chemical industries.

(2) Chemical industries are composed of manufacture of—

(*a*) Acids.

(*b*) Heavy chemicals and other by-products.

(*c*) Alkalis.

(3) Raw materials for acids are available in this country and also could be obtained from abroad without much difficulty.

(4) Acids could be thus manufactured but the demand for acids is much less than that for heavy chemicals.

(5) Heavy chemicals and salts are by-products of acids but the Indian manufacturers are at a disadvantage to compete with foreign manufacturers owing to the latter's output of principal acids in enormous quantities and the consequent low cost of production of by-products of the heavy chemicals and salts.

(6) Heavy chemicals are absolutely essential for other industries.

Heavy chemicals are the by-products of chemical industries.

Heavy chemicals are produced by foreign manufacturers very cheaply owing to their enormous output of acids.

And therefore it follows without much argument that chemical industries in India, *viz.*, for manufacturing acids and the by-products—heavy chemicals, are in need of protection.

(7) The forms of protection advocated by this Chamber are:—

(*a*) That Government should be pleased to change its policy of reserving manufacture of explosives as a State industry and of throwing open the doors to chemical companies of standing to manufacture chemicals required for explosives, disinfectants, fuels, fertilizers, etc.

(*b*) Levy of prohibitive export duties on raw materials such as nitre, bones, chrome and manganese ores and any other necessary articles for the development of these industries. These in their turn would be available for producing acids, which in its own turn would yield by-products of heavy chemicals, salts and manures.

The manures in their turn would materially help agriculture—one of the main stays for India's existence.

(*c*) Levy of protective tariff on imported heavy chemicals.

(*d*) Granting of bounties out of the revenues so collected.

This last would immediately help the chemical industries now in existence and would tend to the establishment of other chemical works to provide the necessaries, required for the other industries of this country.

(8) Whilst my Chamber is on this subject, it advocates strongly the exclusion of magnesium chloride from the exemption from duty on the ground of its coming within the category of mill-stores. There is abundance of raw materials in India to produce this material and its development should be encouraged by stopping the dumping of this material on the Indian market by Foreign interests.

(9) The use of chemicals is inevitable for all finished goods in these days of scientific progress, and therefore protection to chemical industries would directly help other industries, arts and crafts, and thus it will have a far reaching effect on the welfare and promotion of this country.

(10) My Chamber does not restrict its advocacy for the protection of chemical industry only in cases where there is dumping by foreign interests, but advocates protection for all chemical industries, existing and to come in existence as it goes without much saying that without reserves, all new industries will have to face the cost of machinery and training of labour in the beginning.

(11) Simultaneously with the protection in its various forms advocated above, a revision of transport rates for raw and finished materials would be necessary, both rail and sea-borne, and this factor should be studied very carefully.

(12) Alkaline industry cannot be lost sight of. Textiles, glass, soap, paper and kindred industries depend upon these and the case must necessarily be viewed from the standpoint that foreign interests do not indulge in making India its dumping ground.

(13) My Chamber is fully alive to the resolution No. 199-T. of the 16th July, 1928, and requests that attention should not be restricted to those chemicals mentioned therein but should extend the same to *all* chemicals required in various industries.

(14) Lastly, my Chamber urges the necessity of appointment of a standing committee of the Tariff Board to deal with the very many cases which are bound to arise in reference to chemicals not included in the present enquiry.

The Punjab Trades Association.

Letter dated 2nd October, 1928.

In paragraph 4 of the Government of India, Department of Commerce, Resolution No. 199-T. (8), dated the 16th July, 1928, firms or persons interested in the protection proposed to be extended to certain specified chemicals and who desire to have their views considered have been invited to address their representations to you. My Association has in pursuance of the above, instructed me to lay the following before you for the consideration of the Board.

The resolution in question has, I am to say, received the close attention of my Committee, who are entirely opposed to the grant of protection except in rare and very exceptional circumstances, which do not appear to them to exist in the present case. They consider that the manufacturers of these chemicals can easily make them and compete against the imported articles, and they strongly protest against monopolies for chemicals produced in this country, in view of the fact that so few are up to British standard the principle apparently being that anything is good enough for India.

In this connection my Committee desire me to say that they wish to take the present opportunity to vehemently protest against the deplorable state of affairs both as regards the indigenous manufactured drugs and those imported, there being no Food and Drugs Act in force to check fraud and adul-

teration. My Committee are therefore of the most emphatic opinion that nothing should be done in giving chemicals manufactured in India protection until such time as definite standards exist with penalties for fraud and adulterations.

Burma Indian Chamber of Commerce.

Letter No. G. L. 115/28-29, dated the 16th October, 1928.

With reference to the Resolution No. 199-T (8), dated the 16th July, 1928, of the Government of India, Department of Commerce, I am directed by my Committee to send hereby their views.

It has been the policy of this Chamber to support all reasonable claims for the protection of indigenous industries. My Committee are however not in possession of sufficient materials in respect of the Chemical industries which would enable them to make any specific recommendations with regard to the subject under enquiry.

There is however one point to which my Committee would like to refer. They understand that the Indian manufacturers of matches in this province have addressed the Tariff Board asking that the import duty on chemicals used in the manufacture of matches be removed. My Committee further understand that this demand is based on the ground that none of the Chemicals for which protection has been asked is used in the manufacture of matches and hence no conflict of interests is likely to arise. If so, my Committee beg to support the suggestion of the Indian match manufacturers for the removal of import duty on Chemicals used in the manufacture of matches provided that any of these Chemicals is not at present being manufactured in India and further that should at any time in the future any factory in India be prepared to manufacture any of those Chemicals, the question of re-imposing the import duty should be considered.

Mahrashtra Chamber of Commerce, Bombay.

Letter No. 828-28, dated 19th October, 1928.

PROTECTION TO THE INDIAN CHEMICAL INDUSTRY.

I am to address you as follows on the subject of protection to Indian Chemical industry, which the Tariff Board is about to investigate.

It is to be pointed out at the very outset that the Chemical industry is everywhere considered, and rightly too, as one of the important industries of modern times. Its progress in fact can be safely taken to be an index to the general industrial development of a country.

Broadly speaking the three main conditions laid down by the Fiscal Commission in paragraph 97 of its Report, *viz.*, (*a*) that there should be an abundance of raw materials, cheap power and sufficient labour or a large home market; (*b*) that the industry should be such as either won't develop at all or at least not as rapidly as desirable without protection; (*c*) that it should be one which will ultimately be able to face world competition without the help of protection, are satisfied by the Chemical industry. It is also to be further mentioned that Chemical industry will be able to effect increasing economy with increasing production and it will eventually be able to meet the whole of the country's requirements. Vast natural resources have remained hidden and unexploited in India so far, due to a variety of causes, the most important among them being the open-door policy followed by the Government of this country till the other day, a policy which, to say the least, has disastrously affected the general industrial advance of this country. The excise policy pursued by Government has also played its part in rendering difficult, and at times even making impossible, the growth of certain indus-

Three conditions for protection laid down by Fiscal Commiss on satisfied.

tries as for instance the manufacture of sugar and medical preparations, and other industries wherein alcohol is used as a solvent, etc. What is therefore to be suggested is that the Government should change its policy of importing the spirits from outside and allow *bonâ fide* chemical manufacturers in India to manufacture the same. The sugar manufacturers can utilize their waste and they can have spirit as by-product in their works.

Acids: Manufacture of acids is rightly considered to be a basic or key industry—in fact the manufacture of most other chemicals starts with them. It will not therefore be an exaggeration to say that almost every article that is industrially turned out to-day for market has had something to do, with the acids or with the chemicals turned out with their help, while it was in making Raw materials either indigenous or foreign can be secured without any very great difficulty though more favourable railway rates can make possible a better and more effective exploitation of indigenous raw materials for the manufacture of acids. Heavy chemicals made with the help of acids are in greater demand than the acids themselves; and in this field particularly foreign competition is very keen. With this handicap of keen foreign competition in heavy chemicals (which by the by are, in many cases, obtained as by-products from other industries in those countries or not manufactured by using costly acids, ores and metals) this country is unable to produce acids on a large scale and thus reduce their cost of production, since Indian made heavy chemicals cannot be put on the market due to dumping of these chemicals of foreign manufacture on the Indian market. It is these that should be first protected for some time to come and the acids will then be automatically protected as a consequence by the demand for them going up. This will on the whole necessarily have a salutary effect on the industrial development of the country.

Acid manufacture.

Government's manipulations of the exchange in this country have been so often condemned by legislators, by press and writers on economic subjects. Recent fixing up of the exchange ratio at 18*d*. has adversely affected the manufacturers of this country and the advantage derived from 15 per cent. import duty on some of the chemicals has pactically become nullified. But this kind of trouble, to be brief, will not end until India has a gold currency in the true and full sense of the term.

Alkalis: Another branch of Chemical industry, *viz.*, the manufacture of alkalis is also a key industry. Soda ash, for instance, is considered to be the food of many industries. Even this may need protection, if an attempt be made on the part of foreigners by a ruthless and uneconomic cutting down of prices with a view to kill it. The Committee of this Chamber understand that the manufacture of alkalis, especially of soda ash, is undertaken on a big scale in Kathiawar. The case of alkali industry stands on a different footing altogether, in that its raw materials are wholly available in this country and in that the transport difficulties are not seriously experienced. Even then it may need help in the circumstances mentioned at the beginning of this paragraph.

Alkali manufacture.

Explosives: Government can very well buy as they do in other countries certain explosives like gun-cotton from chemical works and this manufacture will be most willingly undertaken by some chemical works of recognised status and standing and the acids turned by these works can be utilised for the manufacture of these explosives. This will practically help manufacture of heavy chemicals which is struggling with great odds to-day.

Explosivesmanufactures.

Chemical Fertilisers: India being a vast agricultural country, there will be an everincreasing demand in time to come for chemical fertilisers as agriculturists become more and more acquainted with their use and efficacy. Imported chemical fertilisers have not even simply touched the fringe of India's agricultural population and from the visible signs to-day it can be safely said that these chemical fertilisers have a great future before them. With the help of these chemical fertilisers impoverished land

will have the fertility restored to it. If, therefore, the export of nitre, bones, oil cakes, and similar other things is prohibited in the larger interests of this country or at least a heavy export duty put on these chemical fertilisers can be turned out here on a very extensive scale, and a new and ever growing demand can be created for acids and an impetus given to their production. The proposed prohibition would materially help the chemical industry of the country, apart from the boon it will bring to the millions of people engaged in agriculture here.

Heavy export duty on nitre, bones, etc., or total prohibition of export.

My Committee therefore favours the grant of protection for some years which is asked for by the Chemical Companies, *viz.*, an import duty on salts and acids and a bounty on production of sulphuric acid from the income derived from this source, and from export duty on nitre, bones, and oil cakes, etc. In passing it may be maintained that it is equally necessary that Indian Railways should offer special concession freight rates from the Chemical Works especially to the principal market centres in India.

The Committee finds that the scope of inquiry by the Tariff Board as ordered by the Government of India in Resolution No. 199-T. (8) is rather narrow for such an important and wide subject like the chemical industry. There is every possibility of a fresh chemical industry approaching Government for protection now and then. It would therefore be much better if the present condition of all the so-called basic or key chemical industries is examined now, and if a special Tariff Board is set up to remain in existence for some years to come to examine during that period the claims advanced on behalf of other than the basic chemical industries which may from time to time approach the Tariff Board for protection.

Present scope of enquiry narrow.

The Karachi Indian Merchants' Association.

Letter, dated 26th November, 1928.

SUBJECT:—PROTECTION TO INDIAN CHEMICAL INDUSTRIES.

In connection with the above enquiry, I am directed by the Managing Committee of my Association to state that in their view protection is essential to India's chemical industries. At present crores of rupees worth chemicals from outside sell at huge profits in the Indian markets. Several of these could be manufactured in the country. The British and German combines have a policy of putting down Indian enterprises by severe competition against Indian manufactured products only.

For several chemicals India has a large reserve of raw materials. Some of our military requirements could be purchased in India. But there must be a policy of frank and definite preference of Indian products against foreign ones. But still the best method of chemical development would no doubt be tariff duty. As the Indian Merchants' Chamber, Bombay, point out, "protection may also take the form of prohibition or heavy duties on raw materials". There is surely a large field for the manufacture of manures. The present infant industries in chemicals would surely hold their own against foreign competition if protected for some time.

My Committee generally support the views of the Indian Merchants' Chamber, Bombay

The Burma Chemical Industries, Ltd.

Letter, dated 19th July, 1928.

With reference to your recent announcement, we wish to represent our claim for protection against imported acid.

In order to manufacture we have to import our crude sulphur, whereas manufacturers of acid in other countries obtain their sulphur as a waste

product from smelting or similar works, and can place their acid on the market at a very low rate.

The bulk of our acid is used by the local oil companies, for washing their oil, and we have enabled them to carry on their business during times when acid was not procurable elsewhere.

Our other products, Nitric and Hydrochloric Acids, are of considerable benefit to local industries.

Should the advantages of manures for paddy be brought home to the cultivator, our factory would prove of the greatest assistance in the manufacture of artificial manures.

North-West Soap Company, Limited, Calcutta.

Letter No. 830/A/D, dated the 8th August, 1928.

We refer to the Government of India, Department of Commerce, Resolution No. 199-T. (8) (Tariffs), dated the 16th ultimo, and concerning the revision of import duties leviable on certain chemicals.

We have to point out that Hydrochloric Acid which is among the commodities upon which the Board will deliberate, is used by us during the manufacture of Glycerine which is among our products. Any increase, therefore, in the import duty on Hydrochloric Acid is bound to re-act adversely upon us. Having regard to the obvious importance, if only for military reasons of fostering the Glycerine industry in India, we would suggest that the Board should give its sympathetic attention to the question of a reduction of the present duty of 15 per cent. *ad valorem* which is imposed on Hydrochloric Acid. Failing this, we would respectfully suggest to the Board that any increase in the duty will impose on a young and struggling industry a burden which would be hard from the commercial point of view to justify.

Messrs. Jenson and Nicholson (India), Limited, Calcutta.

Letter dated 15th August, 1928.

We refer to the issue, dated 26th ultimo, of the *Indian Trade Journal*, on page 153 of which under the heading "Tariff Changes and Customs Notifications—British India" appears the announcement that "The Government of India have decided that.....the Tariff Board will examine the question of the removal of the import duties on those chemicals which are used as materials in Indian Industries". Clause 4 invites representations from firms or persons interested, who desire that their views be considered by the Board.

Our Paint and Dry Colour Factory at Naihati, E. B. Railway, Bengal, is equipped with all the latest machinery for the preparation of crude oxide, ochres, barytes, etc., for the manufacture of paint and similar materials. In addition we are constantly importing a wide range of chemical colours, etc., for manufacture into paint and allied preparations.

We are regularly supplying under contract the Government of India, all the leading railways and Public Works Departments of India, as well as to the Director of Contracts, Simla. These contracts mainly stipulate a very exacting specification to which we guarantee our manufacture to conform.

Attached we submit a list of the chief chemicals and colours we handle in manufacture, with the rate of import duty to which each is subject under the existing regime. This import duty which is levied on all primary raw materials, seriously operates against our endeavours to supply the Indian markets with Indian made paints and other preparations at strictly competitive rates, without selling at a loss to ourselves. In several markets, particularly in Western India, the existing schedule of Customs duties on our raw materials prevents us from entering the field against the large European and American factories who can invariably undersell us wtih mass production exported paints. The result is that there is still a very large consumption of imported

paints, etc., in India in spite of the fact that it has been repeatedly and conclusively demonstrated that India's requirements of paints, etc., can be as satisfactorily supplied, as far as quality and service are concerned, by firms with factories in India.

We would therefore submit that the removal of the existing tariff on chemicals, etc., for use in the manufacture of paints would go far towards enabling manufacturers in India to hold their own against mass production paints exported from America and Europe.

The Chief Chemical Colours imported by us for use in industry on which the existing scale of import duty is 15 per cent. *ad valorem* in every case:—

1. White Lead.
2. White Zinc.
3. Lithopone.
4. Alizarine Lake.
5. Non-setting Red Lead Dry.
6. Turkey Umber Dry.
7. Litharge.
8. Red Oxide.
9. Red Oxide of Mercury.
9a. Yellow Oxide of Mercury.
10. Solvent of Naphtha.
11. Oxide of Copper.
12. Oxide of Iron.
13. Carbon Black.
14. Chrome Green.
15. China Clay.
16. Turkey Red.
17. Vegetable Black (lamp black).
18. Black Oxide of Iron.
19. Cement Green.
20. Lithol Red.
21. Para Red.
22. Asphaltum.
23. "Gilsonite" Asphaltum.
24. Bone Black.
25. Chinese Blue.
26. Prussian Blue.
27. Ultramarine Blue.
28. Manganese Chloride.
29. Helio Red.
30. Lake Red.
31. Yellow Chrome.
32. Light Brunswick Green.
33. Medium Brunswick Green.
34. Deep Brunswick Green.
35. Deep Lime Green.
36. Fast Lime Green.
37. Indian Red deep.
38. Lime Red.
39. Fast Scarlet.
40. Raw Sienna.
41. Burnt Sienna.
42. Whiting (Paris White).
43. Pale Primrose Chrome.
44. Genuine Lemon Chrome.
45. Genuine Mid Chrome.
46. Genuine Orange Chrome.
47. Lime Yellow.

Messrs. Pater Spence & Sons, Ltd., Manchester.

Letter, dated 20th August 1928.

From a notice which has recently appeared in the Press we understand that it is the intention of certain Indian chemical manufacturers to appeal to the Indian Tariff Board at an early date for the imposition of a substantial increase of duty on Alum and Sulphate of Alumina imported from abroad, the avowed object of such action being the protection of local manufacturers.

For the past sixty years we have regularly exported Alum, including Sulphate of Alumina and Aluminoferric, to the Indian market and to-day India is one of our largest customers for these products. It is therefore not unnatural that we view the proposal in question with considerable apprehension.

We are aware that it is the settled policy of the Indian Government to foster and encourage local manufacturers but we submit that at the present time there is no justification for an increased duty on Alum or other Aluminous products. As a matter of fact the native manufacturer is already amply protected by a substantial duty, *viz.*, 15 per cent. *ad valorem*, equivalent to about 27*s.* per ton. Added to this there should be taken into account the outward freight, insurance and other charges equal probably to at least another 30*s.* per ton.

If the local manufacturer is in a position to supply the Indian market under anything like reasonable conditions from the consumer's point of view he should have no difficulty with such a substantial advantage, to compete on very favourable terms against the English Importer.

The fact is, however, that little or no Crystal Alum—either potash or ammonia quality—is made in India to-day, and what Sulphate of Alumina is produced is, judging from samples we have seen, of quite inferior quality. At various times we have had submitted to us samples of what purported to be Crystal Alum manufactured in India, but these have always proved to be of a quality quite unsuited for general industrial requirements.

We are strongly of opinion that if the present duty on Alum is increased as desired the native consumer will necessarily be the sufferer, for he will either be compelled to buy an unsatisfactory product or, what is not at all improbable, he will have to purchase a large proportion of the imported article at a greatly increased price.

We should like to say that it has always been our policy to supply the Indian market with Alum and other Aluminous products at the very lowest possible prices, and the Indian consumer is able to-day to purchase his requirements on much more advantageous terms than he would if compelled to buy Alum of native manufacture.

Alum and Sulphate of Alumina are, to a very large extent, raw materials in the manufacture or treatment of other products and any substantial increase in their cost must add seriously to the cost of production in other industries.

An important point to be borne in mind is that there are only one or two manufacturers producing Alum and Sulphate of Alumina in India and it seems highly improbable that they will be able to supply the requirements of the market for a very considerable time.

Finally we might mention that Alum and Sulphate of Alumina are very largely used in India for water purification purposes and any action taken by the Government which might result in the curtailment of the use of these products would undoubtedly have a very serious effect on the health of the community.

We submit that in the circumstances the request is one that in the best interests of the consumer and the country generally should be disallowed.

Bengal Paper Mill Company, Limited, Calcutta.

(1) *Letter, dated 30th August, 1928.*

We have the honour to bring to your notice that the Indian Chemical Industry have placed before Government the Manufacturers' application for the protection of certain chemicals, several of which are largely employed in connection with the production of paper at our mills. The chemical we are mainly interested in, and of which we use for sizing and water purification, is Aluminium Sulphate, without it, in the former process, we could not manufacture any paper, so that the want of it, or the supply of an inferior quality, would bring our Mill to a standstill. It is therefore essential that we should receive supplies from the cheapest overseas markets. Unfortunately, it is not possible for this chemical to be manufactured in India

suited to the requirements of a Paper Mill. For water purification, the case would not be so serious, but, with regard to sizing, we find that the local article contains too much iron. In our imported supplies, there is only a trace of iron. If there were more than a trace, it would seriously interfere with the manufacture when employed for sizing purposes as is obvious.

In the circumstances, we would request you to note our objection to the proposed enhancement of duty on this chemical. We have been assured at times that the high standard of the imported article could be maintained in this country. This, however, has never been the case, and the trial parcels we have tested have been useless for sizing purposes and has to be mixed with the imported article, even for water clearing purposes.

In reference to other chemicals, we are interested in sulphuric Acid and Hydrochloric Acid, in addition to which, it is possible that we may require Sodium Sulphide of the highest quality in the early future for the special digestion of certain grades of Bamboos, during the process of pulp manufacture from them. We are just beginning to import this article, but as soon as our bamboo manufacture developes we shall require large quantities.

In view of the Government of India's strong support of this particular branch of the Paper Industry, we do not think they would consider for a moment the question of going out of their way to raise the price of one of the principal chemicals employed in the production of bamboo pulp, nor approve of an increased duty on it which would react unfavourably on mill production costs right from the start.

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(2) *Letter, dated 14th November 1928 from the Bengal Paper Mill Company, Limited.*

INDIAN CHEMICAL INDUSTRY—PROPOSED TARIFF.

We have the honour to bring to your notice that since writing to you on 30th August, we have been going further into the question of the extent to which our Mills would be affected by an increase in prices, which might follow the protection of the above, and, in view of a new system of water supply we have practically decided on, which would somewhat do away with the necessity for using heavy quantities of Alumina Sulphate for its clearance, we find that we have comparatively little cause for any complaint, and accordingly should now like to withdraw the objections raised in our above-mentioned letter. It has been of course all along appreciated by us that certain Industries in India must have protection if they are to be encouraged and turned into valuable assets to the country, more especially when there is a shortage, or a risk of shortage of the goods they manufacture, from other countries.

The Chrome Leather Company, Madras.

(1) *Letter No. H. W. M./P. B., dated the 31st August 1928.*

With regard to the Resolution that the Government have decided to refer to the Tariff Board for examination, representations on the part of certain Indian Chemical manufacturing companies that existing tariffs of certain chemicals be enhanced, we beg to represent our opposition to any proposed enhancement of the said tariffs and to recommend their reduction or elimination for the following reasons:—

We are tanners and leather finishers, and in the course of this industry we use the chemicals enumerated on your list, particularly magnesium sulphate, aluminium sulphate, sodium sulphide, copper sulphate and in

addition to these large amounts of the following materials which may probably be also affected by the decision arrived at by the examiners:—

Sodium Bichromate.	Sulphite Cellulose Extract.
Sodium Hyposulphite.	China Clay.
Sodium Bisulphite.	Cod Oil.
Boric Acid.	Manilla Gum Copal.
Barytes.	Martane Oil.
Letharge.	Pancreol Bate in powder.
Hemotine Crystals.	Stearine.
Negrosine, Acid and other dye and leather finishes.	Olive Oil.
Quebrachowood Extract.	Soda.
	Sulphonated oil, etc., etc.

To obtain the quality of chemicals and tanning materials required to manufacture saleable leather, it is vitally necessary to import them from abroad. The existing duties already seriously handicap the tanning industry, and we have long been agitating to have these duties removed. Therefore, if the present duties were increased, it would so materially affect the cost of production of leather as to make it questionable whether it would at all be profitable to continue the industry, and not only this, it would most adversely affect the leather consumers in this country. As it is, there is very little profit in the tanning and finished leather industry, and reduction or elimination of tariffs on the import of materials required for its production would be greatly welcome by all leather producers and people interested in the purchase of leather in India.

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(2) *Letter No. 304, dated 4th April, 1929 from the Tariff Board, to the Chrome Leather Company, Chromepet, Madras.*

I am directed to refer you to your letter of 31st August, 1928, and to request that you will kindly note for the information of the Board—

(*a*) the average quantity of each of the following chemicals:—

(1) magnesium sulphate,

(2) aluminium sulphate,

(3) sodium sulphide,

(4) copper sulphate,

(5) litharge,

used by you annually;

(*b*) the purpose for which each is used, and

(*c*) what percentage of the cost price of any typical finished article the amount of each of the above chemicals used during the process of manufacture represents.

I am to add that the Board may request you to tender oral evidence in support of the views set out in your letter of 31st August, 1928, and to enquire whether, if called upon to do so, you could conveniently send a representative to give evidence before the Board in Ootacamund about the end of April.

Your reply may be addressed to the Tariff Board, Ootacamund, to await arrival.

(2) *Letter No. HWH/PB/522, dated the 9th April 1929.*

With reference to your letter No. 304 of the 4th April addressed from Bombay, we beg to give the following information in reply to your enquiry:—

Chemical.	Average annual consumption.	Purpose for which used.	Percentage of cost price of finished leathers.
	Tons.		
Magnesium sulphate	12	Chrome tanning.	·02
Aluminium sulphate	4	Do.	·02
Sodium sulphate	50	Liming.	·02
Copper sulphate	1	Finishing leather.	·005
Letharge	*Nil*	*Nil.*	*Nil*

On account of the small quantities of the above used by us compared to the extremely large quantities of tanning extracts that we use during the year, we do not think it necessary to send a representative to Ooty to give oral evidence regarding the above chemicals, but if the question of duty on tanning extracts is to be discussed we shall certainly wish to give our oral evidence in this respect. We might mention that the cost of tanning extracts used by us represents about 30 per cent. of the cost of the finished leather.

Kaleeswarar Mills, Ltd., Coimbatore.

Letter No. 696, dated 4th September 1928.

Re Resolution (Tariffs), No. 199-T. (8), Department of Commerce, Simla, of the 16th July 1928. The Mill industry has been passing through a long and continued period of depression and evil times since 1923.

We are anxiously waiting for a change for the better, so any extra burden in way of enhancing the existing duties on chemicals used by the industry will only be the means of driving us further to the wall; rather should it please the Government to remove entirely the import duties on those chemicals which are used in the Cotton Mills industry, the greatest of all the industries in the country.

Therefore we appeal to Government to remove entirely the import duties on those chemicals used in the Mill industry.

Indian Institute of Science, Bangalore.

Letter dated 18th October 1928.

Subject :—Exemption from import duty on apparatus, machinery and chemicals required for educational purposes at the Indian Institute of Science.

I have the honour to request that the Indian Tariff Board may be pleased to consider the above subject, and if possible to make a favourable recommendation to Government in the matter.

2. During each of several years past this Institute has expended amounts varying from Rs. 50,000 to Rs. 1 lakh on appliances and materials for laboratory equipment, and although whenever possible these requirements are purchased in India, it frequently happens that they are not obtainable in this country and must of necessity be imported.

3. Remission of import duty on these educational essentials would therefore liberate each year a sum which, although trifling from the standpoint of national revenue, would be a valuable addition to the Institute's resources available for expenditure on higher study and research.

Messrs. Adamjee Hajee Dawood and Company, The Rangoon Match Works and Mr. M. C. Abowath.

Joint representation without date.

We, the undersigned, interested in the manufacture of matches in Burma, beg to address you with reference to the Government of India, Department of Commerce, Resolution No. 199-T. (8), dated the 16th July 1928, by which the Tariff Board has been asked to examine the question of granting protection to certain chemical industries in India. Paragraph 3 of the Resolution states that along with the question of extending protection to the manufacture of particular chemicals, the Tariff Board will examine the question of the removal of the import duties on those chemicals which are used as raw materials in Indian industries.

As manufacturers of matches, we are more interested in the removal of import duties on those chemicals which are used in the manufacture of matches than in the question of granting protection to the chemical industries. We realise however that both the questions are directly antagonistic because on the one hand higher import duties must be imposed for the protection of an industry and on the other, those using chemicals in industries in India would naturally ask for the removal of the import duty on chemicals. We, however, are glad to note that so far as the chemicals used in match making industry are concerned, no conflict of interests is likely to arise. Because the resolution specially mentions eleven chemicals, for which protection has been asked and none of the chemicals named in the resolution is used in the manufacture of matches.

The Tariff Board are no doubt aware that the following are the chief chemicals used in the manufacture of matches:—

1. Amorphous phosphorus.
2. Chlorate of Potash.
3. Antimony trisulphide.
4. Manganese dioxide (black).
5. Bichromate of potash.
6. Glue.
7. White zinc.
8. Iron oxide.
9. Litharge yellow.
10. Caput mortuum.
11. Ammonium phosphate.
12. Umber burnt.
13. Infusorial earth.
14. Glass powder.

The Tariff Board are also aware that the cost of chemicals used in the manufacture of matches is an essential addition to the total cost of production of matches. Any relief, therefore, by way of the removal of the 15 per cent. import duty now levied on the same would give some relief to the industry for which the Tariff Board has recommended and the Government of India and the Indian Legislature have accepted a measure of protection. We feel that if the import duty on the chemicals named above is removed, it will give some relief to the match making industry without in any way affecting the prospects of any chemical industry in India, for which protection is asked for. We trust that the Tariff Board will be kind enough to give due consideration to our views expressed in this representation.

G. N. Potdar, B.A.

Letter dated 15th November 1928.

In the matter of Enquiry for the protection of Chemicals I have the honour to submit the following for your consideration. I specialised myself in the manufacture of Sulphuric and other acids and heavy chemicals after a Technical Chemistry course in the Imperial University of Japan. After my return I started the manufacture of heavy chemicals in Bombay such as, washing soda, Glauber's Salt, Copper Sulphate, etc., and during war time I also manufactured Epsom salt with the use of local acid. Owing to financial difficulties the Company with which I was connected closed its business last year and I am now planning to take up the manufacture of some of these heavy chemicals. So the suggestions that I am making would be from the standpoint of a consumer and I will also give some details of manufacturing practices in Japan which may be of some use in the present enquiry.

In order to help the development of Chemical industries sulphuric acid must be made available at a very cheap rate. When there was free competition between the Eastern and Dharamsi Companies in Bombay con. sulph. acid was supplied at Rs. 150/160 per ton. Calcutta acid has been all along quoted at Rs. 140 per ton. Taking this latter lower rate of acid it is not possible to manufacture copperas, Copper sulphate or Epsom salt. Even if chamber acid would be available at half the above figure, *i.e.*, at Rs. 70 per ton (which the Companies can possibly do) that will only help the manufacture of copperas and sulphate but not the Epsom salt. So it can be conceded that the price charged by the Companies after their agreement, namely Rs. 315 per ton, is extraordinarily high.

In foreign countries con. sulph. acid is sold at Rs. 45/50 per ton, while in Japan it is sold at Rs. 35/40. In the factory in which I was working the cost of con. sulph. acid came to about Rs. 25 per ton and the same was freely sold at Rs. 30/32 per ton. The cost of chamber acid was about Rs. 17 and nearly three-fourths of the total production was sold as chamber acid. The capacity of the plant was 4,000 tons yearly. It was a Limited Company with Rs. 3·75 lakhs as nominal capital half of which was collected. The plant, buildings, erection, etc., took about Rs. 1,50,000, and about Rs. 30,000 was used as working capital. From the start after working for six months the Company earned 17 per cent. net on investment.

These results were not exceptional but only showed average and normal working. I had access to 5 or 6 other acid making concerns and the figures could be corroborated. These results were due to:—

(1) Cheapness of sulphur from the use of pyrites. The cost per ton of sulphur from this course was Rs. 35 per ton.

(2) The loss of nitre on sulphur was only 2 per cent. and sometimes less.

(3) Cost of raw materials and coal per ton of acid came to Rs. 12-9-0.

(4) Labour supervision and other charges came to Rs. 4-11-0.

I think both the Bombay acid concerns have incurred comparatively very high expenditure for their plant. But even then the sulphuric acid plants in both are old style and antedated. They are based on English model and English practice is most conservative even in scientific matters. We must have to follow German methods. In 1904 I was working in a big acid factory in Japan but at that time almost all the factories had rectangular chambers but as soon as the advantages of the tangential or cylindrical chambers became known by the end of 1907 that is within about four years I found that the extensions of the old acid factories and almost all the new factories had adopted the round chambers. But in India after 15 years we find the same old models being copied. The round chambers are 30 to 40 per cent. more efficient and they require less weight of lead compared with its surface.

The two crucial tests by which the efficiency of a plant is determined are:—Chamber space in cubic feet required per lb. of sulphur burned in 24 hours, and the amount of nitre spent on the weight of sulphur. In the factory in which I was working the chamber space per lb. of sulphur came to a little less than 18 cub. ft. and the percentage of nitre was less than two on weight of sulphur.

As the Chamber Plant cannot now be changed, the efficiency can be increased by introducing small chambers or plate columns or tambours in between the chambers. In order to curtail the expenses on raw materials instead of importing the refined or semi-refined sulphur, one might import the lower grades 75 to 80 per cent. sulphur at comparatively cheaper rates. The sources of pyrite ores should be more fully explored. I had occasion to examine the copper pyrite mines at Khetri in Jaipur State and also at Kharwa in Rajputana in which places especially the former, I found very rich veins of copper and iron pyrites.

Besides the raw materials, the large factors which increase the cost abnormally are the overhead charges, the sales organisation, depreciation, etc., all which items should be so far curtailed that the cost comes to nearly that in other countries. Another point which I may stress here is that both the Bombay Companies have unnecessarily taken the manufacture of too many products having practically very little bearing with the main production, by which the attention is diverted from important matters to trivial ones and the efficiency imparted.

I would support the idea of giving protection to the industries by increasing the import duty on acids and chemicals to 30 per cent. and if necessary, an additional bounty for a period of ten years of say Rs. 10 per ton of chamber acid (only in the case of Sulphuric acid) may be fixed but there should be no bounty on other acids as they are 30 per cent. and 70 per cent. in strength and there is sufficient margin for profit on that account. But I can support the above protection only on the understanding that the manufacturers of acids undertake to sell chamber acid (95 per cent.) at Rs. 25 per ton (*i.e.*, deliver 1½ tons and count 1 ton) and con. acid at about Rs. 50 per ton and not otherwise. If the manufacturers are allowed to keep their own prices then that would be exploitation pure and simple.

If it is decided to give bounty, the capacity of an economical unit of plant should be kept at a low figure and I would suggest at 100 tons yearly production of chamber acid. I have seen one small plant in Delhi and one in Baroda and I am told there is one working in Benares. The capacity of these plants was very small and the working not economical but the low limit of 100 tons would goad them to increase their production and practise economy and there will be healthy competition in the prices of acids and chemicals. If a higher limit is fixed as large scale sulphuric acid is mostly made for internal consumption and not so much for sale, that would put unnecessary pressure on the resources of small acid factories and competition would thereby be stiffled. By fixing a lower limit even if we err on the safe side.

Shalimar Paint, Colour and Varnish Company, Limited, Calcutta.

Letter No. 8748, dated the 30th March 1929.

With reference to your letter No. 213, dated the 8th instant, we have to call your attention to the effect on our industry of imposing a protective tariff on certain chemicals.

2. The chemicals in which we are particularly interested are:—

Sulphuric acid. Hydrochloric acid. Ferrous sulphate. Glauber's salt.	Mentioned in the Resolution by the Government of India regarding the present enquiry.

Also the following which are not mentioned in the Resolution:—

Bichromate of soda.

Yellow prussiate of potash.

3. Competition in the paint business in India is exceedingly acute. This competition is not only with British, but also with Dutch and German firms. The result of imposing a duty on the chemicals required for the manufacture of colours would be to put Indian manufacturers at a very serious disadvantage in the manufacture of colours and coloured paints as compared with imported colours and paints.

4. The standard of quality of the paints and colours manufactured in India is admittedly high and in quality there is no doubt that we have nothing to fear from competition with imported materials. This is amply proved by the large purchases of Indian manufactured material made by the Indian Stores Department and Railways.

5. The quantities used by us and the cost of the four chemicals first mentioned above, which are already made in India are as follows:—

	Our approximate Annual consumption Tons.	Prices paid for Indian purchases. Per cwt. Rs. A. P.	Approximate British prices. Per cwt. s. d.
Sulphuric acid .	6	5 8 0	3 0
Hydrochloric acid	2	12 0 0	5 0
Ferrous sulphate	7	3 0 0	3 6
Glauber's salt .	5	4 12 0	3 9

The prices paid by Indian consumers of these chemicals, in particular acids, are already so high compared with the prices paid by European manufacturers as to constitute a serious handicap to the development of Indian industry. If a tariff were imposed, or the present tariff removed, selling prices of the acids would probably be little affected.

6. Chemicals mentioned above, which are not now made in India are:—

	Our approximate Annual consumption.
Bichromate of Soda	10 tons.
Yellow prussiate of potash	7 tons.

Removal of the duty on these chemicals would assist the Paint industry in its competition with European manufacturers in the business for yellow and green colours and paints.

7. We hope that no protective tariff on these chemicals will be recommended, and suggest the desirability of the removal of the present import duty.

Questionnaire for applicants for protection of heavy Chemical Industry issued by the Tariff Board on the 24th August, 1928.

INTRODUCTORY.

1. When was your firm established? Is it a public or private registered company, or is it an unregistered firm?

2. To what extent is the capital invested in your firm held by Indians? How many Directors are there, and how many of them are Indians? How many Indians are employed in the superior management?

3. Please enumerate the various products which you manufacture?

4. When did your works commence to manufacture?

5. Please state the quantity of each different product which your works as at present equipped could manufacture per annum if working to capacity.

6. What was the actual output of each different product for the last five years?

7. Where are your works? Do you consider they are advantageously situated in respect of—

(*a*) Supply of raw materials.

(*b*) Sources of power or fuel.

(*c*) Markets.

(*d*) Other considerations, such as labour supply.

8. (*a*) Do you consider that your products are equal in quality and appearance to imported chemicals?

(*b*) Do they command the same price in competitive markets as imported chemicals?

(*c*) If not, to what cause do you describe the lower price of the Indian product?

(*d*) Apart from the question of quality, is there any prejudice against your products, either generally, or in particular markets or on the part of a particular class of consumers?

9. (*a*) What are the principal industries in which your products are used?

(*b*) For what purposes are these products used?

(*c*) Are any of your products used for the manufacture of explosives for military purposes?

10. Are there any climatic or other difficulties which prevent your manufacturing all your products all the year round? If so, please explain the reason and state whether the stoppage tends to raise your cost of production above that of other countries.

11. What process do you use for the manufacture of each of your products?

N.B.—When the process is known by a special name, no description of the process need be given. The name only of process should be stated.

RAW MATERIALS.

12. What are the principal raw materials used in the manufacture of each of your products?

13. What would be your annual requirements of raw materials if your plant were working to its full capacity?

14. What quantity of each raw material is required for the production of one unit of each of your products?

N.B.—The customary unit should be stated.

15. What are the main sources of supply for each of your raw materials?

16. Which of these materials are—

A. Imported from abroad.

B. Manufactured and purchased in India.

In case A please give—

(*a*) country of origin,

(*b*) f.o.b. price (in sterling),

(*c*) port of importation,

(*d*) freight, insurance, etc.,

(*e*) landing charges,

(*f*) transport charges to the factory, and

(*g*) customs duty.

N.B.—If information as regards (*b*) and (*d*) is not available, the c.i.f. price should be given.

In case B, please give—

(*a*) market price, and

(*b*) transport and other charges,

and state where and by whom the materials are manufactured.

17. Which of the materials mentioned in the answer to question No. 16, if not already manufactured in India, are—

(*a*) likely to be manufactured,

(*b*) not likely to be manufactured.

Please give reasons for your reply.

18. (*a*) Do you get any special freight rates by sea, river or rail for your raw materials?

(*b*) Do you consider you are at any disadvantage in this respect?

(*c*) If so, have you any proposals to make?

19. Do you consider that this industry is assured of a sufficient supply of its principal raw materials—

(*a*) foreign,

(*b*) domestic,

for a reasonably long period?

20. (*a*) Are there any natural raw materials in India which in the near future may enable you to dispense with similar imported materials?

(*b*) If so, indicate briefly—

(*i*) the localities in which they exist,

(*ii*) what reduction in price may be expected.

21. Would the manufacture of any of your products automatically cease if for any reason it became impossible to import its principal raw material?

22. Are there any raw materials which are the monopoly of—

(*a*) a particular country, or

(*b*) particular Trusts, Combines or Corporations?

LABOUR.

23. Do the processes of manufacture require much expert supervision involving the employment of skilled labour imported from abroad?

24. What number of imported labourers are employed at present, and what would be the number required if the factory were working to full capacity?

25. (*a*) What progress has been made since the factory was established in the substitution of Indian for imported labour?

(*b*) Is it anticipated that eventually the employment of imported labour will be unnecessary?

(*c*) What facilities are given to Indian workmen to acquire training in skilled work or for training apprentices?

26. How do the rates of wages paid to imported workmen compare with the rates paid for similar work in other countries?

27. (*a*) What is the total number of Indian workmen employed?

(*b*) What are the average rates of wages of the different classes?

28. Please give total wages bill for Indian labour at the works for the past five years; any increase in the rates of wages should be noted with the date upon which it was given.

29. (*a*) Is the Indian labour force sufficient?

(*b*) Is it drawn from the vicinity of the factory or from other parts of India?

30. (*a*) Does the Indian labourer improve with training?

(*b*) How does he compare in efficiency with European workmen employed on similar work?

31. What arrangements have you made for housing your labour and for promoting its welfare in other directions?

Power (including Fuel).

32. (*a*) What is the nature of the power used in the factory?

(*b*) If steam, what is the fuel used, and is it available locally in sufficient quantities?

33. What is the total quantity of fuel consumed per unit of output, whether for power production or for other purposes?

34. What is the price per ton of fuel—

(*a*) at source of supply;

(*b*) at works.

35. (*a*) If electric power is used, from what sources is it obtained and what is the cost per unit?

(*b*) How does the cost compare with the rates obtainable elsewhere in India and in other countries?

(*c*) What is the consumption of power per unit of output?

Market.

36. What is the total Indian production so far as it can be estimated of each of your products for the past five years?

37. What do you estimate is the total Indian demand for each of these chemicals?

38. Do you think that the demand will substantially increase in the near future? If so, please give the reasons.

39. Where are your principal markets in India and how far are they from your works?

40. (*a*) Are there any market in which owing to their distance from a port you can compete more easily with foreign manufacturers?

(*b*) If so, please state these markets and the approximate demand for each product in each market.

41. Do you think that you will ever be able to export your chemicals? If so, to what countries and in what quantities?

42. (*a*) Are any of your products purchased by Government or other public bodies or departments?

(*b*) If so, please state the extent of their purchases and the prices paid during—

(*i*) the war,

(*ii*) each of the last five years.

(*c*) Were the prices received by you during the war, the current prices prevailing at the time in India.

FOREIGN COMPETITION.

43. Which foreign countries are your keenest competitors in the Indian market?

44. Do the conditions of manufacture in India differ materially from those in competing countries? If so, what are the main differences?

45. Have conditions in India led you to adopt processes of manufacture different from those practised in the chief competing countries? If so, has the foreign manufacturer an advantage in this respect?

46. Please state—

(*i*) the prices at which imported chemicals have been landed in India under the following heads:—

(*a*) f.o.b. price,

(*b*) freight,

(*c*) insurance and trade charges,

(*d*) customs duty,

(*e*) landing charges.

N.B.—If information regarding (*a*), (*b*) and (*c*) is not available, the c.i.f. price should be given.

(*ii*) the prices realised by you each year of the past five years.

47. (*a*) From what sources is information obtainable as to the prices at which imported chemicals enter the country?

(*b*) How far do you consider the information obtained from these sources is reliable?

48. (*a*) Are there any Trusts or Combines operating in chemicals in the Indian and other foreign markets?

(*b*) If so, please give as far as possible a brief history of their origin, financial position and general activities.

(*c*) To what extent have their operations affected you in the Indian market?

49. Have you any reason to suppose that the prices at which foreign producers sell for export to India are unremunerative, *i.e.*, below the cost of production, or leave only a small margin of profit to the producer? If so, please state fully your reasons and the evidence on which you rely.

50. (*a*) Do you manufacture any chemicals which in competing countries are produced as by-products?

(*b*) If so, state briefly the reasons which prevent you from adopting similar processes of manufacture.

51. In which of the Indian markets is foreign competition keenest?

52. (*a*) Has there been a substantial fall in the prices of imported chemicals since the war?

(*b*) If so, to what causes do you attribute this fall in price?

(*c*) How far do you consider these causes permanent?

53. Please compare the freight which you have to pay to reach your main markets in India with the total freights, sea and rail payable on imports to the same markets.

54. Compare the railway freights paid by importers from the ports to selected up-country markets and the railway freights paid on the produce of your works to the same markets.

N.B.—The mileage between port and the selected stations and between factory and same stations and the rates per unit per mile should be noted.

55. Do you consider that as compared with foreign manufacturers the Indian manufacturer is at a disadvantage in respect of any of the following:—

(*a*) Cost of plant and machinery.
(*b*) Cost of expert labour.
(*c*) Cost or efficiency of ordinary labour.
(*d*) Collection and transport of raw materials.
(*e*) Cost of raw materials and consumable stores.
(*f*) Freights on finished goods.
(*g*) Maintenance of stocks of spare parts.
(*h*) Customs duty on imported materials.
(*i*) Raising of capital.

Wherever it is considered that the Indian manufacturer is at a disadvantage, reasons supported by figures should be given in support of your contention.

56. Which of the disadvantages mentioned in your answer to question 55, do you consider permanent and which temporary? For what period do you consider the temporary disadvantages are likely to operate?

Internal Competition.

57. (*a*) Is there any serious competition among Indian manufacturers of chemicals?

(*b*) If so, who are your principal competitors and in respect of which of your products?

58. Has any attempt been made by Indian manufacturers to eliminate competition by mutual agreement regarding manufacture or by the formation of a joint sales organisation or otherwise?

Equipment.

59. (*a*) Do you consider that your works are sufficiently large as an economic unit of production to ensure economy?

(*b*) What, in your opinion, is the smallest unit of production which can be operated economically under present-day conditions?

60. Does the manufacture of your products require the use of elaborate and expensive machinery?

61. What percentage of your total outlay has been incurred on plant and machinery?

62. Give a brief description of your plant and machinery.

63. Do you consider your machinery and other equipment and the processes of manufacture practised in your works sufficiently up-to-date and efficient to enable you to compete successfully against foreign manufacturers?

64. Have you adopted any new processes of manufacture or have you installed new plant and machinery in replacement of, or in addition to, your original plant? If so, give a brief description of the process or plant, and state whether the results have fulfilled your expectations.

65. What parts of the machinery, if any, are manufactured in India?

Capital Account.

66. What is the block value of your property, as it stood in your books at the end of the last complete year for which figures are available, under the following heads:—

(*a*) Leases and concessions.
(*b*) Lands.

(*c*) Buildings.

(*d*) Plant and machinery.

(*e*) Other miscellaneous assets.

67. Do the figures given in answer to question 66 represent the actual cost of the various assets, or their value after depreciation has been written off? In the latter case, please state the total amount written off for depreciation since manufacture commenced, and in the former case the total of the depreciation fund (if any) which has been accumulated.

68. Apart from any question of an increase in the replacement cost of plant and machinery due to a general rise in the price level, are the sums actually set aside for depreciation since manufacture commenced equal to, greater than, or less than, the sums which ought to have been set aside according to the rates of depreciation which you consider suitable? (See question 82.)

69. What do you estimate would be the present-day cost under the heads: (*a*) buildings, and (*b*) plant and machinery, of erecting a Works having the same output as your present Works? How does the figure compare with the block value of your present Works under the same heads, and would the operating cost of a new Works established now be greater or smaller than yours?

70. What is the total: (*a*) authorized, (*b*) subscribed, (*c*) paid-up capital of the Company? How is it divided between Preference, Ordinary and Deferred shares?

71. At what rate of interest is the dividend payable on the Preference shares? Are these shares entitled to cumulative dividends? If so, state the dates on which they were first entitled to rank for dividends, and whether any dividends are in arrears.

72. Under what conditions do the Deferred shares, if any, participate in the profits of the Company?

73. What is the amount of the debenture loans (if any) raised by the Company? At what dates were they issued, and what is the rate of interest payable? If any period has been fixed for the redemption of the debenture loan, it should be stated. Similarly, if a debenture sinking fund has been established, the annual rate of contribution should be given.

74. What is the amount of the Reserve Fund (if any) created by the Company? Has this amount been accumulated from surplus profits, or from other sources, *e.g.*, by the issue of shares at a premium?

75. What additional capital (if any) would it be necessary to raise in order to carry out any scheme of replacement or extension of plant which the Company contemplate?

Cost of Production.

The cost of production falls under two heads:—

(*a*) works costs, and

(*b*) overhead charges.

The latter head—overhead charges—includes:—

(*i*) Interest on working capital.

(*ii*) Depreciation.

(*iii*) Head office expenses and Agents' commission.

The head "Works Cost" covers all other expenditure. The dividends on share capital are not included in the cost of production, nor is the interest on debenture and other loans in so far as the sums so raised have been devoted to fixed capital expenditure.

(a) *Works Costs.*

76. Please fill up the two Forms annexed to the questionnaire regarding Works Costs. The following explanations may be useful:—

(*a*) The Board are anxious to have as full information as possible regarding the cost of production, but they recognise the difficulty which manufacturers may feel in disclosing to the public the details of their practice and their works costs. Great stress was laid on the importance of publicity in paragraph 303 of the Fiscal Commission's Report, and the Board also have explained the views they hold in paragraph 41 of their Third Report on the Grant of protection to the Steel Industry, 1924, and on subsequent occasions. It rests with the manufacturers, themselves to decide what information can be given publicly, and nothing will be published which the witness desires to be treated as confidential. At the same time, the Board cannot base their recommendations merely on confidential information. The publication of the details of the works costs of each firm may not be essential because the Board may be able, by comparison of the various figures submitted, to arrive at a standard or average figure for each item. But it is very desirable that the total of the works costs should be disclosed in all cases, not necessarily for publication but for the information of the Board.

(*b*) In Form I the actual expenditure of the year under the various heads should be shown, whereas in Form II it is the cost per unit of output that is desired.

(*c*) The years for which figures have been asked for are each of the last three years.

(*d*) The figure given against raw materials should be the cost delivered at the Works and will include the cost of all labour employed in collection or transport. The cost of such labour, therefore, is necessariy excluded from the item "Labour" in the forms.

(*e*) If at any stage of the process of manufacture materials are recovered and can be used again, the credits taken for such recoveries should be entered in the forms, and the manner in which such credits are taken explained.

(*f*) In the forms Power and Fuel are shown as one item, but it is preferable (if possible) that they should be shown separately.

77. Was the works cost increased in any of the years for which figures have been given owing to the fact that the Works were working at less than their full capacity? If so, which were the items principally affected. To what extent would they probably have been reduced if a full output had been obtained?

78. Do you regard the works cost of the last year for which figures have been given as abnormally high for any other reason? If possible, furnish an estimate of the works cost for some future year on the assumption that—

(*a*) conditions are normal,

(*b*) an output is obtained equivalent to the full capacity of the plant.

79. Have you adopted a system of cost accounting? If so, will you place before the Board, for examination and return, your cost sheets for the last complete year for which they have been prepared?

80. Are you in a position to furnish the Board with information as to the works costs in any competing country for any year since the war?

(b) *Overhead charges.*

81. In determining your cost of production in what proportion do you allocate among your different products each of the various items which constitute your overhead charges? Please explain how this proportion is determined.

(i) *Depreciation.*

81. (*a*) What are the rates of depreciation allowed by the Income-tax authorities?

(*b*) Do you consider that, in calculating the cost of production these rates of depreciation are suitable?

(*c*) If not, what rates do you suggest and why?

(ii) *Working Capital.*

83. What is the working capital which the Company requires according to the output equivalent to its full capacity?

84. Is the Company able to provide all the working capital it requires from share and debenture capital, or is it necessary to borrow additional capital for this purpose?

85. If additional working capital has to be borrowed, what is the amount borrowed and the rate of interest payable?

86. Compare the working capital with the cost of one month's output (works cost only, excluding overhead charges).

87. What is the average value of the stocks of finished goods held by the Company? What period normally elapses between production and payment?

88. Does the Company find it necessary to hold large stocks of coal or raw materials? If so, the average value of the stocks held should be stated.

(iii) *Agents' Commission and Head Office expenses.*

89. Has the Company a Head Office other than the office of the local management? Is it under the control of a firm of Managing Agents?

90. If the answer to question 89 is in the affirmative, please state:—

(*i*) the annual amount of the Head Office expenses;

(*ii*) the Agents' commission.

91. How is the amount of the Agents' commission determined?

92. What charges do you incur on account of—

(*i*) Head Office expenses,

(*ii*) Agents' commission,

per unit of each finished product.

93. What rate of dividend do you consider to be a fair return on the capital invested?

CLAIM FOR PROTECTION.

NOTE.—If your replies to any of the following questions have been already stated in your representation to the Government of India, it is unnecessary to repeat them, unless you wish to modify or amplify them.

94. In paragraph 97 of their Report, the Fiscal Commission laid down three conditions which in ordinary cases ought to be satisfied by industries claiming protection. Do you consider that those conditions are satisfied in the case of heavy chemicals?

A. Do you claim that the industry possesses natural advantages, such as an abundant supply of raw materials, cheap power, a sufficient supply of labour or a large home market?

B. Do you claim that, without the help of protection, the industry is not likely to develop at all, or is not likely to develop so rapidly as is desirable in the interests of the country?

C. Do you claim that the industry will eventually be able to face world competition without protection? These conditions have been approved by the Government of India and by the Legislative Assembly, and it is, therefore, of great importance to ascertain whether they are satisfied. If you consider that your industry fulfills these conditions, the reasons for your opinion should be fully explained.

95. Do you claim that your industry satisfies either or both of the conditions mentioned in paragraph 98 of the Fiscal Commission's Report, *viz.*,—

(*a*) That the industry is one in which the advantages of large scale production can be achieved, and that increasing output would mean increasing economy of production?

(*b*) That it is probable that in course of time the whole needs of the country could be supplied by the home production?

96. Do you consider that your industry is of importance on national grounds and therefore deserves protection apart from economic considerations?

97. Do you consider that there are any features of the industry which make it peculiarly suitable to Indian economic conditions?

98. What special measures (if any) do you suggest to safeguard your industry against underselling by reason of any cause other than a reduction in the foreign cost?

99. What is the amount of protection the industry receives at present owing to:—

(*a*) the existing Customs duties,

(*b*) transport charges between the country of production and the port of entry, *i.e.*, freight, insurance, trade charges and landing charges?

100. What is the amount of the protection which you consider necessary?

N.B.—The reasons for proposing the particular rate recommended should be explained.

101. Do you recommend any form of assistance other than a protective duty? If so, please state what form such assistance should take and the reasons for your proposal.

FORM I.

Statement showing the aggregate expenditure incurred at the Works on the total output of your factory for each of the last three years. (See question 76.)

	Year.		
1. Raw materials			
2. Works labour			
3. Power and fuel			
4. Ordinary current repairs and maintenance of buildings, plant and machinery.			
5. General services, supervision and local office charges.			
6. Miscellaneous, *e.g.*, rent, municipal taxes, insurance, etc.			
7. Any other single item not enumerated above which amounts to 5 per cent. or more of the total expenditure.			
Total .			

FORM II.

Statement showing the Works cost per unit of each finished product for each of the last three years. (*See question 76.*)

Year.	Products.		
1. Raw materials			
2. Works labour			
3. Power and fuel			
4. Ordinary current repairs and maintenance of buildings, plant and machinery.			
5. General services, supervision and local office charges.			
6. Miscellaneous, *e.g.*, rent, municipal taxes, insurance, etc.			
7. Any other single item not enumerated above which amounts to 5 per cent. or more of the total expenditure.			
Total .			
Credit for materials recovered (if any) .			
Net Total .			
Total production .			

NOTE.—In filling up this form, please explain clearly the method by which the total expenditure has been distributed among the different finished products. It is probable that in some cases such as raw materials the actual expenditure on each product can be ascertained from the books maintained by the Company but in other cases it may be necessary to adopt some method of allocation for arriving at the expenditure on each product. Please state in each case whether the expenditure shown is actual or estimated, and in the case of estimated expenditure how far in your opinion the estimate may be regarded as approximately correct for the purpose of calculating the cost of each product.

Dharamsi Morarji Chemical Company, Limited, Bombay.

(1) *Letter No. C./2588, dated 6th October 1928.*

In compliance with your letter No. 62-T, dated the 22nd August 1928, we beg to submit herewith our replies (with six spare copies) to the questionnaire of the Tariff Board.

We have been in communication with some of our friends in the United Kingdom and on the Continent to obtain certain statistics to lend additional support to some of our replies. We shall submit those when we receive them.

Introductory.

1. The Firm was established on 25th September 1919. It is a Public Registered Company.

2. The capital is held almost wholly by Indians. There are only 5 European shareholders, holding 765 shares worth Rs. 76,500. At present there are four Directors,—all Indian. The superior management is completely in the hands of Indians since 1925.

3. We manufacture the following:—

(*a*) Commercial Acids—Sulphuric, Hydrochloric, Nitric and Phosphoric.

(*b*) Commercial Chemicals—Alum of Potash, Alumina Ferric, Glauber's Salt, Zinc Chloride, Copperas, Copper Sulphate, Soda Sulphide, Epsom Salt and Zinc Sulphate.

(*c*) Fine Chemicals—The three acids—Sulphuric, Hydrochloric and Nitric. Silver Nitrate, Epsom Salt, Alum, Ferrous Sulphate, Ferrous Ammonium Sulphate, Zinc Sulphate, Copper Sulphate, Ammonium Chloride, Ferric Chloride, Liquor Ammonia, Plaster of Paris, etc.

(*d*) Fertilisers—Bone Meal, Oil Cake Meals, Bone Superphosphates and Mixed Fertilisers.

(*e*) Insecticides and Fungicides—Fish Oil Rosin Soap, Sulphur Lime (Powder), Bordeaux Mixture, etc.

4. The works commenced to manufacture from June 1922.

5. The works could manufacture, working to full capacity, as follows:—

Sulphuric Acid—	
Chamber Acid . . .	8,000 tons, 100 per cent. basis, per annum.
Concentrated Sulphuric Acid 1·84 sp. gr. . . .	2,100 tons.
Hydrochloric Acid . .	900 tons.
Nitric Acid	500/600 tons.
Soda Sulphide . . .	250 tons.
Alumina Ferric . . .	900/1,000 tons.
Alum of Potash . . .	600 tons.
Zinc Chloride . . .	200/300 tons.
Copperas	200/300 tons.
Copper Sulphate . . .	200 tons.
Glauber's Salt . . .	200 tons.
Phosphoric Acid . . .	100 tons.
Epsom Salt	500/600 tons.
Fine Chemicals—Acid Sulphuric, Nitric, Hydrochloric	110,000 lbs.
Capacities for pure salts at present	About 200,000 lbs.
Fertilisers—Bone Meal .	2,500 tons.
Superphosphates . . .	5,000 tons.
Mixed Fertilisers . . .	5,000 tons.

6. The actual output for the last five years is as per statement given below :—

Statement of Production.

No.	Products.	1923-24.	1924-25.	1925-26.	1926-27.	1927-28, 11 months.
		Tons.	Tons.	Tons.	Tons.	Tons.
1	Sulphuric Acid Chamber, 100 per cent. basis.	881·00	1064·00	1406·31	1184·59	918·9
2	Sulphuric Acid concentrated, 95 per cent.	582·57	731·00	775·64	680·57	478·37
3	Nitric Acid	39·46	46·00	62·25	100·93	81·33
4	Hydrochloric Acid . .	103·94	73·00	69·82	66·81	28·03
5	Phosphoric Acid . . .	...	14·05	23·70	8·94	17·57
6	Nitre Cake (Soda Bisulphate)	59·66	37·79	86·35	115·20	87·00
7	Salt Cake (Sodium Sulphate) .	82·75	100·32	85·90	151·48	119·25
8	Glauber's Salt . . .	86·97	84·50	90·83	89·35	146·57
9	Zinc Chloride . . .	7·23	6·60	5·10	3·80	...
10	Potash Bisulphate . .	...	31·64	...	...	...
11	Alumina Ferric 16/17 per cent. and 14/15 per cent.	93·88	317·00	294·20	64·90	15·22
12	Aluminium Sulphate 16/17 per cent. and 14/15 per cent.	11·22	33·60	13·20	...	...
13	Alum of Potash . . .	21·75	228·00	251·00	346·10	113·42
14	Copperas	69·23	122·00	160·83	214·65	132·88
15	Copper Sulphate . . .	...	30·30	54·79	38·76	32·88
16	Epsom Salt	...	8·50	23·65	130·20	49·66
17	Sodium Sulphate . . .	...	12·43	...	11·43	...
18	Bone Meal	...	79·65	161·17	156·50	178·02
19	Bone Superphosphate . .	...	50·50	45·50	88·32	179 80
20	Fertiliser Mixtures . .	...	5·00	58·13	290·00	277·21
21	Basic Bone Super . . .	...	...	11·43	19·90	11·77
		lbs.	lbs.	lbs.	lbs.	lbs.
22	Pure Acids	...	2,520	7,440	32 825	34,856
23	Pure Salts	...	...	873	16,795	6,033
24	Fish Oil Rosin Soap . .	...	...	...	8,707	18,731

7. At Ambernath (Near Kalyan), about 38 miles from Bombay.

(*a*), (*b*), (*c*) and (*d*) Yes.

8. (*a*) As regards the acids except Phosphoric Acid which is somewhat inferior in quality—they are equal in quality and appearance to those imported.

As regards Commercial Chemicals—Epsom Salt, Copperas, Glauber's Salt and Soda Sulphide, are all equally good in appearance and quality.

Zinc Chloride, Alum Potash, Alumina Ferric and Copper Sulphate—are somewhat inferior in appearance though quite up to standard in quality.

Fine Chemicals—All up to standard both in quality and appearance.

Fertilisers—Up to standard.

(*b*) Not always.

(*c*) Some prejudice against Indian Products and long standing connections of the importers with foreign sources of supply.

(*d*) The main prejudice is that the foreign producers being long in the trade, the buyers here think that they must be making the best products. Also as our concerns are newly established these buyers are not yet certain of our regular supplies of standard quality and that our concerns will be permanent. They are, therefore, unwilling to break up their long standing foreign connections. Some public bodies also think, even after they are satisfied with our samples, that the bulk supplies may not always prove to be of uniform standard quality. Some Public Institutions and consumers decline to buy from us because of the fact we cannot supply all their varied requirements. These prejudices are not confined to any particular market or class of consumers.

9. (*a*) Textile, Metal workers and Refiners, Aerated Water Manufacturers, Railways, Match Manufacturers, Paper Manufacturers, Printers, Lithographers, Photographers and Agriculture.

(*b*) In Textile: dyeing, sizing and finishing. Metal Workers and Refiners: for cleaning and refining metals. Aerated Water Manufacturers: for the generation of Carbon Dioxide Gas. Railway: for charging batteries and for cleaning metals generally. Match Manufacturers: for impregnations. Paper Makers: for cleaning and sizing. Printers and Lithographers: for etching and cleaning. Photographers: for developing and printing. Agriculture: for fertilising the soil and checking fungus growths and insect pests.

(*c*) Yes, mostly acids are purchased by the Military Department for the said manufacture.

10. Of our present products, only Glauber's Salt cannot be produced all the year round, because in summer the temperatures are higher and prejudicial to efficient production. So far as this product is concerned the costs of manufacture tend to rise somewhat.

11. Sulphuric Acid: the Chamber process and concentration on Silica Cascade system.

Hydrochloric Acid: by decomposing salt with sulphuric acid and absorbing the cooled hydrochloric gas in storage tanks containing water.

Nitric Acid: decomposing soda nitrate or potash nitrate with sulphuric acid and condensing the evolved Nitric Acid vapours.

Phosphoric Acid: by digesting bone ash with sulphuric acid.

Alum of Potash: by mixing alumina ferric with potash sulphate and crystallising and melting the crystals into moulds.

Alumina Ferric: dissolving bauxite in sulphuric acid.

Copperas: dissolving scrap iron in sulphuric acid and crystallising.

Copper Sulphate: dissolving copper in sulphuric acid and crystallising.

Epsom Salt: dissolving magnesite in sulphuric acid and crystallising.

Soda Sulphide: reducing salt cake or nitre cake with coal—leaching the melt from the furnace and boiling down the liquor to solidification.

Zinc Chloride: dissolving zinc scrap or ashes, etc., in hydrochloric acid, purifying the liquor and filtering and boiling down to solidification.

Fine Chemicals: produced from commercial qualities by special purification processes.

Fertilisers: Bone Superphosphate is obtained by dissolving Bone Meal in sulphuric acid.

Mixed Fertilisers are obtained by mixing Bone Meal, Bone Superphosphate, Nitrogenous materials and Potash Salts.

Insecticides—Fish Oil Rosin Soap: by saponifying Fish Oil and Rosin.

Other insecticides are obtained by the use of different chemicals by standard methods.

Raw Materials.

12.	Sulphuric Acid	Sulphur and Nitre.
	Hydrochloric Acid	Salt and Sulphuric Acid.
	Nitric Acid	Nitre and Sulphuric Acid.
	Phosphoric Acid	Bone Ash and Sulphuric Acid.
	Copperas	Iron scraps and sulphuric acid.
	Copper Sulphate	Copper scraps and sulphuric acid.
	Soda Sulphide	Salt Cake and Coal Dust.
	Zinc Chloride	Zinc drosses and ashes and hydrochloric acid.
	Epsom Salt	Magnesite and sulphuric acid.
	Glauber's Salt	Salt Cake and Nitre Cake.
	Alumina Ferric	Bauxite and sulphuric acid.
	Alum	Bauxite, sulphuric acid and potash sulphate.
	Superphosphate	Bone Meal and sulphuric acid.
	Pure Chemicals	Commercial products are purified.
	Fertiliser Mixtures	Bone Meal, Bone Superphosphate, Oil Cakes, Ammonium Sulphate, Nitre of Soda, Potash Sulphate, Kainite, Nitrate of Potash, Rock Phosphate, etc.

13.	Sulphur	2,700 tons.
	Common Salt	900 tons.
	Nitre	500/600 tons.
	Bauxite	600 tons.
	Zinc Dross, etc.	100 tons (based on 100 per cent.).
	Iron Scraps	50 tons.
	Copper Scraps	52 tons.
	Bone	5,000 tons.
	Sulphate of Ammonia	2,000 tons.
	Other organic Fertiliser materials, *e.g.*, cakes, potash-bearing wastes, etc.	1,000 tons.
	Potash Sulphate	600 tons.
	Magnesite	300 tons.

14. *Raw Materials used per ton of product.*

Products.	Raw materials used.	Quantity of raw materials in tons used per ton of product.
1. Sulphuric Acid (Chamber Acid) 100 per cent. basis.	Sulphur	0·36
	Sodium Nitrate	0·0011
2. Sulphuric Acid (concentrated 95 per cent.).	Chamber Acid Sulphuric (100 per cent. basis).	1·09
3. Nitric Acid	Sodium Nitrate	1·12
	Sulphuric Acid	1·04
4. Hydrochloric Acid	Salt	1·1
	Sulphuric Acid	1·0
5. Phosphoric Acid	Bones	3·06
	Sulphuric Acid	1·16
6. Glauber's Salt	Salt Cake	0·6
	Soda Carbonate	0·08
	Lime	0·06
7. Copperas	Iron Scrap	0·21
	Sulphuric Acid	0·36
8. Copper Sulphate	Copper Scrap	0·27
	Sulphuric Acid	0·56
9. Epsom Salt	Magnesite	0·51
	Sulphuric Acid	0·56
	Nitric Acid	0·005
10. Alumina Ferric	Bauxite	0·36
	Sulphuric Acid 100 per cent.	0·47
11. Alum Potash	Bauxite	0·29
	Sulphuric Acid 100 per cent.	0·38
	and Potash Sulphate	0·23
12. Bone Superphosphate	Bone Meal	0·67
	Sulphuric Acid	0·38

15. Sulphur is at present obtained from Hamburg, which we believe to be of American origin. This is at present made duty free.

Chili Saltpetre or Soda Nitrate is obtained from Hamburg or London. This product is manufactured from natural deposit in Chili and that is the general source of supply for the whole world. Since few years past synthetic product is made in Germany and Norway, but mainly consumed in the countries of production.

Potash Sulphate: The country of origin is Germany, the famous Stassford deposits.

Sulphate of Ammonia is produced in India and practically everywhere. Our supplies come from United Kingdom and Germany. The largest producers in India are the Tata Iron and Steel Company, but their sales are controlled by British Sulphate of Ammonia Federation, who stand as our competitors in the market.

Salt is obtained from Salt Works, Thana (Bombay Presidency).

Bauxite is obtained from Central Provinces mines in India.

Magnesite is brought from Mysore mines.

Scrap Copper, Iron and Zinc Scraps and drosses, Bones, Oil Cakes, Nitrate of Potash, are supplied by the local market in Bombay.

16. (A) Sulphur, Soda Nitrate, Potash Sulphate and Sulphate of Ammonia.

(B) Potash Nitrate, Common Salt, Bauxite, Magnesite, Scrap Copper, Iron and Zinc Bones.

Sulphur.	Nitrate of Soda.	Sulphate of Potash.	Sulphate of Ammonia.
(*a*) U. S. A., Sicilly, Japan. Our purchases through Hamburg.	Natural production from Chili, Synthetic from Germany and Norway.	Germany and France.	Germany and England.
(*b*) Not on our records because purchases are made on c.i.f. basis.			
(*c*) Bombay . .	Bombay . . .	Bombay . .	Bombay.
(*d*) Not on our records as explained in (*b*).			
(*e*) Rs. 7-12 . .	Rs. 4-5-6 . . .	Rs. 4-6 . . .	Rs. 4-8.
(*f*) ,, 4-2 . .	,, 2-4-6 . . .	,, 2-4-6 . . .	,, 2-4-6.
(*g*) Free . . .	Free . .	Free . . .	Free.

NOTE.—c.i.f. prices variable—present prices per ton

£7-10.		£12-9.		£10-18.		£12.	
(*b*) Am. Sulphate.	Nit. Potash.	Bauxite.	Copper.	Common Salt.	Iron Scrap.	Magnesite.	Zinc Scrap.
	Rs. a. p.	Rs.	Rs.	Rs.	Rs.	Rs.	Rs.
(*a*) 160/170 .	300 0 0	7	800	18	10	15	350
(*b*) 6-12-6 .	2 4 6	18	*Nil*	4	*Nil*	28	*Nil*

Nitrate of Potash—manufactured in the Punjab, Bihar and U. P.

Copper Scrap—obtained from local markets.

Common Salt—manufactured locally. Thana, Bhandup, etc.

Iron Scrap—purchased f.o.r. Ambernath locally.

Zinc Scrap—obtained locally.

Magnesite—obtained from Mysore mines.

Bauxite—obtained from Jubbulpore mines.

Ammonium Sulphate—can be obtained from Iron works, *e.g.*, Tatas, Bengal Iron and Steel Co., etc.

Bones—obtained from all parts of the Bombay Presidency, delivered at Ambernath.

17. (*a*) None.

(*b*) Sulphate of Potash, Sulphur and Sodium Nitrate.

These are not likely to be manufactured, because they are natural products obtainable in enormous quantities in their countries of origin. If manufactured here the production costs will be unremunerative.

18. (*a*) Yes; in only two of the raw materials, *viz.*, bauxite and magnesite, we get a small concession in Railway Freight.

(*b*) & (*c*) Yes, our contention is that the freights on these raw materials, particularly on bauxite, magnesite and bones, should be reduced still further in the case of Home Manufacturers.

19. (*a*) Yes.

(*b*) Yes.

20. (*a*) Yes, Sulphur and Soda Nitrate.

Sulphur by native supplies of iron and copper pyrites and zincblende. Soda Nitrate by Potash Nitrate.

(*b*) (*i*) Pyrites are known to exist in some of the Central Indian States such as Sirohi and in Baluchistan and Afghanistan. In the latter two places sulphur too is said to exist. Zincblende is found in Burma.

Nitrate of Potash is already being produced in Punjab, Bihar and U. P. and with sufficient facilities as mentioned in the Industrial Commission Reports, the supplies would be increased and the prices so reduced as to supplant the use of Sodium Nitrate and Potash Sulphate.

(*ii*) It is not possible to exactly guess what the reduction would be until the possible sources are tapped.

21. No; in the case of none of our products, is there a possibility of wholesale stoppage, due to stoppage of imports, as the imported materials are almost all obtainable in many countries and also because they can be replaced by similar materials in India, if necessity arises.

22. (*a*) Only one—*i.e.*, Soda Nitrate in the natural state is a monopoly of Chili but substitute for this such as Potash Nitrate or Synthetic Nitrate will serve the purpose satisfactorily.

(*b*) Some of the potash salts are controlled by combines but they can be very well replaced by other salts that are not so controlled and are available in India.

Labour.

23. In processes of Chemical manufacture expert supervision is always necessary, but at the present time, there is sufficient skilled labour available in the country.

24. None.

25. (*a*) All imported labour has now been dispensed with and replaced by Indian hands.

(*b*) Even now no imported labour is wanted.

(*c*) All facilities are given to apprentices who come with certain minimum qualifications.

26. As we are using no imported labour now there is no room for comparison. At one time some imported labour was used but it was found to be more costly.

27. Strength of labour employed till December 1927 was 200.

Skilled labour Rs. 2 to Rs. 3-8 per day.

Ordinary labour Re. 1 to Rs. 1-8 per day.

				Rs.	A.	P.
28. October 1927 to August 1928 (both inclusive)				35,674	15	5
,, 1926 to September 1927 (both inclusive)				54,238	7	1
,, 1925 to ,, 1926 ,, ,,				47,639	13	3
,, 1924 to ,, 1925 ,, ,,				40,736	5	4
,, 1923 to ,, 1924 ,, ,,				59,613	13	4

No wholesale increase in wages was found necessary.

29. (*a*) Quite sufficient.

(*b*) Both from the vicinity and other parts of the Presidency. It is always available at the spot.

30. (*a*) Yes.

(*b*) Comparing the climatic conditions and the low rates of wages, the efficiency percentages compare favourably.

31. We have our quarters erected for the housing of labour, we have also medical, sanitary and educational arrangements.

Power (including) Fuels.

32. (*a*) Both Electric and Steam.

(*b*) For steam both coal and oil are used and are available in sufficient quantities from the nearest market, Bombay.

33. The total quantity of fuel whether for power production or for other purposes is 0·33 ton of Crude Oil and 0·5 ton of Coal.

34. (*a*) Coal at Rs. 6 per ton; Crude Oil at Rs. 39 per ton.

(*b*) Coal at Rs. 17-18 per ton; Crude Oil at Rs. 45 per ton.

35. (*a*) Produced at Works by Diesel Engine using Crude Oil as Fuel, the cost being 1 anna per unit.

(*b*) It compares favourably with the power supplied by Bombay Development Department here which is about As. 2 per unit but not so with Electric Power supplied by Tatas at Bombay which has not been yet available here. It is, however, cheaper than other sources of supply in India, the minimum rate being ·55 of an anna per unit. As far as we are aware in other countries power supplied to Industry is cheaper, the highest being ·5 of an anna per unit.

(*c*) The power consumed per ton of all products taken together amounts to 22 Kw.

36. *Markets.*

Sulphuric Acid	20,000 to 22,000 tons.
Hydrochloric Acid	500 to 600 tons.
Nitric Acid	500 to 600 tons.
Phosphoric Acid	13·5 tons our average production per year. Nobody else makes it.
Zinc Chloride	Our production 5·5 tons average. Nobody else to our knowledge is making it yet.
Epsom Salt	2,500 to 3,000 tons.
Alum of Potash	800 to 1,000 tons.
Copperas	800 to 1,000 tons.
Copper Sulphate	100 tons.
Glauber's Salt	1,000 tons.
Soda Sulphide	Not definitely known. We made 12 tons per year average.
Alumina Ferric	1,000 tons.
Bone Superphosphate	300 tons.
Bone Meal	100,000 tons.
Mixed Fertilisers	3,000 tons.
Pure Products	Not definitely known. 35,000 lbs. is our annual average.

N.B.—The figures given above are only approximate and to be considered as an annual average for the last five years.

37. Commercial Acids—

	Tons.
Sulphuric Acid	23,000
Hydrochloric Acid	600
Nitric Acid	600
Phosphoric Acid	300
Commercial Salts—	
Alum Potash	4,000
Copper Sulphate	700
Epsom Salt	5,000
Glauber's Salt	3,000
Zinc Chloride	1,200
Alumina Sulphate	4,000
Copperas	1,500
Soda Sulphide	1,500

Chemical Fertilisers: 30,000 tons. Demand is increasing every year.

Pure Chemicals: Demand varied and large. Actual figures cannot be obtained. The demand for acids is practically supplied by the indigenous production. Before the war supplies used to come from foreign sources. Since, however, as a number of plants sprang up as a result of the war, foreign importations were stopped. Recently again some quantities are supplied from abroad, because of foreign surplus production and the advantage arising out of the exchange rates.

38. It is only in the case of acids that the supply is actually equal to the present demand. In all other cases the demand is much greater than the total Indian outturn. The demand for acids will increase according as new Industries are started and the existing ones are further developed. In the case of acids specially, the capacity for production is no doubt much greater than the existing demand, and the production of this excess capacity can be easily utilised by the production of other chemicals which are being imported, but can be made in India under proper encouragement.

39. The principal markets are: Bombay, Ahmedabad, Karachi, Nagpur, Bangalore, Secunderabad, Southern Maratha Countries, Sholapur, Baroda, Poona, Cawnpore, Lucknow, Agra, Delhi. The statement supplied to our answer to question No. 53 gives the distances required.

40. (*a*) No; on the contrary the importers are at an advantage inasmuch as they have to pay lower freights to a number of up-country markets, though the mileage between Bombay and those stations is greater than Ambernath and those stations.

(*b*) There are no such markets.

41. Yes; at least to countries like Japan, Burma, Java, Eastern Peninsula, China, Afghanistan, Persia and Africa; because our labour and some of the raw materials are cheaper in India than in Western Countries and these are markets nearer to us than to Western Countries. Besides, these countries do not possess chemical works in sufficient number. We are not in a position to exactly state what quantities can be exported to these places. As instances in point we may mention that the surplus products of the Turpentine & Rosin Co., Ltd., and some of the products of The Mysore Iron Works and Tata Iron Works, *e.g.*, sulphate of ammonia, Lime Acetate, etc., have already established an export market in foreign countries.

42. (*a*) Yes; both by Government and Public Bodies such as Railways, Municipalities, etc.

(*b*) (*i*) During the war our works did not exist.

(*ii*) Table showing chemicals purchased by Government and Public Bodies during five years 1923 to 1927:—

Products.	1923.		1924.		1925.		1926.		1927.	
	Quantity.	Rate per ton.	Quantity.	Rate per ton.	Quantity.	Rate per ton.	Quantity.	Rate per ton.	Quantity.	Rate per ton.
	T. C. lbs.	Rs. A. P.	T. C. lbs.	Rs. A. P.	T. C. lbs.	Rs. A. P.	T. C. lbs.	Rs. A. P.	T. C. lbs.	Rs. A. P.
Sulphuric Acid . .	0 14 0	208 0 0	33 8 0	197 13 0	50 8 0	168 9 0	72 5 0	171 13 0	94 0 0	137 8 0
Hydrochloric Acid .	0 18 28	401 11 0	4 5 0	303 13 0	5 18 0	233 1 0	8 10 56	298 12 3	11 15 0	230 14 0
Nitric Acid . .	4 17 56	689 4 0	7 8 0	600 0 0	9 3 0	495 0 0	13 1 0	537 3 10	3 6 0	774 0 0
Alumina Ferric .	*Nil.*	*Nil.*	48 0 0	125 0 0	79 12 63	131 4 0	71 4 8	112 5 4	82 13 56	115 8 0
Copper Sulphate .	*Nil.*	*Nil.*	2 10 0	400 0 0	6 2 0	420 14 0	1 8 0	380 0 0	3 11 0	363 0 0
Pure Acids . .	*Nil.*	*Nil.*	*Nil.*	*Nil.*	1,550 lbs.	0 10 10 (per lb.)	7,932 lbs.	0 14 1 (per lbs.)	19,406 lbs.	0 13 1 (per lb.)
Pure Salts . .	*Nil.*	*Nil.*	*Nil.*	*Nil.*	5 lbs.	0 14 0	932 lbs	0 10 2	2,957 lbs.	0 12 5
Saltpetre for blue composition.	*Nil.*	*Nil.*	*Nil.*	*Nil.*	*Nil.*	*Nil.*	*Nil.*	*Nil.*	T. C. lbs. 4 15 0	560 0 0

(*c*) We are not concerned with this question, inasmuch as we started our manufacture after the war.

Foreign Competition.

43. England, Germany and Japan to some extent.

44. Main difference in conditions lies in the quantities and varieties produced in those countries. Productions are made there on a mass scale which enables the manufacturers there to produce at lower unit costs. The number of industries consuming chemicals in those countries are much more than what exist at present in this country.

45. Conditions in India have led us to adopt processes and plants for smaller productions which naturally entail higher production costs. We have to import machinery and plant from abroad while the foreign manufacturers have them practically at their door, the effect being that we have to invest proportionately larger capital for smaller production.

46. Here below we give a statement showing the average c.i.f. prices per year for five years from 1924 to 1928:—

Average c.i.f. prices—Bombay Port.

Materials.	1924.	1925.	1926.	1927.	1928.
	£ s. d.	£ s. d.	£ s. d.	£ s. d.	£ s. d.
Potash Alum . .	8 7 6	8 16 0	8 7 0	8 10 6	8 17 6
Alumina Sulphate . .	7 16 3	7 7 0	5 18 9	5 17 6	7 2 6
Copper Sulphate . .	23 0 0	24 2 6	24 10 0	26 5 0	24 0 7
Copperas . . .	5 12 9	5 16 6	5 15 0	5 16 3	5 15 0
Zinc Chloride . .	24 10 0	27 5 0	22 15 0	22 0 0	20 10 0
Epsom Salt . . .	5 5 0	4 10 6	4 0 0	3 13 3	4 4 6
Sodium Sulphide (60-62 per cent.).	13 0 0	12 3 6	10 17 6	11 0 9	9 9 3
Glauber's Salt . .	5 0 0	4 10 3	4 15 0	4 6 3	4 0 0

(*d*) Customs duty on all the above products is 15 per cent. *ad valorem* except on Copperas where a duty of 2½ per cent. is levied.

(*e*) Landing charges (*i.e.*, Port Trust charges) on all the above production are Rs. 3 per ton.

(*ii*) The following table shows the prices realised by us for each product for each of the past five years:—

No.	Products.	1924.	1925.	1926.	1927.	1928.
		Rs.	Rs.	Rs.	Rs.	Rs.
1	Sulphuric Acid 1·84 . .	218·6	188·7	165·1	173·5	224·0
2	Hydrochloric Acid . .	358·8	451·4	232·3	253·5	289·4
3	Nitric Acid	679·0	554·3	554·8	595·5	781·5
4	Copperas	70·0	66·1	60·1	65·8	81·1
5	Glauber's Salt . . .	65·5	78·4	66·5	73·6	66·6
6	Zinc Chloride . . .	265·1 (60 per cent.)	290 0 (60 per cent.)	252·9 (60 per cent.)	353·3 (solid).	*Nil.*
7	Alumina Ferric . . .	125·0	131·0	110·0	110·0	100 0
8	Alum Potash . . .	146·5	132·9	133·9	128·2	130·1
9	Copper Sulphate . . .	...	403·0	368·7	376·3	416·9
10	Phosphoric Acid . . .	0-5-6 (per lb.)	0-5-6 (per lb.)	0-5-6 (per lb.)	0-5-6 (per lb.)	0-5-9 (per lb.)
11	Soda Sulphide . . .	...	...	...	200·0	...
12	Epsom Salt . . .	...	...	...	73·5	74·4
13	Pure Acids (S. A., H. A., and N. A.) (average).	...	0-10-10 (per lb.)	0-14-0 (per lb.)	0-13-0 (per lb.)	0-13-0 (per lb.)
14	Pure Salts	...	...	0-10-0 (per lb.)	0-12-6 (per lb.)	0-10-8 (per lb.)

N.B.—The prices for Zinc Chloride in the years 1924-1926 are for 60 per cent. product, which we were then manufacturing.

47. (*a*) From information received from our Agents abroad as well as foreign and Indian Journals and publications.

(*b*) Fairly reliable,—as has been often tested from actual market conditions prevailing in Bombay which is one of the largest importing port.

48. (*a*) As far as we are concerned the I. G. F. in Germany and the I. C. I. in England are the two big trusts which practically control all the imports of chemicals into India.

(*b*) & (*c*) The Imperial Chemical Industries, Ltd., came into existence towards the end of 1926, by the amalgamation of the four largest concerns in Great Britain, *viz.*, the Brunner, Mond & Co., Nobel Industries, Ltd., The United Alkali Co., Ltd., and the British Dyestuffs Corporation, Ltd., together with all the subsidiaries under these four and many others. Some of the producers of sulphate of ammonia even in India had perforce to join this great combination for fear of being throttled.

The principal object with which this combination was incorporated was to minimise the internal competition in the United Kingdom which after the war was found to be keenest and to control the whole of the chemical and allied trade of the British Dominions, Crown Colonies, Dependencies and mandated territories. This has thus become a formidable menace to small Indian concerns.

The general activities of this combine tend over a very large field of industries, *e.g.*, acids, alkalies, nitrogenous products, chlorine products, cements and limes, explosives, ammunitions, naval and military equipments, dyestuffs, chemical fertilisers, paints, varnishes and lacquers, polishes, cellulose, etc., in fact not a sigle chemical industry or any of the other allied industries left out of their sphere of operation.

As far as it can be ascertained from reports, the financial strength of this big trust is £100,000,000.

The I. G. F. in Germany was formed about the same time, amalgamating about 100 German concerns engaged in chemical and allied industries, similar to those stated above. The object is to regain the pre-war status of the German Chemical Industry in the world.

Its financial position may be somewhat lower than the British combine. The capital of the combine is 1,100 million marks as it stood in 1927.

Between these two the existence of any Indian Chemical Concern will become impossible unless all legitimate protection is granted to the indigenous industry by the Government.

49. That there has been dumping going on at an increasing rate since the close of the war is a fact. But it is not possible to bring this home by direct evidence, *i.e.*, by comparing the export prices in foreign countries with the cost prices of the manufacturers, because the latter figures are not made available; and again combines have a number of manufacturers within their hold and they adjust the export prices of different chemicals as may suit their policy and purpose. We have, therefore, depended on indirect and circumstantial evidence only, of which we have enough.

(*a*) In the first place we shall start with value figures per ton of the Indian Customs Tariff and see how things appear. Here below we give a statement and a graph for five years 1922-1927.

No.	Materials.	1922-23.	1923-24.	1924-25.	1925-26.	1926-27.	Percentage.
		Rs.	Rs.	Rs.	Rs.	Rs.	
1	Alum Potash . .	225·4	189·44	161·07	141·6	130·9	42% reduction.
2	Alumina Sulphate .	154·4	136·8	99·5	75·7	80·5	48% ,,

No.	Materials.	1922-23.	1923-24.	1924-25.	1925-26.	1926-27.	Percentage.
		Rs.	Rs	Rs.	Rs.	Rs.	
3	Copper Sulphate .	498·8	409·0	363·2	349·5	368·5	25% reduction.
4	Copperas . . .	95·6	79·5	86·8	98·1	90·6	...
5	Zinc Chloride . .	414·3	406·4	369·1	330·7	300·2	28% reduction.
6	Epsom Salt . .	92·7	66·2	155·2	80·8	70·5	24% ,,
7	Soda Sulphide . .	338·1	258·2	202·5	176·8	146·1	57% ,,

N.B.—Here we have considered such chemicals only as we have been manufacturing for the last few years.

From the above statement it will be clear that in every instance the prices have gradually gone down from year to year. For instance, take Soda Sulphide, price in 1922-23 was Rs. 338 per ton at Bombay Port and the same for 1926-27 stands at Rs. 143. There is thus a reduction of 57 per cent. in price. Take the case of Alumina Sulphate. The price in 1922 was Rs. 154 per ton. In 1926-27 it comes to Rs. 80 only. The reduction is evidently 48 per cent. Take the case of Copper Sulphate, and we find the price going down from Rs. 498 per ton to Rs. 368 per ton in five years. Alum of Potash has gone down from Rs. 225 to Rs. 130 per ton during the same period showing a lowering in price per ton to the extent of 32 per cent.

There is no reason to suppose that during these years there have been any special changes in the processes of manufacture or reductions in labour costs, equipments or raw materials, etc., which only can bring about a decrease in manufacturing costs and account for a consequent lowering in sale prices. The world situation on the contrary since after the war, as is very well-known, has been towards the increase in labour and raw material costs, and in fact, in everything. Thus, there should rather be an increase instead of a decrease in manufacturing costs and consequently in sale prices. But, here the fact, as it appears, is otherwise. The observed change in condition of manufacture since the war has been an over-production of chemical commodities due to the fact that war-time plants for the manufacture of explosives and ammunitions have been put to the service of peace-time chemical production. And this excess production has naturally been running up to unprotected or inefficiently protected markets like that of India at whatever prices they can fetch. Manufacturing countries like England, Germany, the United States of America, and France have introduced their statutes measures to prevent a rush of the over-production of other countries into their markets. The safeguarding of Key Industries Act in Great Britain and similar Legislative Acts in other countries are evidence in point.

We have another evidence of dumping, *viz.*, a comparison of market prices in England and c.i.f. prices at the Bombay Port. We have collected price figures of English markets from prices published in current English papers and the c.i.f. prices from those supplied to us from our Agents in London

(*b*) & (*c*) We give below a statement showing these for the years 1924 to 1928:—

Materials.	English quotations per ton.					C.I.F. prices Bombay Port.				
	1924.	1925.	1926.	1927.	1928.	1924.	1925.	1926.	1927.	1928.
	£ s. d.	£ s. d.	£ s. d.	£ s. d.	£ s. d.	£ s. d.	£ s. d.	£ s. d.	£ s. d.	£ s. d.
Potash Alum . .	10 14 0	9 1 0	7 16 0	8 5 0	8 6 0	8 7 6	8 16 0	8 7 0	8 10 0	8 17 6
Alumina Sulphate 17-18 per cent.	9 2 0	6 14 0	5 9 0	5 10 0	5 8 0	7 18 3	7 7 0	5 18 9	5 17 0	7 2 6
Copperas . . .	2 15 0	3 6 0	4 0 0	4 12 6	4 12 6	5 12 9	5 16 6	5 15 0	5 16 3	5 15 0
Copper Sulphate .	24 15 0	23 14 0	23 7 6	23 3 0	23 8 0	23 0 0	24 2 6	24 10 0	26 5 0	24 0 7
Zinc Chloride (solid)	24 7 0	23 15 0	23 15 0	24 15 0	24 15 0	24 10 0	27 5 0	22 15 0	22 0 0	20 10 0
Glauber's Salt .	3 18 0	4 0 0	4 0 0	4 0 0	4 0 0	5 0 0	4 10 3	4 15 0	4 6 3	4 0 0
Soda Sulphide (60-62 per cent.)	15 1 0	14 1 0	13 5 0	10 10 0	9 1 0	13 0 0	12 3 6	10 17 6	11 0 9	9 9 3
Epsom Salt . .	7 7 0	5 15 0	5 15 0	...	...	5 0 0	4 10 6	4 0 0	3 13 3	4 4 0

From this statement it will be evident that in the majority of cases, for example Potash Alum, Alumina Sulphate and Copper Sulphate, Magnesium Sulphate and Zinc Chloride, c.i.f. prices at the Bombay port have almost invariably been lower than the prices prevailing in England. In other cases like that of Glauber's Salt and Soda Sulphide the prices are almost equal at both places.

Really speaking when ocean freights, insurance and better packing for exports are considered, the c.i.f. prices for Bombay should be at least £2 higher than the prices ruling in England.

The lowering down of prices made apparent by the above tables, incontrovertibly proves that foreign combines are dumping their surplus production in this market at unremunerative prices, because it is unprotected.

A third kind of evidence can be advanced by showing that in certain instances the imports have been very much higher than the average previous normal quantities. Two outstanding cases may be cited. The average import of Copper Sulphate has been below 500 tons before 1925-26, when the prices were above Rs. 400 per ton. The prices came down to Rs. 350 per ton and the imports suddenly rise up to about 850 tons. In the case of Soda Sulphide a similar sudden rise of about 200 per cent. takes place as soon as the price per ton goes down to Rs. 146. Such sudden leaps in imports depending upon lowering of prices are in our opinion also an indisputable evidence of dumping.

There is still another way of evidencing that dumping has been going on. We give below a comparative table showing the maximum market prices at Bombay (the main port of imports) and the market prices that should be, taking the c.i.f. prices as the basis. The items of expenditure that have to be added on c.i.f. prices to arrive at correct market prices are:—

(1) Customs duties at 15 per cent. *ad valorem* except on copperas.

(2) Landing charges Rs. 3 or sh. 4-6 per ton for all chemicals.

(3) Carriage to importer's godown—Average Rs. 3 per ton or sh. 4-6.

(4) Godown and shop expenses of the importer—at least 7 per cent. on c.i.f. prices.

(5) Importers' profits—at least 8 per cent. on his total costs.

No.	Materials.	Market prices that should be			Market prices current.		
		1926.	1927.	1928.	1926.	1927.	1928.
		Rs. A.	Rs. A.	Rs. A.	Rs. A.	Rs. A.	Rs. A.
1	Potash Alum . . .	158 0	161 11	166 5	145 0	126 0	132 0
2	Alumina Sulphate . .	104 9	114 9	135 4	132 0	122 8	100 0
3	Copper Sulphate . . .	437 11	476 13	500 2	395 0	418 0	435 0
4	Copperas	100 12	101 14	100 12	60 12	67 8	82 0
5	Zinc Chloride . . .	410 2	400 14	375 10	355 10	334 7	310 0
6	Epsom Salt	80 10	73 7	83 8	70 12	71 12	65 0
7	Sodium Sulphide . . .	202 13	205 15	178 2	188 12	185 0	160 0
8	Glauber's Salt . . .	93 4	86 2	80 10	78 10	74 0	65 8

It will be evident from the above table that in almost every case the current market prices have been lower than the prices that should reasonably prevail. The reason for this is to be found, as we see, in the fact that the foreign combines have their offices and their agents in the market and they control the market prices probably by a system of discounts and rebates given to merchants purchasing for them.

From what has been said above, regarding this question, it is, we believe incontestably proved that 'dumping' is resorted to.

50. (*a*) No.

(*b*) This question does not arise.

51. In the country as a whole, at all the big ports—Calcutta, Bombay, Karachi and Madras specially.

52. (*a*) Yes; as the following table and the chart will conclusively prove:—

Valuation per ton for each of the last five years obtained from Sea-Borne Trade Reports.

Materials.	1922-23.	1923-24.	1924-25.	1925-26.	1926-27.
Alum Potash	225·35	189·44	161·07	141·6	180·9
Alumina Sulphate	154·40	136·8	99·5	75·7	80·5
Copper Sulphate	498·8	409·0	363·2	349·5	365·5
Copperas	95·6	79·5	86·8	98·1	90·6
Zinc Chloride	414·3	406·4	369·1	330·7	300·2
Epsom Salt	92·7	66·2	155·2	80·8	70·5
Soda Sulphide	338·1	258·2	202·5	176·8	146·1

(*b*) Mainly to over-productions caused by the war time factories for explosive chemicals being transformed into factories for the production of industrial products, and the competition between the different producing countries having become keener to capture the Indian market.

(*c*) This state of things will continue as long as the Indian markets are left freely open to imports. Practically all countries in the world are protecting their own Chemical Industries while Indian has even reduced the little measure of protection to this industry, in recent years.

53. We give below the sea freights from the United Kingdom and the Continent for the chemicals we are interested in. These rates were in force in 1925. The table given under reply to question 54 gives the Railway freights from Bombay port to upcountry markets.

Freight on heavy chemicals.

Description.	1925.		1928.
	From United Kingdom.	From Continent.	From Rotterdam or Hamburg to Bombay per ton of 1015 Kilos.
Glauber's Salt	sh. 40-0 per ton	sh. 23-9 per ton	sh. 31-0 per ton.
Iron Sulphate	,, 35-0 ,,	,, 27-6 ,,	,, 38-0 ,,
Lump Alum	,, 22-6 ,,	,, 20-0 ,,	,, 24-0 ,,
Soda Sulphide	,, 75-0 ,,	,, 25-0 ,,	,, 26-0 ,,
Alumina Sulphate . . .	,, 22-6 ,,	,, 21-0 ,,	,, 24-0 ,,
Zinc Chloride	,, 65-0 ,,	,, 23-9 ,,	,, 36-0 ,,
Acid –			
Sulphuric	...	...	,, 95-0 ,,
Hydrochloric			
Nitric			

The rates from United Kingdom are subject to 10 per cent. primage. Continental rates bear no primage. Continental rates are from Hamburg and Antwerp; they usually apply to Rotterdam also.

54. The table below will show that the rail freights from Bombay—the main port of imports—are less than those from Ambernath to the several important inland markets.

Stations.	Miles From.			Potash Alum.			Copperas.			Glauber's Salt.		
	Ambernath.	Wadibunder.	Carnac Bridge.	Ambernath.	Wadibunder.	Carnac Bridge.	Ambernath.	Wadibunder.	Carnac Bridge.	Ambernath.	Wadibunder.	Carnac Bridge.
				Rs. A. P.	Rs. A. P.	Rs. A. P.	Rs. A. P.	Rs. A. P.	Rs. A. P.	Rs. A. P.	Rs. A. P.	Rs. A. P.
Cawnpore	811	839	992	1 6 6	1 6 5	1 7 6	1 6 6	1 6 5	1 7 6	1 13 5	1 8 6	1 9 7
Delhi	928	957	862	1 14 5	1 10 8	1 9 8	1 14 5	1 10 8	1 9 8	2 1 6	1 13 4	1 12 4
Agra	806	835	...	1 10 6	1 9 2	...	1 10 6	1 9 2	...	1 13 3	1 11 9	..
Bangalore City	654	692	...	1 6 1	1 5 3	...	1 6 1	1 5 3	...	1 8 4	1 7 0	...
Lucknow	857	884	...	1 12 6	1 8 7	...	1 12 6	1 10 10	...	1 15 5	1 10 10	...
Allahabad	821	850	...	1 11 5	1 2 9	...	1 11 5	1 2 9	...	1 14 2	1 4 7	...
Bombay	38	...	...	0 2 5	...	...	0 2 5	...	...	0 2 7	...	...

				Copper Sulphate.			Sulphuric Acid.			Nitric Acid.		
Cawnpore	811	839	992	2 4 2	2 4 2	2 5 2	3 9 1	2 15 3	3 0 3	5 5 6	4 5 4	4 5 4
Delhi	928	957	862	3 0 11	2 10 3	2 9 5	4 1 2	3 7 11	3 6 11	6 1 8	5 3 4	5 2 4
Agra	806	835	...	2 10 8	2 8 9	...	3 8 9	3 6 5	...	4 6 10	5 1 8	...
Bangalore City	654	692	...	2 2 7	2 0 1	...	2 14 8	2 10 6	...	4 5 7	4 4 10	...
Lucknow	857	884	...	2 13 9	2 7 8	...	3 12 7	3 3 1	...	5 10 7	4 10 4	...
Allahabad	821	850	...	2 11 10	1 13 11	...	3 10 2	2 6 8	...	5 7 0	3 11 4	...
Bombay	38	...	...	0 3 3	...	...	0 3 8	...	...	0 5 0	...	...

In few cases special wagon rates have recently been granted by the G. I. P. Ry. administration but these can scarcely be taken advantage of yet because our orders are generally not for wagonloads at a time except in the case of Bombay.

55. (*a*) Yes; because the foreign manufacturers get their supply almost at their door and have no transport or other charges to bear while we have to bear heavy charges in this respect.

(*b*) Not now in the initial stages.

(*c*) No.

(*d*) Inasmuch as we have to pay higher Railway freights.

(*e*) Yes; to some extent, because of higher transport charges.

(*f*) Not except what has been referred to in question (54).

(*g*) Yes; stocks and spares have to be kept in store for a longer period and in greater quantities than the foreign manufacturers who can get them nearer home.

(*h*) No.

(*i*) Yes; partly, because the interest rates in India are higher than those prevailing in other countries.

56. (*a*) Until such time as machineries are made in India, which does not seem likely in the near future.

(*b*) Until the Government persuades the Transport Companies to reduce their freights to a reasonably low figure.

(*c*) The consumption of raw materials and commercial products because as a consequence of further development of the industry.

(*g*) As expended in (*a*).

Internal Competition.

57. (*a*) and (*b*) Not much, except in the case of commercial acids, *e.g.*, sulphuric, hydrochloric and nitric. All the acid plants in India taken together are capable of producing more acids than are actually in demand in their native form to-day.

In the Bombay Presidency we have for example two big plants, *viz.*, The Eastern Chemical Co. and The Dharamsi Morarji Chemical Co., Ltd., situated near each other. Both the concerns have had to cater to the same clientage, as regards the supply of commercial acids, thus giving rise to an unhealthy competition.

In the case of commercial and pure salts, *e.g.*, Epsom Salt, Copperas, Alum, etc., we find no such competition.

58. Since we put our acids in the market in 1922 till the end of 1926, the competition in the sales of acids was very keen from the Eastern Chemical Co. Realising the evil effects of this competition both these companies have arrived at a temporary understanding which is in operation to-day and the trouble has ended for the time being.

Equipment.

59. (*a*) If we compare our plants with those of foreign manufacturers our units are far smaller and entail higher equipment costs. But considering the present demand and conditions in India, the plants are quite large and economic units if they are worked to full capacity. But success can only be achieved for this Industry only with proper protection.

(*b*) Our Works with a production capacity of 8,000 tons of sulphuric acid per annum and all the chemicals and acids made from this basic material can be considered an economical plant.

60. Yes.

61. Total outlay—Rs. 39,00,000.

Plant and Machinery—Rs. 9,89,000.

Percentage—25·6 per cent.

62. The following is the brief description of our various plants:

(1) *Sulphuric Acid Plant:* It is the Moritz type chamber plant supplied by Messrs. Simon Carves Ltd., of Manchester. This consists of eight hand-fired sulphur burners, two C. I. Nitre pots for charging nitre, a Glover Tower, two Gay Lussac Towers, four chambers (each measuring 55′×18′×45′). The acid for circulation to the towers is obtained with the help of four Kestner automatic lead-lined elevators. Two Ingersoll Rand Air Compressor supply the air required for elevating work. Two high pressure water pumps deliver the water into the chamber system. The water is first filtered through sponge and sand filters (pressure type) and allowed to go into chambers through fine atomising sprays.

(2) *Sulphuric Acid concentrating plant:* Consists of two "Vitreosil" concentrating systems, supplied by the Thermal Syndicate Ltd., each capable of producing 4/5 tons of sulphuric acid of 95/96 per cent. strength per 24 hours. The furnaces can be fired either by coal or oil fuel. The system is provided with a scrubber arrangement for absorbing uncondensed vapours of acid. The hot concentrated acid coming out of the Cascade plant is cooled in water jacketed Silica and lead coolers, before storing.

(3) *Nitric Acid Plant:* Consists of a Cast Iron three sectional retort attached with "Vitreosil" S-pipe condensing plant and an earthenware tower packed with earthenware rings to absorb completely the gases escaping from the condensing system. The acid made is stored in a battery of earthenware jars.

(4) *Hydrochloric Acid Plant:* The plant is worked on the "Plus-Pressure system" and consists of (1) a C. I. Pan set in proper brick-work with a dome to catch the evolved gases and convey them to the absorbing system, (2) a hand-worked muffled furnace to roast the bisulphate and salt mixture formed in the pan, (3) an absorption system, with six sand-stone condensing cisterns and two sandstone towers packed with coke, (4) a Kestner Automatic acid elevator (lined internally with Ebonite) for the circulation of acid on the towers. The plant is equipped with two oil burners for heating purposes.

(5) *Phosphoric Acid:* Consists of several lead-lined dissolving vats, a series of leaching tanks and a couple of concentrating pots.

(6) *Glauber's Salt:* The plant consists of:

(*i*) C. I. dissolver, with false bottom, for dissolving salt cake.

(*ii*) An iron settler.

(*iii*) A pressure filter press with the necessary pump.

(*iv*) Crystallising tanks.

(*v*) A mother liquor storage tank, and

(*vi*) A pump to deliver the mother liquor into the dissolver.

(7) *Zinc Chloride:* This plant is capable of producing both liquid and solid Zinc Chloride and is provided with:

(1) A sandstone dissolver with proper lining,

(2) A settler lined with proper acid proof tiles,

(3) A filter press for filtering the liquor,

(4) Two lead-lined concentrators for making liquid zinc chloride, and

(5) A concentrating pot properly set in furnace, for making solid zinc chloride.

(8) *Copperas Plant:* The plant comprises of:—

(1) A leadlined dissolver for dissolving iron scraps,

(2) One leadlined evaporator with steam coils inside,

(3) Four leadlined crystallisers, and

(4) A leadlined mother liquor tank provided with a Duriron ejector.

(9) *Copper Sulphate Plant:* This plant has:—

(1) C. I. glass enamelled dissolver.

(2) A leadlined leaching and settling vat.

(3) Four leadlined crystallisers and a mother liquor storage tank fitted with Duriron ejector.

(10) *Epsom Salt Plant:* This plant has a tank for dissolving Magnesite A series of crystallising tanks and a couple of centrifugal machines.

(11) *Alumina Ferric Plant:* This plant has several leadlined dissolvers for dissolving bauxite and a number of wooden settlers. The liquor is concentrated in leadlined evaporators fitted with steam coils. The concentrated liquor is set in C. I. moulds.

(12) *Alum Potash Plant:* The plant consists of:—

(1) Leadlined dissolvers for making Alumina Ferric and Potash Alum.

(2) Large size settlers.

(3) Crystallisers.

(4) Melting pots (leadlined and fitted with steam coils inside) for melting the crystals.

(5) Leadlined moulds for Lump Alum.

(6) Leadlined mother liquor tank provided with proper ejectors.

(13) *Soda Sulphide Plant:* Consists of the following:—

(1) Oil fixed reverberatory furnace.

(2) A system of leaching vats for the extraction of sodium sulphide from the melt.

(3) Two coal fired furnaces holding two C. I. concentrating pots for the production of solid sodium sulphide.

(14) *Pure Chemicals and Acids:* The department has necessary equipments of varied type.

(15) *Bone Mill Plant:* The plant is equipped with the following:—

(1) Bone Crusher.

(2) A Bone Disintegrator, sledge hammer type from which the crushed bones are taken up by a bucket elevator, to an automatic "Neago" Screen for getting Fine Bone Meal, and a revolving screen for getting Bone Meal of different grists.

A big bin as provision for the storage of a large quantity of Bone Meal. The whole system is enclosed and a powerful suction fan draws all the dust into a dust filter wherein the bone dust is collected and thus the atmosphere is kept clean and healthy.

(16) *Bone Superphosphate Plant:* An automatic bucket elevator conveys the Bone Meal into two automatic weighing machines. The Bone Meal after being weighed falls into two C. I. mixers wherein the same is treated with sulphuric acid fed from an acid storage tank. There is provision for weighing the acid in another, automatic weigher. The superphosphate thus made is discharged into wooden dens. The poisonous gases evolved are absorbed in a scrubber.

(17) *Fertiliser Mixing Plant:* Consists of a Disintegrator provided with an elevator for conveying different ingredients. The crushed material passes through a seive before being bagged and weighed.

63. Yes.

When the plants were purchased in 1919 in England they were considered all to be up-to-date. Rapid changes in Europe and elsewhere have taken place since then both in Plant equipment and processes of manufacture, thus necessitating replacements and modifications in some of our plants. These have received and are receiving our attention.

64. No new processes of ours have been adopted nor have we installed any new plants and machinery in replacement of or in addition to our original plants. Some changes have, however, been effected in the light of what has been stated in reply to question (63) and others to suit our requirements.

65. A few parts of our machineries are being manufactured in India; such as (1) Castings, (2) many spare parts, *e.g.*, elevators, nitre pots, cascade basin seatings, (3) Acid proof earthenware, etc.

Capital Account.

66. Block value as on 31st December 1927:—

(*a*) None.

(*b*) Rs. 29,000.

(*c*) Rs. 11,29,758.

(*d*) Rs. 9,89,186.

(*e*) Rs. 1,88,613.

67. The figures given in (66) do represent the various assets after depreciation has been written off, which amounts to Rs. 50,248 for the last five working years. The plants and machineries are maintained in working order by effecting repairs and renewals to the extent of over a lac of rupees during the last five years.

68. In our opinion the abovementioned depreciation is no doubt much less than should reasonably have been, but more allowance could not be made because of continued losses which the company had to sustain from year to year. But more than a lac of rupees have been utilised for repairs and renewals as mentioned above.

69. (*a*) The present valuation of the building would be about 60 per cent. of what has actually been spent, because when these buildings were constructed the prices of all constructional materials were higher.

(*b*) The present valuation of the plants and machinery would be about 50 per cent. of what has been spent, because the purchases were made just after the war when prices were high and exchange unfavourable. The operating costs would be just about the same as our present values.

70. (*a*) Rs. 50,00,000.

(*b*) Rs. 40,00,000.

(*c*) Rs. 31,70,782.

All shares are ordinary and of a face value of Rs. 100.

71. *Nil.*

72. *Nil.*

73. *Nil.*

74. None.

75. The additional capital required to carry out replacement and extensions would be about three lacs of rupees.

Cost of Production.

76. Cost sheets are attached as required by you.

FORM I.

Statement showing the aggregate expenditure incurred at the works on the total output of the Factory for each of the last three years.

No.	——	1924-25.	1925-26.	1926-27.
		Rs.	Rs.	Rs.
1	Raw Materials	99,046	99,022	1,15,326
2	Works labour	40,730	47,640	54,238
3	Power and Fuel	71,106	71,890	73,904
4	Repairs and Renewals	21,569	31,394	25,000
5	General Services and Supervision charges .	22,401	23,598	24,381
6	Rent, Taxes, Insurance, etc. . . .	5,400	5,400	5,400
7	Sales organisation	60,000	60,000	60,000
	TOTAL .	3,20,252	3,38,944	3,58,249

77 and 78. In none of the years under review have we worked any plant to full capacity.

Assuming that conditions are normal and an output is obtained equivalent to full capacity of the plant the works costs would be as per sheets attached.

FORM 2.

Cost Sheets.

FOR FULL CAPACITY.

Plants	Chamber Acid Plant.				Cascade Plant.			
Production	8,000 tons.				2,100 tons.			
——	Quantity.	Rate.	Value.	Cost per ton.	Quantity.	Rate.	Value.	Cost per ton.
	Tons.	Rs.	Rs.		Tons.	Rs.	Rs.	
Raw Materials— Sulphur	2,432	120	2,91,840	36·48	...	...	...	...
Sodium Nitrate	97	190	18,430	2·30	...	...	...	..
Sulphuric Acid Tower	97	40	3,680	0·46	2,335	45	1,05,075	50·04
Labour	...	...	5,000	0·63	...	...	5,000	2·38
Power and Fuel	...	...	11,200	1·40	...	...	19,992	9·00
Repairs and Renewals	...	...	8,000	1·00	...	...	2,100	1·00
General services and supervision charges.	...	...	7,440	0·93	...	..	1,197	0·57
Rent, Taxes, Insurance, etc.	...	...	12,000	1·50	...	...	3,150	1·50
Selling organisation	...	...	...	...	...	...	62,370	29·70
Packing charges	...	...	...	...	...	...	21,000	10·00
Ex-Works	...	...	...	44·70	...	...	...	104·19

Plants	Copperas.				Copper Sulphate.			
Production	200 tons.				200 tons.			
Raw Materials— Sulphuric Acid	72	45	3,240	16·20	170	65	11,050	55·25
Copper Scrap	...	...	...	...	54	800	43,200	216·00
Iron Scrap	42	10	420	2·10	...	...	...	...
Labour	...	...	700	3·50	...	...	1,000	5·00
Power and Fuel	...	...	120	0·60	...	...	400	2·00
Repairs and Renewals	...	...	200	1·00	...	...	200	1·00
General supervision and charges, etc.	...	...	78	0·39	...	...	520	2·60
Rents, Taxes, Insurance, etc.	...	...	300	1·50	...	...	300	1·50
Selling organisation	...	...	1,600	8·00	...	...	9,800	49·00
Packing charges	...	...	1,000	5·00	...	...	1,400	7·00
Ex-Works	...	...	...	38·39	...	...	...	339·3

Plants	Hydrochloric Acid.				Nitric Acid.			
Production	900 tons.				600 tons.			
——	Quantity.	Rate.	Value.	Cost per ton.	Quantity.	Rate.	Value.	Cost per ton.
Raw Materials—	Tons.	Rs.	Rs.		Tons.	Rs.	Rs.	
Sodium Nitrate	...	...	...	...	672	200	1,34,400	224·00
Sulphuric Acid	900	45	40,500	45·00	624	45	28,080	46·68
Salt	990	18	17,820	19·80	...	...	...	...
Labour	...	...	18,000	20·00	...	...	6,000	10·00
Power and Fuel	...	...	4,10,400	45·60	...	...	4,320	7·20
Repairs and Renewals	...	...	900	1·00	...	...	600	1·00
General services and supervision charges.	...	...	2,610	2·90	...	...	2,580	4·30
Rents, Taxes, Insurance, etc.	...	...	13,500	1·50	...	...	900	1·50
				135·8				294·68
Less—Cakes made	1,000	40	40,000	44·4	672	10	6,720	11·20
				91·4				283·48
Selling organisation	...	...	48,150	53·5	...	...	49,878	83·13
Packing charges	...	...	11,700	13·00	...	...	7,800	13·00
Ex-Works	...	...	...	157·90	...	...	...	379·61
Plants	Glauber's Salt.				Epsom Salt.			
Production	200 tons.				600 tons.			
Raw Materials—								
Sulphuric Acid	...	...	...	...	336	45	14,720	24·53
Nitre Cake	...	...	...	...	306	45	13,770	22·94
Salt Cake	120	40	4,800	24·00	...	...	...	...
Soda Ash	16	135	2,160	10·80	...	...	...	...
Nitric Acid	...	...	...	...	3	283	849	1·40
Labour	...	...	825	4·13	...	...	1,800	3·00
Power and Fuel	...	...	120	0·60	...	...	360	0·60
Repairs and Renewals	...	...	200	1·00	...	...	600	1·00
General services and supervision charges.	...	...	104	0·52	...	...	312	0·52
Rents, Taxes, Insurance, etc.	...	...	300	1·50	...	...	900	1·50
Selling organisation	...	...	1,840	9·20	...	...	5,520	9·20
Packing charges	...	...	1,400	7·00	...	...	4,200	7·00
Ex-Works	...	...	...	58·75	...	...	...	71·69

Plants	Zinc Chloride.				Phosphoric Acid.			
Production	300 tons.				150 tons.			
——	Quantity.	Rate.	Value.	Cost per ton.	Quantity.	Rate.	Value.	Cost per ton.
	Tons.	Rs.	Rs.		Tons.	Rs.	Rs.	
Raw Materials—								
Sulphuric Acid	...	...	...	...	174	45	7,830	52·2
Bones	...	...	..	...	594	70	41,580	277·2
Zinc Scrap	150	300	45,000	150·00	...	...	...	...
Hydrochloric Acid	495	92	15,540	51·80	...	..	...	...
Labour	...	...	1,350	4·5	...	...	5,700	38·00
Power and Fuel	...	...	2,400	8·00	...	...	90	0·60
Repairs and Renewals	...	...	300	1·00	...	...	150	1·00
General services and supervision charges.	...	...	600	2·00	...	...	660	4·40
Rents, Taxes, Insurance	...	...	450	1·50	...	...	225	1·50
Selling organisation	...	...	12,000	40 00	...	...	13,750	93·00
Packing charges	...	...	4,500	15·00	...	...	1,500	10·00
Ex-Works	...	...	...	273·80	...	...	... per lb.	477·90 As. 3-5

Plants	Sodium Sulphide.			
Production	250 tons.			
——	Quantity.	Rate.	Value.	Cost per ton.
	Tons.	Rs.	Rs.	
Raw Materials—				
Nitre Cake	240	10	2,400	9·60
Salt Cake	260	40	10,400	41·60
Coal Dust	343	15	5,145	20·58
Labour	...	...	5,000	20·00
Power and Fuel	...	...	10,075	40·30
Repairs and Renewals	...	...	250	1·00
General services and supervision charges.	...	...	260	1·04
Rents, Taxes, Insurance	...	...	375	1·50
Selling organisation	...	...	5,327	21·31
Packing charges	...	...	7,500	...
Ex-Works	...	...	...	186·93

Plants	Bone Meal.				Bone Superphosphates.			
Production	2,500 tons.				5,000 tons.			
——	Quantity.	Rate.	Value.	Cost per ton.	Quantity.	Rate.	Value.	Cost per ton.
	Tons.	Rs.	Rs.		Tons.	hs.	Rs	
Raw Materials— Sulphuric Acid	...	...	...	...	1,900	45	85,500	17·10
Bones	2,550	70	1,78,500	71·4	...	...	...	...
Bone Meal	...	...	...	...	3,350	77	2,57,950	51·19
Labour	...	...	5,000	2·0	...	..	20,000	4·00
Power and Fuel	...	...	3,450	0·60	...	...	6,900	1·38
Repairs and Renewals	...	...	2,500	1·00	...	...	5,000	1·00
General services and supervision charges.	...	...	1,625	0·65	...	...	3,250	0·65
Rents, Taxes, Insurance, etc.	...	...	3,750	1·50	...	...	7,500	1·50
Selling organisation	...	...	33,275	13·31	...	...	66,550	13·31
Packing charges	...	...	20,000	8·00	...	...	40,000	8·00
Ex-Works	...	...	...	98·46	...	...	...	98·13
Plants	Alumina Ferric.				Potash Alum.			
Production	1,000 tons.				600 tons.			
Raw Materials— Sulphuric Acid	470	45	21,150	21·15	228	45	10,260	17·10
Bauxite	360	25	9,000	9·00	174	25	4,350	7·25
Potash Sulphate	...	...	...	...	138	165	22,770	37·95
Labour	..	..	2,000	2·00	...	..	1,800	3·00
Power and Fuel	...	...	600	0·60	...	...	360	0·60
Repairs and Renewals	...	...	1,000	1·00	..	...	600	1·00
General services and supervision charges.	...	...	780	0·78	...	...	546	0·91
Rents, Taxes, Insurance	...	...	150	1·50	...	...	900	1·50
Selling organisation	...	...	13,310	13·31	...	...	10,320	17·20
Packing charges	...	...	1,000	1·00	...	...	4,800	8·00
Ex-Works	...	...	...	50·34	...	...	...	94·51

79. We have no elaborate system of cost accounting introduced yet because plants have to be worked only intermittently and no accurate allocation of different charges becomes possible.

FORM 2.

Cost Sheets.

Period.	1924-1925.				1925-1926.				1926-1927.			
Production.	1,064 tons.				1,406 tons.				1,185 tons.			
No. ——	Quantity.	Rate.	Value.	Cost per ton	Quantity.	Rate.	Value.	Cost per ton.	Quantity.	Rate.	Value.	Cost per ton.
	Tons.	Rs. A. P	Rs. A. P.		Tons.	Rs. A. P.	Rs. A. P.		Tons.	Rs. A. P.	Rs. A. P.	
	CHAMBER ACID.											
1	Raw Materials—											
	Sulphur	368	158 0 0	58,144 9 7	43·46	522·75	105 0 0	54,888 12 0	39·04	425·0	116 0 0	49,300 0 0	41·6
	Nitre Soda	21·0	210 0 0	4,410 0 0	4·14	22·6	220 0 0	4,972 0 0	3·54	14·8	200 0 0	2,960 0 0	2·49
	Sulphuric Acid	13·0	60 0 0	780 0 0	0·73	17·6	60 0 0	1,056 0 0	0·75	8·1	60 0 0	486 0 0	0·41
2	Labour	...	...	2,500 0 0	2·35	...	...	3,000 0 0	2·13	...	...	2,500 0 0	2·1
3	Power and Fuel	...	...	1,489 9 7	1·40	...	...	2,109 0 0	1·50	...	...	1,718 4 0	1·45
4	Repairs and Renewals	...	...	7,448 0 0	7·00	...	...	11,951 0 0	8·50	...	...	7,821 0 0	6·6
5	General services and supervision charges	...	...	7,086 3 10	6·66	...	...	10,404 6 5	7·40	...	...	8,934 14 5	7·54
6	Rents, Taxes, Insurance, etc.	...	...	1,596 0 0	1·50	...	...	2,109 0 0	1·50	...	...	1,777 8 0	1·5
	Ex-Works	...	...	...	78·42	...	...	...	64·36	...	...	...	63·69

Period	1924-1925.				1925-1926.				1926-1927.			
Production	731 tons.				776 tons.				681 tons.			
No. ——	Quantity.	Rate.	Value.	Cost per ton.	Quantity.	Rate.	Value.	Cost per ton.	Quantity.	Rate.	Value.	Cost per ton.
	Tons.	Rs. A. P.	Rs. A. P.		Tons.	Rs. A. P.	R. A. P.		Tons.	Rs. A. P.	Rs. A. P.	
	CONCENTRATED SULPHURIC ACID 95 PER CENT.											
1	Raw Materials—											
	Chamber Acid	820·0	78 6 5	63,288 0 0	86·57	840·0	64 0 0	53,760 0 0	69·27	760·0	64 0 0	48,640 0 0	71·42
2	Labour	...	...	2,500 0 0	3·42	...	...	2,500 0 0	3·22	...	...	2,000 0 0	2·94
3	Power and Fuel	...	...	6,579 0 0	9·00	...	...	9,467 0 0	12·2	...	...	5,883 13 5	8·64
4	Repairs and Renewals	...	...	5,117 0 0	7·00	...	...	6,596 0 0	8·5	...	...	2,955 8 7	4·34
5	General services and supervision charges.	...	...	3,362 9 7	4·60	...	...	3,290 3 9	4·24	...	...	4,494 9 7	6·60
6	Rents, Taxes, Insurance, etc.	...	...	1,096 8 0	1·50	...	...	1,164 0 0	1·50	...	...	1,021 8 0	1·50
7	Selling organisation	...	...	21,710 11 2	29·70	...	...	23,047 3 2	29·70	...	...	20,225 11 2	29·70
8	Packing charges	...	...	7,310 0 0	10·00	...	...	7,760 0 0	10·00	...	...	6,810 0 0	10·00
					151·79				138·63				135·14

	NITRIC ACID.	46 tons.				62 tons.				101 tons.			
1	Raw Materials—												
	Sodium Nitrate .	51·0	240 0 0	12,240 0 0	267·00	71·3	220 0 0	15,686 0 0	253·0	113·7	200 0 0	22,740 0 0	225·14
	Sulphuric Acid—												
	(Chamber) .	51·0	78 0 0	3,978 0 0	86·5	69·0	64 0 0	4,416 0 0	71·22	40·0	64 0 0	2,560 0 0	25·34
	(Cascade) .									68 0	95 0 0	6,460 0 0	63·96
	Nitrate of Potash	...	...	...	...	...	...	...	...	2·0	380 0 0	760 0 0	7·52
2	Labour . . .	...	...	600 0 0	13·04	...	...	1,000 0 0	16·13	...	...	1,500 0 0	14·85
3	Power and Fuel . .	...	...	736 0 0	16·00	...	...	701 13 5	11·32	...	...	799 14 5	7·92
4	Repairs and Renewals	..	...	322 0 0	7·00	...	...	527 0 0	8·50	..	...	666 9 7	6·60
5	General services and supervision charges.	...	...	1,463 0 0	30·50	...	...	2,021 3 2	32·60	..	...	3,682 8 0	33·25
6	Rents, Taxes and Insurances, etc.	...	...	69 0 0	1·50	...	...	930 0 0	1·50	...	...	151 8 0	1·50
					421·54				394·27				386·08
	Less—Nitre Cake .	57·0	10 0 0	570 0 0	12·40	71·0	10 0 0	710 0 0	11·44	114·0	10 0 0	1,140 0 0	11·28
					409·14				382·83				374·80
7	Selling organisation .	...	...	3,823 1 7	83·13	...	...	5,154 0 0	83·13	...	...	8,396 2 0	83·13
8	Packing charges . .	...	...	598 0 0	13·00	..	...	806 0 0	13·00	...	...	1,313 0 0	13·00
	Ex-Works .	...	...	...	505·27	...	..	...	478·96	...	...	...	470·93

Period		1924-1925.				1925-1926.				1926-1927.			
Production		73 tons.				70 tons.				60 tons.			
No.	——	Quantity.	Rate.	Value.	Cost per ton.	Quantity.	Rate.	Value.	Cost per ton.	Quantity.	Rate.	Value.	Cost per ton.
		Tons.	Rs. A. P.	Rs. A. P.		Tons.	Rs. A. P.	R. A. P.		Tons.	Rs. A. P.	Rs. A. P.	
	HYDROCHLORIC ACID.												
1	Raw Materials—												
	Nitre Cake	...	...	...	...	...	...	...	...	64·2	10 0 0	642 0 0	10·70
	Salt	81·0	18 0 0	1,458 0 0	19·97	77·0	18 0 0	1,386 0 0	19·80	66·0	15 0 0	990 0 0	16·50
	Sulphuric Acid	73·0	78 0 0	5,694 0 0	78·00	70·0	64 0 0	4,480 0 0	64·00	56·0	64 0 0	3,584 0 0	59·73
2	Labour	...	...	1,700 0 0	23·00	...	...	1,500 0 0	21·42	...	...	2,000 0 0	33·33
3	Power and Fuel	...	...	4,657 6 5	63·80	...	...	1,664 0 0	23·78	...	...	4,524 9 7	75·41
4	Repairs and Renewals	...	...	511 0 0	7·00	...	...	595 0 0	8·50	...	...	90 0 0	1·50
5	Rents, Taxes, etc.	...	...	109 8 0	1·50	...	...	105 0 0	1·50	...	...	396 0 0	6·60
6	General services and supervision charges.	...	...	1,487 11 10	20·38	...	...	1,531 9 7	21·88	...	...	1,338 0 0	22·30
					213·65				160·80				225·87
	Less—Salt Cake made	88·0	40 0 0	3,520 0 0	48·2	86·0	40 0 0	3,440 0 0	49·14	130·0	40 0 0	7,200 0 0	120·00
					165·44				111·74				105·87
7	Selling organization	...	...	3,909 13 9	53·56	...	...	3,729 3 2	53·56	...	...	3,213 9 7	53·56
8	Packing charges	...	...	949 0 0	13·00	...	...	910 0 0	13·00	...	...	780 0 0	13·00
	Ex-Works without containers.	...	...	...	232·00	...	...	...	178·30	...	...	...	172·43

		15·5 tons.				24 tons.				9 tons.			
	PHOSPHORIC ACID.												
1	Raw Materials —												
	Bones . . .	58	70 0 0	4,060 0 0	261·94	95	66 0 0	6,272 0 0	261·25	35	68 0 0	2,380 0 0	242·22
	Sulphuric Acid .	18	78 0 0	1,404 0 0	90·58	30	64 0 0	1,920 0 0	80·0	10·5	64 0 0	672 0 0	74 67
2	Labour . .	...	...	1,000 0 0	64·52	...	...	1,000 0 0	41·66	...	...	700 0 0	77·78
3	Power and Fuel .	...	...	21 6 5	1·38	...	...	33 1 10	1·38	...	...	124 3 3	1·38
4	General services and supervision charges.	...	...	527 0 0	34·0	...	...	874 5 1	36·43	...	...	333 0 0	37·00
5	Repairs and Renewals	...	...	108 8 0	7·6	...	...	204 0 0	8·5	...	...	59 6 5	6·6
6	Rents, Taxes, etc. .	...	...	23 4 0	1·5	...		36 0 0	1·5	...	...	13 8 0	1·5
7	Selling organisation .	...	...	1,441 8 0	93·0	...	...	2,232 0 0	93·2	..	...	837 0 0	93·0
8	Packing charges	..	...	201 8 0	13·0	...	...	312 0 0	13·0	...	...	117 0 0	13·0
	Ex-Works without containers.	...	...	...	566·92	...	...	...	536·92	...	...	...	547·15

Period		1924-1925.				1925-1926.				1926-1927.			
Production		122 tons.				160 tons.				215 tons			
No.	——	Quantity.	Rate.	Value.	Cost per ton.	Quantity.	Rate.	Value.	Cost per ton.	Quantity.	Rate.	Value.	Cost per ton.
		Tons.	Rs. A. P.	Rs. A. P.		Tons.	Rs. A. P.	Rs. A. P.		Tons.	Rs. A. P.	Rs. A. P.	
	COPPERAS.												
1	Raw Materials—												
	Iron Scrap	26·0	10 0 0	260 0 0	2·13	33	10 0 0	330 0 0	2·10	47	11 0 0	517 0 0	2·40
	Sulphuric Acid	44·0	78 0 0	3,432 0 0	28·1	57	64 0 0	3,648 0 0	22·80	78	64 0 0	4,992 0 0	23·26
2	Labour	...	...	600 0 0	4·91	...	...	600 0 0	3·75	...	...	350 0 0	1·63
3	Power and Fuel	...	...	168 5 10	1·38	...	...	220 12 10	1·38	...	...	296 11 2	1·38
4	Repairs and Renewals	...	...	854 0 0	7·00	...	...	1,360 0 0	8·50	...	...	1,431 14 5	6·60
5	General services and supervision charges.	...	...	353 14 5	2·90	...	...	502 6 5	3·14	...	...	688 0 0	3·20
6	Rent, Taxes, Insurance.	...	...	183 0 0	1·50	...	...	240 0 0	1·50	...	...	322 0 0	1·50
7	Selling organisation	...	...	976 0 0	8·00	...	...	1,280 0 0	8·00	..	..	1,720 0 0	8·00
8	Packing charges	...	...	610 0 0	5·00	...	...	800 0 0	5·00	...	...	1,775 0 0	5·00
	Ex-Works	...	...	...	60·92	...	...	...	56·17	...	...	...	52·97

		8·5 tons.				24 tons.				130 tons.			
	EPSOM SALT.												
1	Raw Materials—												
	Magnesite . .	5·0	45 0 0	225 0 0	26·4	12·0	45 0 0	540 0 0	22·50	67·4	45 0 0	3,033 0 0	23·3
	Sulphuric Acid .	5·4	78 0 0	421 3 2	49·5	13·0	64 0 0	832 0 0	34·6	70·0	64 0 0	4,480 0 0	34·5
2	Labour . . .	...	...	40 0 0	4·70	...	...	120 0 0	5·20	...	...	600 0 0	4·62
3	Power and Fuel .	...	...	11 11 7	1·38	...	...	33 1 10	1·38	...	...	179 6 5	1·38
4	General services and supervision charges.	...	...	28 11 7	3·38	...	...	86 14 5	3·62		...	487 8 0	3·75
5	Repairs and Renewals	...	...	59 8 0	7·00	...	...	204 0 0	8·50	...	...	858 0 0	6·6
6	Rent, Taxes, etc. .	...	...	12 11 8	1·50	...	...	36 0 0	1·50	...	...	195 0 0	1·5
7	Selling organisation .	...	...	78 3 2	9·20	...	...	220 12 10	9·20	...	...	1,196 0 0	9·20
8	Packing charges .	...	...	59 8 0	7·00	...	...	168 0 0	7·00	...	...	910 0 0	7·0
	Ex-Works .	...	...	...	110·56	...	...	...	93·3	..	...	..	91·85

Period		1924-1925.				1925-1926.				1926-1927.			
Production		35 tons.				55 tons.				35 tons.			
No.	——	Quantity.	Rate.	Value.	Cost per ton.	Quantity.	Rate.	Value.	Cost per ton.	Quantity.	Rate.	Value.	Cost per ton.
		Tons.	Rs. A. P.	Rs. A. P.		Tons.	Rs. A. P.	Rs. A. P.		Tons.	Rs. A. P.	Rs. A. P.	
	COPPER SULPHATE.												
1	Raw Materials—												
	Copper Scrap	9·5	1,000 0 0	9,500 0 0	271·40	15·00	950 0 0	14,250 0 0	259·10	9·3	765 0 0	7,094 0 0	202·70
	Sulphuric Acid	30·5	112 0 0	3,416 0 0	97·60	47·3	99 0 0	4,682 11 2	85·66	31·0	95 0 0	3,942 8 0	112·64
	Nitric Acid	0·9	427 0 0	384 4 10	10·98	1·0	383 0 0	383 0 0	7·00	0·50	373 0 0	186 8 0	5·33
2	Labour	..	...	875 0 0	25·00	...	..	600 0 0	10·90	...	...	450 0 0	12·85
3	Power and Fuel	...	...	94 8 0	2·70	...	...	130 14 5	2·38	...	..	438 3 2	12·52
4	Repairs and Renewals	...	...	245 0 0	7·00	...	...	467 8 0	8·50	...	...	231 0 0	6·60
5	General services and supervision charges.	...	...	656 4 0	18·75	...	...	1,056 0 0	19·20	...	...	684 9 7	19·56
6	Rent, Taxes, Insurance, etc.	...		52 8 0	1·50	...	...	82 8 0	1·50	...	...	52 8 0	1·50
7	Selling organisation	...	...	1,715 0 0	49·00	...	...	2,695 0 0	49·00	...	...	1,715 0 0	49·00
	Packing charges	...	...	245 0 0	7·00	..	..	275 0 0	7·00	...	...	245 0 0	7·00
	Ex-Works	...	...	...	489·93	...	...	...	450·44	...	...	...	429·70

	GLAUBER'S SALT.	84 tons.				91 tons.				100 tons.			
1	Raw Materials—												
	Salt Cake	32·	40 0 0	1,288 0 0	15·33	58	40 0 0	2,320 0 0	25·50	58·0	40 0 0	2,320 0 0	23·20
	Nitre Cake	39·0	10 0 0	390 0 0	4·64	...	...	...	...	2·10	10 0 0	21 0 0	0·20
	Soda Ash	13·97	140 0 0	1,955 12 10	23·28	6·0	135 0 0	810 0 0	8·9	8·00	135 0 0	1,080 0 0	10·80
	Lime	0·48	100 0 0	48 0 0	0·57	...	...	...	...	138 tins	1 0 0	138 0 0	1·38
2	Labour	...	...	800 0 0	9·52	...	...	800 0 0	8·79	...	..	800 0 0	8·00
3	Repairs and Renewals	...	..	588 0 0	7·00	...	...	773 8 0	8·50	..	...	660 0 0	6·60
4	General services and supervision charges.	...	...	283 14 8	3·38	...	...	329 6 8	3·62	...	...	370 0 0	3·70
5	Power and Fuel	...	...	115 14 8	1·38	...	...	125 9 4	1·38	...	...	138 0 0	1·38
6	Rents, Taxes, Insurance, etc.	...	...	126 0 0	1·50	...	...	136 8 0	1·50	...	...	150 0 0	1·50
7	Selling organisation	...	...	772 5 0	9·20	...	...	837 3 2	9·20	...	...	920 0 0	9·20
8	Packing charges	...	...	588 0 0	7·00	...	...	637 0 0	7·00	...	...	700 0 0	7·00
	Ex-Works	...	...	...	82·80	...	...	...	74·39	...	...	...	72·96

Period.		1924-1925.				1925-1926.				1926-1927.			
Production.		317 tons.				294 tons.				65 tons.			
No.	——	Quantity.	Rate.	Value.	Cost per ton.	Quantity.	Rate.	Value.	Cost per ton.	Quantity.	Rate.	Value.	Cost per ton.
		Tons.	Rs. A. P.	Rs. A. P.		Tons.	Rs. A. P.	Rs. A. P.		Tons.	Rs. A. P.	Rs. A. P.	
	ALUMINA FERRIC 14/15 % Al_2O_3.												
1	Raw Materials—												
	Bauxite . .	116·0	26 0 0	3,016 0 0	9·61	105·84	23 0 0	2,434 0 0	8·28	23·4	23 0 0	514 12 10	7·92
	Sulphuric Acid	150·0	78 0 0	11,700 0 0	36·90	138·00	64 0 0	8,832 0 0	30·04	31·0	64 0 0	1,984 0 0	30·52
2	Labour . . .	...	...	3,500 0 0	11·04	...	...	3,000 0 0	10·20	...	...	700 0 0	10·80
3	Power and Fuel .	...	...	437 7 5	1·38	...	...	405 11 6	1·38	...	...	89 11 3	1·38
4	Repairs and Renewals	...	...	2,219 0 0	7·00	...	...	2,499 0 0	8·50	...	...	429 0 0	6·60
5	General services and supervision charges	...	...	1,553 4 10	4·90	...	...	1,540 0 0	5·24	...	...	345 2 5	5·31
6	Rents, Taxes, etc. .	...	...	475 8 0	·50	...	...	441 0 0	1·50	...	...	97 8 0	1·50
7	Selling organisation .	...	...	4,219 4 4	13·31	...	...	3,913 2 3	13·31	...	...	865 2 5	13·31
8	Packing charges .	...	...	317 0 0	1·00	...	...	294 0 0	1·00	...	...	65 0 0	1·00
	Ex-Works . .	...	...	...	86·64	...	...	...	79·45	...	...	...	78·34

		228 tons.				250 tons.				346 tons.			
	POTASH ALUM.												
1	Raw Materials—												
	Bauxite	66	26 0 0	1,716 0 0	7·53	72·5	23 0 0	1,667 8 0	6·67	100	22 0 0	2,200 0 0	6·36
	Sulphuric Acid	85	78 0 0	6,630 0 0	29·07	95·0	64 0 0	6,080 0 0	24·32	132	64 0 0	8,448 0 0	24·42
	Potash Sulphate	52	200 0 0	10,400 0 0	45·00	57·5	200 0 0	11,500 0 0	46·00	79·6	165 0 0	13,134 0 0	37·96
2	Labour	...	...	3,200 0 0	14·04	...	...	3,500 0 0	14·00	...	...	8,500 0 0	24·57
3	Power and Fuel	...	...	314 10 3	1·38	...	...	345 0 0	1·38	...	...	477 8 0	1·38
4	General services and supervision charges.	...	...	1,438 11 2	6·31	...	...	1,687 8 0	6·75	...	...	2,335 8 0	6·75
5	Repairs and Renewals	...	...	1,596 0 0	7·00	...	...	2,125 0 0	8·50	...	...	2,283 9 7	6·60
6	Rents, Taxes	...	...	342 0 0	1·50	...	...	375 0 0	1·50	...	...	519 0 0	1·50
7	Selling organisation	...	...	3,921 9 7	17·20	...	...	4,300 0 0	17·20	...	...	5,951 3 2	17·20
8	Packing charges	...	...	1,596 0 0	7·00	...	...	1,750 0 0	7·00	...	...	2,422 0 0	7·00
	Ex-Works	...	...	...	136·63	...	...	...	133·32	...	...	...	133·74

Period	1924-1925.				1926-1927.			
Production	12·4 tons.				11·4 tons.			
No. —	Quantity.	Rate.	Value.	Cost per ton.	Quantity.	Rate.	Value.	Cost per ton.
	Tons.	Rs. A. P.	Rs. A. P.		Tons.	Rs. A. P.	Rs. A. P.	
	SODA SULPHIDE.							
1 Raw Materials—								
Nitre Cake	12	10 0 0	120 0 0	0·97	28	10 0 0	280 0 0	2·45
Salt Cake	13	40 0 0	520 0 6	4·19	...	...	...	...
Coal Dust	17	15 0 0	255 0 0	2·05	15	15 0 0	225 0 0	1·97
2 Labour	...	...	500 0 0	40·32	...	...	500 0 0	43·86
3 Power and Fuel	...	...	1,257 1 9	101·38	...	...	1,037 6 4	91·00
4 Repairs and Renewals	...	...	86 12 9	7·00	...	...	75 3 10	6·60
5 General services and supervision charges.	...	...	96 1 7	7·75	...	...	96 14 5	8·50
6 Rents, Taxes, etc.	...	...	18 9 7	1·50	...	...	17 1 8	1·50
7 Packing charges	...	..	372 0 0	30·00	..	...	342 0 0	30·00
8 Selling organisation	...	...	264 3 11	21·31	...	...	242 14 11	21·31
Ex-Works	...	...	...	216·47	...	...	...	207·19

Period		1924-1925.				1925-1926.				1926-1927.			
Production		5·7 tons. 100 % Basis.				5 tons. 100 % Basis.				3·8 tons. 100 % Basis.			
No.	——	Quantity.	Rate.	Value.	Cost per ton.	Quantity.	Rate.	Value.	Cost per ton.	Quantity.	Rate.	Value.	Cost per ton.
	ZINC CHLORIDE.	Tons.	Rs. A. P.	Rs. A. P.		Tons.	Rs. A. P.	Rs. A. P.		Tons.	Rs. A. P.	Rs. A. P.	
1	Raw Materials—												
	Zinc Scrap	2·9	500 0 0	1,450 0 0	254·39	4·02 (65 %)	150 0 0	603 0 0	120·60	3·1 (60 %)	150 0 0	465 0 0	122·3
	Hydrochloric Acid	9·58	166 0 0	1,590 0 0	278·77	8·0	112 0 0	896 0 0	179·2	6·3	105 0 0	661 8 0	174·1
2	Labour	...	...	60 0 0	10·53	...	...	30 0 0	6·0	...	...	40 0 0	10 53
3	Power and Fuel	...	...	7 14 0	·38	...	...	6 14 5	1·38	...	...	21 0 2	5·53
4	General services and supervision charges	..	...	82 15 10	14·56	...	...	78 8 10	15·71	...	...	60 12 10	16·00
5	Repairs and Renewals	...	...	39 14 5	7·00	...	...	42 8 0	8·50	...	...	25 0 0	6·60
6	Rents, Taxes, etc.	...	...	8 8 10	1·50	...	...	7 8 0	1·50	...	...	5 11 2	1·50
7	Selling organisation	...	...	228 0 0	40·0	...	...	200 0 0	40·00	...	...	15 3 2	40·00
8	Packing charges	...	...	85 8 0	15·0	...	...	75 0 0	15·00	...	...	38 0 0	15·00
					623·13				387·82				391·66

Period		1924-1925.				1925-1926.				1926-1927.			
Production		80 tons.				160 tons.				167 tons.			
No.	——	Quantity.	Rate.	Value.	Cost per ton.	Quantity.	Rate.	Value.	Cost per ton.	Quantity.	Rate.	Value.	Cost per ton.
	BONE MEAL.	Tons.	Rs. A. P.	Rs. A. P.		Tons.	Rs. A. P.	Rs. A. P.		Tons.	Rs. A. P.	Rs. A. P.	
1	Raw Materials—												
	Bones	85	70 0 0	5,950 0 0	74·37	169	66 0 0	11,154 0 0	69·70	170	68 0 0	11,560 0 0	69·20
2	Labour	...	...	600 0 0	7·50	...	...	1,200 0 0	7·50	..	...	1,199 1 10	7·18
3	Repairs and Renewals	...	...	560 0 0	7·00	...	...	1,360 0 0	8·50	...	...	1,102 3 2	6·60
4	General services and supervision charges,	...	...	392 0 0	4·9	...	...	838 6 5	5·24	...	...	886 12 10	5·31
5	Power and Fuel	...	...	1,104 0 0	1·38	...	...	220 12 10	1·38	...	...	230 8 0	1·38
6	Rents, Taxes, etc.	...	...	120 0 0	1·5	...	...	240 0 0	1·5	...	...	250 8 0	1·50
7	Selling organisation	...	...	1,064 12 10	13·31	...	...	2,129 9 7	13·31	...	...	2,222 12 10	13·31
8	Packing charges	...	...	640 0 0	8·00	...	...	1,280 0 0	8·00	...	...	1,336 0 0	8·00
	Ex-Works	...	...	...	117·96	...	...	...	115·13	...	...	...	112·48

		51 tons.				46 tons.				88 tons.			
	BONE SUPER-PHOSPHATE.												
1	Raw Materials—												
	Bone Meal	36·3	97 0 0	3,521 0 0	69·04	31·0	94 0 0	2,914 0 0	63·34	59	93 0 0	5,428 0 0	61·70
	Sulphuric Acid	18·0	78 0 0	1,404 0 0	27·52	18·0	64 0 0	1,152 0 0	25·04	33·0	64 0 0	2,112 0 0	24·00
2	Labour	...	...	300 0 0	5·88	...	...	400 0 0	8·70	...	...	500 0 0	5·68
3	Power and Fuel	...	...	70 6 5	1·38	...	...	63 5 0	1·38	...	...	121 4 10	1·38
4	Repairs and Renewals	...	...	357 0 0	7·00	...	...	391 0 0	8·50	...	...	580 12 10	6·6
5	General services and supervision charges.	...	...	249 14 5	4·9	...	...	241 0 7	5·24	...	...	467 4 10	5·31
6	Rents, Taxes, etc.	...	...	76 8 0	1·5	...	...	69 0 0	1·5	...	...	134 0 0	1·5
7	Selling organisation	...	...	678 12 10	13·31	...	...	612 4 10	13·31	...	...	1,171 4 10	3·31
8	Packing charges	...	...	408 0 0	8·0	...	...	368 0 0	8·0	...	...	704 0 0	8·0
	Ex-Works	...	...	...	138·53	...	...		135·01	...	...	...	127·48

Period	1924-1925.				1925-1926.				1926-1927.			
Production . . .	1·13 tons.				3·32 tons.				14·7 tons.			
No.	——	Quantity.	Rate.	Value.	Cost per ton.	Quantity.	Rate.	Value.	Cost per ton.	Quantity.	Rate.	Value.	Cost per ton.
		Tons.	Rs. a. p.	Rs. a. p.		Tons.	Rs. a. p.	Rs. a. p.		Tons.	Rs. a. p.	Rs. a. p.	
	PURE ACIDS.												
1	Raw Materials—												
	Sulphuric Acid .	0·80	112 0 0	89 10 0	79·3	0·95	99 0 0	94 0 10	28·33	12·0	95 0 0	1,140 0 0	77·55
	Nitric Acid . .	0·30	409 0 0	122 11 0	100·0	0 8	383 0 0	306 6 5	92·30	2·00	375 0 0	750 0 0	51·02
	Hydrochloric Acid	0·2	166 0 0	33 3 0	30·0	2·39	112 0 0	267 11 2	80·62	2·5	106 0 0	215 0 0	18·00
2	Labour . . .	...	...	200 0 0	177·0	...	...	500 0 0	150·70	...	...	2,205 0 0	150·00
3	Power and Fuel .	...	...	210 9 8	186·38	..	...	581 10 8	175·21	...	..	2,616 10 0	178·00
4	General services and supervision charges.	...	...	92 3 4	81·60	...	...	289 12 10	87·30	...	...	1,308 4 10	89·00
5	Repairs and Renewals	...	...	7 14 5	7·00	...	...	28 3 6	8·50	.	...	97 0 4	6·60
6	Rents, Taxes, Insurance, etc.	...	...	1 11 2	1·50	...	...	4 15 8	1·50	...	...	22 0 10	1·50
7	Selling organisation .	...	...	251 11 2	222·75	...	...	739 8 0	222·75	...	...	3,274 6 10	222·75
8	Packing charges	...	...	791 0 0	700·0	...	...	2,324 0 0	700·00	..	...	10,290 0 0	700·00
	Ex-works with containers.	...	...	... Per lb.	1594 53 As. 11-5	...	...	... Per lb.	1547·21 As. 11	...	...	... Per lb.	1494·42 As. 10-8

80. We are unable to furnish the Board with cost sheets of manufacturers in any competing countries.

Overhead charges.

81. The overhead charges are divided into the following sub-heads:—

(*i*) Depreciation.
(*ii*) Interest on working capital.
(*iii*) Expenses *re* sales organisation.
(*iv*) Head office charges, establishment and other charges.
(*v*) Agents' Commission.

The first was allocated on the investments made on different plants at 2½ per cent. in years 1922 and 1923. Since then no depreciation has been written off.

The other four items are divided proportionately on total production value of each article at works costs.

(I) *Depreciation.*

82. The following are the rates as scheduled by the Income-tax Act, Sec. 10 (2) (*v*):—

	Per cent.
(*a*) Buildings:—	
(*a*) First class substantial buildings of selected materials	5
(*b*) Buildings of less substantial quantity	10
(*c*) Temporary erections	20
Plants and Machineries	6¼

(*b*) Yes.
(*c*) *Nil.*

83. The working capital required for an output equivalent to the full capacity would be between 8 and 10 lacs of rupees.

84. The company is not in a position to provide for working capital from share capital.

85. Yes; the company has already borrowed Rs. 6,50,000 at the rate of 6½ to 8 per cent. interest, out of which 3½ lacs are used as working capital.

86. Our average monthly production at works costs is about Rs. 25,000 which makes 7 per cent. of the working capital, exclusive of the part of Fertiliser business which amounts to about Rs. 7,000 a month. We exclude this part from actual production because bulk of it is more or less only merchanting.

87. The average value of stocks held by the company is about one lac and a quarter of rupees exclusive of packing materials, *viz.*, jars, carboys, cases, which by themselves lock up over a lac of rupees of the working capital. The normal period which elapses between production and payment is about eight months.

88. On an average the company has to hold a stock of about Rs. 50,000 worth of raw materials and fuel.

Head Office Expenses and Agents' Commission.

89. The company has a Head Office at Bombay besides the Works at Ambernath. It is under the Managing Agents: Messrs. Dharamsi Morarji & Co.

90. (*i*) The Head Office expenses are about Rs. 16,000 per year exclusive of sales organisation, interest, etc.

(*ii*) The Agents are entitled to a minimum commission of Rs. 36,000 per annum but during past eight years they have charged only Rs. 57,000 which have been their out of pocket expenses as against Rs. 2,97,000 to which they were entitled.

91. The commission is fixed by agreement, but not received as stated in (90).

92. Following table will show the charges incurred per unit of each finished product (current year's production is considered), on account of (*i*) Head Office expenses, (*ii*) Agents' Commission.

N.B.—Customary unit of one ton is considered.

Products.	Head Office charges.	Agents' Commission.
	Rs. A. P.	Rs. A. P.
Cascade Acid	7 14 8	3 7 4
Nitric Acid	22 3 0	9 10 11
Hydrochloric Acid	14 13 7	6 7 8
Phosphoric Acid	24 12 0	10 12 10
Glauber's Salt	2 7 7	1 1 3
Copper Sulphate	13 0 10	5 9 7
Copperas	2 2 0	0 14 10
Zinc Chloride	10 10 5	4 10 5
Epsom Salt	2 7 7	1 1 3
Sodium Sulphide	5 10 10	2 7 8
Alumina Ferric	3 8 10	1 8 11
Alum of Potash	4 9 10	2 0 4
Bone Meal	3 8 10	1 8 11
Bone Super	3 8 10	1 8 11
Basic Bone Super	2 13 5	1 3 10
Fertiliser Mixtures	4 15 2	2 2 6
Pure Acids	59 6 5	25 15 2
Pure Salts	39 9 7	17 4 10

93. A fair return on the capital invested should be 9 per cent. to 12 per cent. per annum.

94. (A) In our previous two representations to the Government of India one dated 27th January 1925 and the other 14th August 1925 we have fully dealt with this question.

(B) This has been also treated at sufficient length in the said representations. But circumstances have since changed in view of which we should like to add a word: The coming into existence of two big combines, *viz.*, The Imperial Chemical Industries Ltd., and the I. G. F. have made the position of the Indian Chemical Industry very critical. With enormous funds at their back, the support of their Government and the mass productions they turn out, they are in a position to strangle at any moment the indigenous concerns which are yet in their infant stage.

It is only a very watchful eye and a very vigorous measure of protection, continued even for a much longer period than we think of, which can save the industry from complete annihilation.

(C) We have said in our previous reports that in about 20 years' time we should be able to face world competition without the help of protection but in the light of the facts above stated, protection will be required for a much longer period and we may even say that time has arrived to form a permanent committee of the Tariff Board to keep a watch on the doings of Foreign Trusts and Combines and formulate measures to protect indigenous industry from their operation.

95. We have answered these questions in our previous representations.

96. This has been replied in our previous communications.

97. We have an abundant supply of raw materials, *e.g.*, Bauxite, Magnesite, Chromite Manganese Ores, Potash Nitrate, Lead and Iron Ores and many vegetable and animal products, out of which varied and innumerable chemicals and drugs can be manufactured with great advantage. Most of these products are at present being exported and the country is denuded of its natural wealth, more finished commodities manufactured out of these are imported back into the country.

Again, the Agricultural requirements of the country in the form of chemical manures are so great that the development of the industry for the

supply of chemical fertilisers is of the utmost importance and should not be overlooked any longer.

98. The measures we suggest to safeguard this industry from outside competition are as under:—

(1) Total prohibition of the import of manufactured commodities that are at present being produced in small quantities but can be produced in sufficient quantities to supply the demand of the country if full scope is granted to such production.

(2) Heavy tariff duties on chemicals be levied, an attempt to produce which is zealously being made and may prove successful under proper encouragement within a measurable time.

(3) Encouragement in the form of bounties and long term loans should be granted to Indian concerns that are making a serious attempt to promote the cause of this Industry but are passing through a career of uncertainty and adversity on account of enormous losses continuously sustained because of the unequal war they have had to wage with the all powerful foreign producers.

(4) Prohibition or heavy export duties on raw materials of the country which have every prospect of being utilised in the country in one form or the other such as Bones, Manganese, Magnesite, etc.

(5) Government can also help the indigenous industry by handing over the manufacture of explosives to reliable Indian firms instead of manufacturing them in Government Factories maintained at enormous costs or imported from outside.

(6) In the same manner the production of alcohols and spirits be entrusted to private manufacturers with suitable facilities.

99. (*a*) Some of the chemicals have recently been made free of duties. In some the duties are nominal such as in the case of Copperas. In other cases the highest duty levied is only 15 per cent. The recent appreciation of the rupee has in fact nullified these duties inasmuch as the foreign manufacturers gain a clear advantage of 12½ per cent. due to the present exchange rate, thus there is scarcely any advantage reaped by the indigenous producers over their foreign competitors by a levy of the current customs duty.

(*b*) The foreign producers no doubt are somewhat at a disadvantage regarding ocean freight, insurance, trade and landing charges and these come to about 40 sh. per ton average but we have also to bear similar charges in importing machineries, consumable stores and some raw materials. In this connection it has to be noted that the foreign manufacturers have the advantage of having their own national shipping and insurance companies, to go to their help whenever necessary; nay, transport companies in India are helping the foreign rather than the indigenous manufacturers inasmuch as the railway freight rates from ports to certain important markets are lower than freights from our Works to these markets notwithstanding the fact that the mileage to be travelled over by our goods is shorter than from the ports to these markets, as shown elsewhere. Again actual instances can be pointed out where shipping and other charges we had to pay on parts of machinery and stores have been so high in a number of cases that the c.i.f. Bombay prices have proved to be twice as much as the f.o.b. prices in the country of origin.

100. The rate of protection should be considered separately in the case of each chemical. Chemicals, the demand for which can be adequately met by the capacities of production of the indigenous manufacturers, should carry on a prohibitive import duty even to the extent of 100 per cent. Chemicals which are being produced in the country but the capacity for the supply of which is not enough to meet the demand should bear so much of duty as to equalise our costs of production *plus* at least 12 per cent. of profit.

101. We recommend two other forms of assistance, one is a bounty enabling the Indian manufacturers to sell their goods in the market on

equal terms with importers that is equal to a sum that would cover their cost of production *plus* a reasonable profit. The other form is to give a long term loan without interest to be utilised for purposes of replacements and modifications so as to bring the plants and machineries to up-to-date standard, as well as to serve as working capital for further developments to concerns that may be in need of such help.

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(2) *Reconciliation of Block Accounts as at 31st December 1927.*

(Handed on the 6th November 1928.)

(1) Plant and Machinery Account—

	Rs.	A.	P.
Alumina ferric plant account	5,321	3	1
Bonemeal plant account	35,700	1	5
Superphosphate plant account	1,502	3	0
Copperas plant account	5,000	0	0
Cascade concentration plant account	61,325	1	6
Hydrochloric plant account	1,51,382	8	8
Nitric acid plant account	15,595	15	3
Plant and machinery account	5,90,424	9	3
Sodium sulphide plant account	23,381	14	4
Zinc chloride plant account	11,643	3	1
Copper sulphate plant account	8,038	10	3
Glauber's salt plant account	8,868	9	2
Aluminium sulphate plant account	1,047	9	2
Potash alum plant account	41,977	6	2
B. O. acid plant account	7,025	9	8
Acetic acid plant account	489	15	3
Phosphoric acid plant account	5,512	8	0
Epsom salt plant account	14,949	6	0
TOTAL	9,89,186	5	3

(2) Building, etc.—

	Rs.	A.	P.
Factory building godown account	9,29,563	13	10
Auxiliary building account	1,795	0	0
Glauber's salt building account	9,959	0	0
Steel godown account	4,933	10	0
Bonemeal building account	17,987	5	9
By products building account	445	9	3
Copperas building account	4,994	11	7
Hydrochloric factory account	36,687	14	7
Drainage account	10,164	5	9
Storage shed account	19,598	12	3
Superphosphate building account	25,011	6	0
Sodium sulphide building account	22,433	3	0
Crude oil pipe lime	1,422	3	6
B. P. acid building account	7,764	0	0
Copper sulphate building	1,500	0	0
Phosphoric acid building account	1,000	0	0
Laboratory building account	19,909	8	0
Alumina ferric building account	1,500	0	0
Nitric acid building account	12,010	6	0
Zinc chloride building account	2,500	0	0
Roads and fences account	4,970	0	0
TOTAL	11,36,150	13	6

(3) *Letter dated the 13th November 1928.*

Herewith enclosed please find six copies each of the revised cost sheets for the last three years' production as well as for maximum production; and also the other information required by the Board.

Regarding the question as to what the probable drain will be on the Exchequer if bounty is granted on Sulphuric Acid, we beg to place the following estimate for the consideration of the Board:—

From information made available to us, it appears that exclusive of the manufacture of Sulphate of Ammonia the total quantity of Sulphuric Acid consumed in India at present in all forms is about 6,000 tons per annum. The chemicals wherein this acid plays an important role, directly and indirectly are Copperas, Copper Sulphate, Epsom Salt, Potash Alum, Alumina Ferric or Alumina Sulphate, Zinc Chloride, Superphosphate, etc. Assuming that the present requirements of the country are met by indigenous manufacturers,—leaving aside the consideration of the future increasing demand,—the total consumption of the acid will reach in the course of the next ten to fifteen years, approximately the quantities given below:—

Articles.	Demand.	Quantity of Sulphuric Acid.
	Tons.	Tons.
Copperas	1,500	540
Potash Alum	4,000	1,520
Alumina Ferric (Alumina Sulphate)	4,000	1,880
Copper Sulphate	700	602
Epsom Salt	5,000	1,800
Zinc Chloride	1,200	1,500
Superphosphate	5,000 (app.)	1,900
Phosphoric Acid	300	348
Total	...	10,080

To this must be added tons 3,000 that are consumed in the form of the three acids, *viz.*, Sulphuric, Hydrochloric and Nitric. Thus the total requirement for the acid will be about tons 13,000.

The number of manufacturers of Sulphuric Acid in India whose production per annum would exceed over 300 tons will not be more than six or seven. Accepting the suggestion made during the course of our last evidence that bounty to Sulphuric Acid may be given for production above the first 300 tons, the production of about 2,000 tons of the six or seven factories has to be left out. Thus remains tons 11,000 as maximum tonnage, which will be entitled to bounty.

The tonnage entitled for bounty to-day will be approximately 4,000 tons (6,000—2,000). Supposing a bounty of Rs. 50 per ton is granted, the present

amount will aggregate to Rs. 2,00,000 (two lakhs), which will be the minimum and the future to 11,000×50=Rs. 5,50,000 which will be the maximum.

It will be seen that this small amount is quite insignificant, considering the impetus the acid branch of the Chemical Industry will receive.

By granting this little protection Government not only will have given a chance for developing the Chemical Industry, but also indirectly promoted the cause of the Agricultural Industry by helping the manufacture of Chemical Fertilisers such as Superphosphate, which the exhausted soils of India so urgently need.

Moreover, if protective duties are levied on salts, as suggested by us in our reply to question No. 98, the amount realised by such duties will more than make up the amount to be expended on the grant of bounties, at least, during the first few years of such levy.

While dealing with this subject, we think it is necessary to draw the attention of the Board to one important point. In whatever form protection be proposed, the conditions laid on it should be such that only the real indigenous manufacturer will be allowed to reap the full benefit of it. Otherwise, there is the danger of the Foreign Trusts, with the enormous capital behind them, coming and establishing their factories in India, as has been done by the Swedish Match Combine, to wipe the small Indian Concerns out of existence. The question has not escaped the attention of the Board as we could observe from the President's Introductory remarks when opening the inquiry. We have very briefly referred to this matter in our replies to the Questionnaire, but we think a more pointed reference would not be out of place.

QUESTION No. 53 (APPENDIX).

The Current sea-freights from the United Kingdom and the Continent are as under:—

Name of Article.	United Kingdom per ton.	Continent—Hamburg or Antwerp per ton.
Sulphuric Acid	100 sh. Wt. or Mt.	...
Hydrochloric Acid	100 sh. ,,	...
Nitric Acid	100 sh. ,,	...
Phosphoric Acid	80 sh. Ditto	...
Alum	25 sh. Wt.	25 sh. Wt.
Copperas	55 sh. ,,	40 sh. ,,
Copper Sulphate	55 sh. ,,	55 sh. ,,
Glauber Salt	32/6 ,,	32/6 ,,
Zinc Chloride	37/6 ,,	37/6 ,,
Epsom Salt	32/6 ,,	30 sh. ,,
Soda Sulphide	27/6 ,,	27/6 ,,

Wt. = Weight. Mt. = Measurement.

QUESTION No. 76 (CONTD.).

Cost of different packing per ton for all the three acids in jars, cases, carboys and drums.

Sulphuric Acid:

	Rs.
In jars and cases—	
56 jars at Rs. 3-8 per jar	198
28 cases at Re. 1-4 per case	35
	233
In carboys—	
25 carboys per ton at Rs. 6 per carboy	150
In steel drums of 3 per ton at Rs. 15 per drum	45

Nitric Acid:

In jars and cases—	
80 jars at Rs. 3-8 per jar	280
40 cases at Re. 1-4 per case	50
	330
In Carboys—	
32 carboys at Rs. 6 each per ton	192
	192
In Chrome Steel Drums—	
3 drums per ton at Rs. 270 each	810

Hydrochloric Acid:

In jars and cases—	
80 jars at Rs. 3-8 per jar per ton	280
40 cases at Re. 1-4 per case per ton	50
	330
In Carboys—	
40 carboys per ton at Rs. 6 per carboy	240

QUESTION No. 54 (APPENDIX).

Freight rates for acids from Ambernath to different stations.

Name of Stations.	Sulphuric Acid. Md. Rate.	Nitric and Hydrochloric acids Md. Rate.	Sulphuric Acid. Special rate for wagonloads of 120 Mds.	Nitric and Hydrochloric acids special rate for wagonloads of 120 Mds.
	Rs. A. P.	Rs. A. P.	Rs. A. P.	Rs. A. P.
Nagpur	2 3 0	3 4 2	1 10 4	1 10 4
Poona	0 6 8	0 9 7	0 5 3	0 5 3
Sholapur	1 2 0	1 10 8	0 13 9	0 13 9
Bangalore City	2 14 8	4 5 7	2 7 7	3 0 3
Secunderabad	2 3 1	3 1 3	2 11 4	1 15 7
Delhi	4 1 2	6 1 8	2 10 3	2 10 3
Cawnpore C. C.	3 9 1	5 5 6	No special rates.	
Hyderabad (Deccan)	2 0 8	3 1 1	(Minimum weight accepted is 20 maunds).	
Lucknow	3 12 7	5 10 7	No special rates.	
Allahabad	3 10 2	5 7 0		
Amritsar	4 1 3	5 15 4		
Lahore	4 10 3	5 15 10		
Ahmedabad	1 8 9	2 4 7		
Indore	1 13 9	2 7 0		
Nanded	1 9 7	2 1 3	(Minimum weight accepted is 20 maunds.)	
Baroda	1 4 5	1 14 0	No special rates.	
Byculla or Bombay	0 3 8	0 5 0	0 2 10	0 2 10

N.B.—1. Except for Bombay wagonload consignments to upcountry stations are very rare.

2. (*a*) A case of Sulphuric Acid contains 82 lbs. in 2 jars, weighing 1½ maunds inclusive of packing materials.

(*b*) A case each of Nitric Acid and hydrochloric Acid contains 56 lbs. respectively, and weighs 1½ maunds inclusive of packing materials.

(*c*) A carboy contains 92 lbs. Sulphuric Acid, 70 lbs. Nitric Acid and 56 lbs. Hydrochloric Acid respectively weighing Gross 120 lbs., 100 lbs. and 86 lbs. approximately.

(*d*) (i) A 40—45-gallon drum carries 740 lbs. Sulphuric Acid, weighing gross 820 lbs. approximately.

(ii) A 60—65-gallon drum carries 1,100 lbs., weighing gross 1, 240 lbs. approximately.

With reference to the Board's enquiry as to the maximum productions we are likely to attain within the next ten or fifteen years we give below a statement as under:—

Articles.	Tons
Sulphuric Acid (Con.)	800
Hydrochloric Acid	600
Nitric Acid	260
Phosphoric Acid	300
Alum Potash	3,000
Alumina Ferric	300
Copper Sulphate	200
Copperas	300
Epsom Salt	1,500
Glauber's Salt	600
Superphosphate	5,000
Zinc Chloride	300

We have already drawn your attention that the capacity of our Chamber Plant is 8,000 tons per annum. The above productions will consume this acid as under:—

Articles.	Tons.
Concentrated Sulphuric Acid	880
Hydrochloric Acid	600
Nitric Acid	208
Phosphoric Acid	348
Alum Potash	1,410
Alumina Ferric	141
Copper Sulphate	172
Copperas	108
Epsom Salt	840
Superphosphate	1,900
	6,607

N.B.—Our present capacities for production of Alum and Epsom Salt are 600 tons each. As we have already explained it would not even take a few months nor it would be difficult to raise the productions as stated above.

QUESTION No. 76 (APPENDIX).

A. As desired by the Board we give below a statement showing the items of expenditure on selling organisation :—

	1924-1925.	1925-1926.	1926-1927.
Salaries.	Rs.	Rs.	Rs.
1. Sales manager and Staff at Office and Godown.	9,140	13,270	15,960
2. Rents for Godown and Telephone charges	5,800	8,282	7,858
3. Railway freight on finished goods to Bombay.	7,055	6,935	12,320
4. Return freight for Empties . . .	1,915	2,720	2,500
5. Export charges for goods sent out to Calcutta and Karachi.	5,490	1,380	4,840
6. Distribution charges: (Labour and Petrol).	7,805	9,855	11,070
7. Propaganda expenses for Fertilisers .	12,400	8,030	16,800
8. Advertisements	6,450	966	1,680
Total .	56,055	51,898	73,028

Average per year : Rs. 60,160-5.

N.B.—Commission account is not shown in the above.

The amounts are shown as under :—

1924-1925.	1925-1926.	1926-1927.
Rs.	Rs.	Rs.
4,779	8,958	9,532 *plus* 7,990 to Messrs E. D. Sassoon's office for office allowance and commission for the sales of 3 commercial acids only.

Period.	1924-1925.			1925-1926.			1926-1927.		
	Quantity.	Value.	Cost per ton.	Quantity.	Value.	Cost per ton.	Quantity.	Value.	Cost per ton.
Production.	1,064 tons.			1,406 tons.			1,185 tons.		
	Tons.	Rs. a. p.		Tons.	Rs. a. p.		Tons.	Rs. a. p.	
CHAMBER ACID 100 % BASIS.									
Raw Materials—									
Sulphur	368 at 158	58,144 0 0	54·64	522·75 at 105	54,888 0 0	39·04	425 at 116	49,300 0 0	41·6
Nitre Soda . . .	21 at 210	4,410 0 0	4·14	22·6 at 220	4,972 0 0	3·54	14·7 at 200	2,960 0 0	2·49
Sulphuric Acid . .	13 at 60	7,080 0 0	0·73	17·6 at 60	1,056 0 0	0·75	8·1 at 60	486 0 0	0·41
Labour	...	2,500 0 0	2·35	...	3,000 0 0	2·13	...	2,500 0 0	2·10
Power and Fuel . . .	...	1,489 0 0	1·40	...	2,109 0 0	1·50	...	1,718 0 0	1·45
Repairs and Renewals . .	...	5,630 0 0	5·30	...	7,877 0 0	5·6	...	5,429 0 0	4·59
General services and supervision charges.	...	5,655 0 0	5·31	...	5,921 0 0	4·21	...	5,297 0 0	4·50
Rent, Taxes, Insurances, etc.	...	1,400 0 0	1·30	...	1,353 0 0	0·96	...	1,179 0 0	1·0
Ex-works naked .	...	...	75·17	...	...	57·73	...	...	58·05

Period.	1924-1925.			1925-1926.			1926-1927.		
	Quantity.	Value.	Cost per ton.	Quantity.	Value.	Cost per ton.	Quantity.	Value.	Cost per ton.
Production.	731 tons.			776 tons.			681 tons.		
	Tons.	Rs. a. p.		Tons.	Rs. a p.		Tons.	Rs. a. p.	
CASCADE ACID.									
Raw Materials—									
Chamber Acid .	820 at 75	61,500 0 0	84·13	840 at 58	48,720 0 0	62·50	760 at 58	44,080 0 0	64 70
Labour	...	2,500 0 0	3·42	...	2,500 0 0	3·22	...	2,000 0 0	2·94
Power and Fuel . .	...	10,965 0 0	15·00	...	14,123 2 0	18·20	...	9,196 8 4	14·64
General services and supervision.	...	6,078 13 0	8·30	...	5 895 0 0	7·60	...	5,256 10 0	7·70
Repairs and Renewals . .	...	6,052 0 0	8·30	...	7,736 0 0	9·90	...	5,387 0 0	7·90
Rent, Taxes and Insurance	...	1,505 0 0	2·00	...	1,347 6 0	1·70	...	1,170 0 0	1·70
Selling organisation . .	...	21,290 0 0	29·10	...	17,130 0 0	22·00	...	20,260 0 0	30·00
Packing charges . .	...	7,310 0 0	10·0	...	7,760 0 0	10·00	...	6,810 0 0	10·00
Ex-works naked .	...	...	160·25	...	...	135·12	...	...	139·58

Production.	73 tons.			70 tons.			60 tons.		
HYDROCHLORIC ACID.									
Raw Materials—									
Nitre Cake	*Nil*	...	....	*Nil*	...	...	64·2 at 10	642 0 0	10 7
Salt	81 at 18	1,458 0 0	19·97	77 at 18	1,386 0 0	19·8	66 at 15	990 0 0	16·5
Chamber Acid	73 at 75	5,475 0 0	75·00	70 at 58	4,060 0 0	58·0	56 at 58	3,248 0 0	54·1
Labour	...	1,700 0 0	23·00	...	1,500 0 0	21·42	...	2,000 0 0	33·33
Power and Fuel	...	4,657 0 0	63·8	...	4,664 0 0	66·63	...	4,525 0 0	75·41
Repairs and Renewals	...	1,130 0 0	15·4	...	1,076 0 0	15·3	...	1,119 0 0	18·6
Rent, Taxes, etc.	...	281 0 0	3·8	...	185 0 0	2·6	...	243 0 0	4·0
General services and supervision charges.	...	1,135 0 0	15·5	...	810 0 0	11·4	...	1,092 0 0	18·2
Selling organisation	...	3,972 0 0	54·4 270·87	...	2,354 0 0	33·6 228·75	...	4,208 0 0	70·0 300·84
Less—Salt Cake made	84 at Rs 40	3,520 0 0	48·21 222·66	86 at 40	3,440 0 0	49·14 179·61	130 at 40	5,200 0 0	86·6 214·24
Packing charges	...	949 0 0	13	...	910 0 0	13	...	780 0 0	13
Ex-works naked	...	...	235·66	...	...	192·61	...	...	227·21

Period.	1924-1925.			1925-1926.			1926-1927.		
	Quantity.	Value.	Cost per ton.	Quantity.	Value.	Cost per ton.	Quantity.	Value.	Cost per ton.
Production.	46 tons.			62 tons.			101 tons.		
NITRIC ACID.	Tons.	Rs. a. p.		Tons.	Rs. a. p.		Tons.	Rs. a. p.	
Raw Materials—									
Sodium Nitrate	51 at 240	12,240 0 0	267·0	71·3 at 220	15,686 0 0	253·0	113·7 at 200	22,740 0 0	225·14
Sulphuric Acid—									
Chamber	51 at 75	3,825 0 0	83·1	69 at 58	4,002 0 0	64·5	40 at 58	2,320 0 0	23·00
Cascade	...	...		...	..	...	68 at 124	8,432 0 0	83·40
Nitrate of Potash	...	...	..	...	..	...	2 at 380	760 0 0	7·52
Labour	...	600 0 0	13·04	..	1,000 0 0	16·13	...	1,500 0 0	14·85
Power and Fuel	..	736 0 0	16·00	...	702 0 0	11·32	...	800 0 0	7·92
Repairs and Renewals	...	1,470 0 0	32·00	...	2,601 0 0	42·06	...	3,319 0 0	32·8
General services and supervision.	...	1,475 0 0	32	...	1,955 0 0	31·5	...	3,238 0 0	32·0
Rent, Taxes, Insurance, etc.	...	365 0 0	8	...	447 0 0	7·0	...	721 0 0	7·1
			451·14			425·45			433·73
Less Nitre Cake	57 at 10	570 0 0	12·4	71 at 10	710 0 0	11·44	114 at 10	1,140 0 0	11·28
			438·74			414·01			422·45
Selling organisation	...	5,163 0 0	112·2	...	5,683 0 0	91·70	..	12,479 0 0	123·40
			550·94			505·71			545·85
Packing charges	...	598 0 0	13	...	806 0 0	13·0	...	1,313 0 0	13·00
Ex-works packed	...	...	563·94			518·71			558·85

Production.	15·5 tons.			24 tons.			9 tons.		
PHOSPHORIC ACID.									
Raw Materials—									
Bones	58 at 70	4,060 0 0	261·94	95 at 66	6,272 0 0	261·25	35 at 68	2,380 0 0	242·22
Sulphuric Acid . .	18 at 75	1,350 0 0	87·09	30 at 58	1,740 0 0	72·50	10·5 at 58	609 0 0	67·70
Labour	...	1,000 0 0	64·52	...	1,000 0 0	41·66	...	700 0 0	77·78
Power and Fuel . . .	...	139 5 0	9·00	...	216 0 0	9·00	...	81 0 0	9·00
General service and supervision charges.	...	485 0 0	31·3	...	818 0 0	34·00	...	361 0 0	40·00
Repairs and Renewals . .	...	542 0 0	35·00	...	1,101 0 0	45·90	...	369 0 0	41·00
Rent, Taxes, Insurance, etc. .	...	134 0 0	8·60	...	189 0 0	7·90	...	80 0 0	9·00
Selling organisation . .	...	1,908 0 0	123·10	..	2,404 0 0	100·00	...	1,390 0 0	154·40
Packing charges . . .	...	202 0 0	13·00	...	312 0 0	13·00	...	117 0 0	13·00
Ex-works .	...	...	633·55	...	...	585·21	...	...	654·10
Ex-works with packing per lb.	...	...	Re. 0-4-6	...	...	Re. 0-4-2	...	...	Re. 0-4-7

Period.	1924-1925.			1925-1926.			1926-1927.		
	Quantity.	Value.	Cost per ton.	Quantity.	Value.	Cost per ton.	Quantity.	Value.	Cost per ton.
Production.	122 tons.			160 tons.			215 tons.		
	Tons.	Rs. a. p.		Tons.	Rs. a. p.		Tons.	Rs. a. p.	
COPPERAS.									
Raw Materials—									
Iron Scrap . . .	26 at 10	260 0 0	2·13	33 at 10	330 0 0	2·10	47 at 11	517 0 0	2·40
Chamber Acid . . .	44 at 75	3,300 0 0	27·00	57 at 58	3,306 0 0	20·70	78 at 58	4,524 0 0	21·10
Labour	...	600 0 0	4·91	...	600 0 0	3·75	...	350 0 0	1·63
Power and Fuel . . .	...	701 5 0	5·75	...	920 0 0	5· 5	...	1,236 0 0	5·75
Repairs and Renewals . .	...	374 0 0	3·10	...	573 0 0	3·66	...	587 0 0	2·70
General services and supervision charges.	...	374 0 0	3·10	...	430 0 0	2·70	..	572 0 0	2·60
Rent, Taxes, Insurance, etc. .	...	93 0 0	0·76	...	97 0 0	0·61	..	127 0 0	0·60
Selling organisation . .	...	1,312 0 0	10·70	...	1,250 0 0	8·00	...	2,207 0 0	10·30
Packing	...	610 0 0	5·00	...	800 0 0	5·00	...	1,075 0 0	5·00
Ex-works with packing .	...	...	62·45	...	...	52·21	...	...	52·08

Production.	35 tons.			55 tons.			35 tons.		
COPPER SULPHATE.									
Raw Materials—									
Copper Scrap. . .	9·5 at 1,000	9,500 0 0	271·4	15 at 950	14,250 0 0	259·1	9·3 at 765	7,094 0 0	202·7
Sulphuric Acid . .	30·5 at 144	4,392 0 0	125·5	47·3 at 119	5,628 7 0	102·3	41·5 at 124	5,146 0 0	147·0
Nitric Acid . . .	0·9 at 551	495 9 0	14·1	1·0 at 506	506 0 0	9·2	0·5 at 546	273 0 0	7·8
Labour	...	875 0 0	25·0	...	600 0 0	10·9	...	450 0 0	12·85
Power and Fuel . . .	...	95 0 0	2·7	...	131 0 0	2·38	...	88 2 0	2·52
Repairs and Renewals .	...	1,192 0 0	34·0	...	2,392 0 0	43·50	...	1,154 0 0	33·00
General services and supervision charges.	...	1,198 0 0	34·2	.	1,798 0 0	32·70	...	1,126 0 0	32·2
Rent, Taxes, Insurance, etc. .	...	297 0 0	8·5	...	411 0 0	7·50	...	251 0 0	7·2
Selling organisation . .	...	4,197 0 0	119·	...	5,223 0 0	95·00	...	4,340 0 0	124·0
Packing	...	245 0 0	7·0	...	375 0 0	7·0	...	245 0 0	7·0
Ex-Works .			642·3			569·58			576·27

Period.	1924-1925.			1925-1926.			1926-1927.		
	Quantity.	Value.	Cost per ton	Quantity.	Value.	Cost per ton.	Quantity.	Value.	Cost per ton.
Production.	317 tons.			294 tons.			65 tons.		
ALUMINA FERRIC 14/15% Al_2O_3.	Tons.	Rs. a. p.		Tons.	Rs. a. p.		Tons.	Rs. a. p.	
Raw Materials—									
Bauxite	116 at 26	3,016 0 0	9·61	105·84 at 23	2,434 0 0	8·28	23·4 at 22	515 0 0	7·92
Sulphuric Acid . .	159 at 75	11,250 0 0	35·40	138 at 58	8,004 0 0	27·20	31 at 58	1,798 0 0	27·60
Labour	...	3,500 0 0	11·04	...	3,000 0 0	10·20	...	700 0 0	10·80
Power and Fuel . . .	...	3,607 0 0	11·38	...	3,346 0 0	11·38	...	740 0 0	11·38
Repairs and Renewals . .	...	1,560 0 0	4·90	...	1,750 0 0	6·00	...	314 0 0	4·80
General service and supervision charges.	...	1,567 0 0	4·92	...	1,315 0 0	4·40	...	306 0 0	4·70
Rent, Taxes, Insurance, etc. .	...	388 0 0	1·20	...	301 0 0	1·00	...	68 0 0	1·04
Selling organisation . .	...	5,487 0 0	17·30	...	3,823 0 0	13·00	...	1,179 0 0	18·00
Packing charges . . .	...	317 0 0	1·00	...	294 0 0	1·00	...	65 0 0	1·00
Ex-works .	...	...	96·75	...	...	82·46	...	...	87·24

Production.	228 tons.			250 tons.			346 tons.		
POTASH ALUM.									
Raw Materials—									
Bauxite	66 at 26	1,716 0 0	7·53	72·5 at 23	1,668 0 0	6·670	100 at 22	2,200 0 0	6·36
Sulphuric Acid . .	85 at 75	6,375 0 0	28·00	95 at 58	5,510 0 0	22·040	132 at 58	7,656 0 0	22·12
Potash Sulphate . .	52 at 200	10,400 0 0	45·00	57·5 at 200	11,500 0 0	46·000	796 at 165	13,134 0 0	37·96
Labour	...	3,200 0 0	14·04	...	3,500 0 0	14·000	...	8,500 0 0	24·57
Power and Fuel . . .	...	1,683 0 0	7·38	...	1,845 0 0	7·380	...	2,553 0 0	7·38
Repairs and Renewals . .	...	1,862 0 0	8·10	...	2,755 0 0	11·020	...	3,122 0 0	9·02
General service and supervision charges.	...	1,870 0 0	8·10	...	2,070 0 0	8·280	...	3,067 0 0	8·80
Rent, Taxes, Insurance, etc.	...	463 0 0	2·03	...	473 0 0	1·900	...	678 0 0	1·90
Sales organisation . . .	...	6,551 0 0	28·7	...	6,019 0 0	24·070	...	11,740 0 0	34·00
Packing charges . . .	...	1,596 0 0	7·00	...	1,750 0 0	7·000	...	2,422 0 0	7·0
Ex-works .	...	...	155·88	...	...	148·36	...	...	159·11

Period.	1924-1925			1925-1926.			1926-1927.		
	Quantity.	Value.	Cost per ton.	Quantity.	Value.	Cost per ton.	Quantity.	Value.	Cost per ton.
Production.	8·5 tons.			24 tons.			130 tons.		
EPSOM SALT.	Tons.	Rs. a. p.		Tons.	Rs. a. p.		Tons.	Rs. a. p.	
Raw Materials—									
Magnesite . . .	5 at 45	225 0 0	26·4	12 at 45	540 0 0	22·5	67·4 at 45	3,033 0 0	23·3
Chamber Sulphuric Acid .	5·4 at 75	405 0 0	47·6	13 at 58	754 0 0	31·4	70·0 at 58	4,060 0 0	31·23
Labour	...	40 0 0	4·7	...	120 0 0	5·2	...	600 0 0	4·62
Power and Fuel. . . .	...	51 0 0	6·0	...	144 0 0	6·0	...	780 0 0	6·0
Repairs and Renewals . .	...	58 0 0	6·8	...	182 0 0	7·6	...	790 0 0	6·1
General Supervision, etc. .	...	59 0 0	7·0	...	137 0 0	5·7	...	771 0 0	5·93
Rent, Taxes, Insurance, etc. .	...	15 0 0	1·8	...	31 0 0	1·3	...	172 0 0	1·32
Selling organisation . .	...	204 0 0	24	...	398 0 0	16·6	...	2,973 0 0	22·80
Packing	...	60 0 0	7·0	...	168 0 0	7·0	...	910 0 0	7·00
Ex-works .	...	...	131·3	...	...	103·3	...	...	108·3

Production.	84 tons.			91 tons.			100 tons.		
GLAUBER'S SALT.									
Raw Materials—									
Salt Cake . . .	32·2 at 40	1,288 0 0	15·33	58 at 40	2,320 0 0	25·5	58 at 40	2,320 0 0	23·20
Nitre Cake . .	39 at 10	390 0 0	4·64	...	...	...	2·1 at 10	21 0 0	0·20
Soda Ash . .	13·97 at 140	1,956 0 0	23·28	6 at 135	810 0 0	8·9	8 at 135	1,080 0 0	10·80
Lime	0·48 at 100	48 0 0	0·57	...	...	...	138 tins at Re. 1	138 0 0	1·38
Labour	...	800 0 0	9·52	...	800 0 0	8·79	...	800 0 0	9·00
Power and Fuel . .	...	420 0 0	5·00	...	455 0 0	5·00	...	500 0 0	5·00
Repairs and Renewals . .	...	385 0 0	4·60	...	484 0 0	5·3	...	429 0 0	4·29
General service and supervision.	...	387 0 0	4·60	...	364 0 0	4·00	...	417 0 0	4·17
Rent, Taxes, Insurance, etc.	...	96 0 0	1·14	...	83 0 0	0·91	...	93 0 0	0·93
Selling organisation . .	...	1,353 0 0	16·20	...	1,057 0 0	11·60	...	1,612 0 0	16·12
Packing	...	588 0 0	7·00	...	637 0 0	7·00	...	700 0 0	7·00
Ex-works .	...	...	91·88	...	...	77·64	...	...	80·73

Period.	1924-1925.			1925-1926.			1926-1927.		
	Quantity.	Value.	Cost per ton.	Quantity.	Value.	Cost per ton.	Quantity.	Value.	Cost per ton.
Production.	12·4 tons.			...			11·4 tons		
SODA SULPHIDE.	Tons.	Rs. a. p.		Tons.	Rs. a. p.		Tons.	Rs. a. p.	
Raw Materials—									
Nitre Cake . . .	12 at 10	120 0 0	9·70	...	...	...	18 at 10	280 0 0	24·50
Salt Cake . . .	13 at 40	520 0 0	41·90	...	...	...	...	...	...
Coal Dust . . .	17 at 15	255 0 0	20·50	...	...	...	15 at 15	250 0 0	19·70
Labour	...	500 0 0	40·32	...	...	...	...	500 0 0	43·86
Power and Fuel . .	...	1,257 0 0	101·38	...	...	...	...	1,037 0 0	91·00
Repairs and Renewals . .	...	316 0 0	25·40	...	...	...	...	195 0 0	17·10
General services and supervision charges.	...	238 0 0	19·20	...	...	...	...	190 0 0	16·60
Rent, Taxes, Insurance, etc. .	...	54 0 0	4·35	...	...	...	...	42 0 0	3·60
Selling organisation .	...	691 0 0	55·70	...	...	...	...	732 0 0	64·20
Packing charges . . .	...	372 0 0	30·00	...	...	...	...	342 0 0	30·00
Ex-Works .	...	...	348·45	...	...	...	...	...	310·56

Production.	5·7 tons.			5·0 tons.			3·8 tons.		
ZINC CHLORIDE.									
Raw Materials—									
Zinc Scrap . . .	2·9 at 500	1,450 0 0	254·30	4·02 at 150	603 0 0	120·60	3·1 at 150	465 0 0	122·30
Hydrochloric Acid . .	9·58 at 231	2,213 0 0	388·00	8·00 at 180	1,440 0 0	288·00	6·3 at 214	1,348 0 0	355 00
Labour	...	60 0 0	10 53	...	30 0 0	6·00	...	40 0 0	10 53
Power and Fuel . . .	...	19 2 6	3·38	...	16 9 0	3·38	...	21 0 0	5·53
Repairs and Renewals . .	...	260 0 0	45·61	...	183 0 0	36·60	...	113 0 0	30·00
General service and supervision charges.	...	261 0 0	45·80	...	138 0 0	27·60	...	111 0 0	30·00
Rent, Taxes, Insurance, etc.	...	65 0 0	11·40	...	32 0 0	6·4	...	25 0 0	·60
Selling organisation . .	...	914 0 0	160·30	...	400 0 0	80·00	...	426 0 0	112·10
Packing	...	86 0 0	15·00	...	75· 0 0	15·00	...	38 0 0	15·00
Ex-Works .	...	...	934·41	...	...	583·58	...	...	677·06

Period.	1924-1925.			1925-1926.			1926-1927.		
	Quantity.	Value.	Cost per ton.	Quantity.	Value.	Cost per ton.	Quantity.	Value.	Cost per ton.
Production.	80 tons.			160 tons.			167 tons.		
	Tons.	Rs. a. p.		Tons.	Rs. a. p.		Tons.	Rs. a p.	
BONE MEAL.									
Raw Materials—									
Bones	85 at 70	5,950 0 0	74·37	169 at 66	11,154 0 0	69·70	170 at 68	11,560 0 0	69 20
Labour	...	600 0 0	7·50	...	1,200 0 0	7·50	...	1,199 0 0	7 18
Repairs and Renewals . .	...	557 0 0	6·96	...	1,500 0 0	9·30	...	1,238 0 0	7·40
General services and supervision charges.	...	559 0 0	6·96	...	1,120 0 0	7·00	...	1,203 0 0	7 20
Power and Fuel . . .	...	104 0 0	1·38	...	221 0 0	1·38	...	231 0 0	1·38
Rent, Taxes, Insurance, etc. .	...	139 0 0	1·70	...	258 0 0	1·60	...	269 0 0	1·60
Selling organisation . .	...	1,958 0 0	24·50	...	3,269 0 0	20·40	...	4,652 0 0	27·80
Packing charges . . .		640 0 0	8·00	..	1,280 0 0	8·00	...	1,336 0 0	8·00
Ex-Works .	...	...	131·37	..	...	124·88	..	...	129·76

Production.	51 tons.			46 tons.			88 tons.		
BONE SUPERPHOSPHATE.									
Raw Materials—									
Bone Meal . . .	36 3 at 97	3,521 0 0	69·04	31 at 98	2,914 0 0	63·34	59 at 92	5,428 0 0	61·70
Sulphuric Acid . .	18 at 75	1,350 0 0	26·40	18 at 58	1,044 0 0	22·70	33 at 58	1,914 0 0	21·70
Labour	...	300 0 0	5·88	...	400 0 0	8·70	...	500 0 0	5·68
Power and Fuel . . .	...	71 0 0	1·38	...	63 0 0	1·38	...	121 0 0	1·38
Repairs and Renewals . .	...	443 0 0	8·70	...	541 0 0	11·80	...	618 0 0	7·00
General services and supervision charges.	...	445 0 0	8·72	...	406 0 0	8·80	...	762 0 0	8·60
Rent, Taxes, Insurance, etc. .	...	110 0 0	2·10	...	93 0 0	2·00	...	169 0 0	1·90
Selling organisation . .	...	1,558 0 0	30·85	...	1,180 0 0	25·60	...	2,925 0 0	33·20
Packing charges . . .	...	408 0 0	8·00	..	368 0 0	8·00	...	704 0 0	8·00
Ex-Works .	...	...	160·77	..	...	152·32	...	...	149·16

Period.	1924-1925.			1925-1926.			1926-1927.		
	Quantity.	Value.	Cost per ton.	Quantity.	Value.	Cost per ton.	Quantity.	Value.	Cost per ton.
Production.	1·13 tons.			3·32 tons.			14·7 tons.		
PURE ACIDS.	Tons	Rs. A. P.		Tons.	Rs. A. P.		Tons.	Rs. A. P.	
Raw Materials—									
Sulphuric Acid	0·8 at 144	115 0 0	102·0	0·95 at 119	113 0 0	34·4	12 at 124	1,488 0 0	101·2
Nitric Acid	0·3 at 551	165 0 0	146·3	0·8 at 506	405 0 0	121·9	2 at 546	1,092 0 0	74·3
Hydrochloric Acid	0·2 at 271	54 0 0	48·0	2·39 at 229	547 0 0	165·0	2·5 at 301	753 0 0	51·2
Labour	...	200 0 0	177·0	...	500 0 0	150·0	...	2,205 0 0	150·0
Power and Fuel	...	211 0 0	186·38	...	582 0 0	175·21	...	2,617 0 0	178·0
General service and supervision charges.	...	55 0 0	48·7	...	157 0 0	47·3	...	646 0 0	44·0
Repairs and Renewals		55 0 0	48·7	...	209 0 0	62·9	...	660 0 0	45·0
Rent, Taxes, Insurance, etc.	...	14 0 0	12·4	...	36 0 0	10·8	...	143 0 0	9·7
Selling organisation	...	193 0 0	170·8	...	456 0 0	137·3	...	248 0 0	17·0
Packing charges with containers.	...	791 0 0	700·0	...	2,324 0 0	700·0	...	10,290 0 0	700·0
			1,640·28			1,604·81			1,370·4
Cost per lb.	...	...	11·7 Annas		...	11·4 Annas	...	...	9·8 Annas

Statement showing present production and the maximum production expected to be attained in 10—15 years' time.

Name of the Product.	Present average production.	Maximum production expected in 10-15 years' time.	Average.
	Tons	Tons.	Tons.
Chamber Acid . . .	1,200	6,600	4,000
Cascade Acid . . .	630	800	700
Hydrochloric Acid . . .	70	600	350
Nitric Acid . . .	70	200	150
Phosphoric Acid . . .	16	300	150
Potash Alum . . .	350	3,000	1,500
Alumina Ferric . . .	200	300	200
Copperas . . .	170	300	250
Copper Sulphate . . .	50	200	150
Epsom Salt . . .	130	1,500	700
Glauber's Salt . . .	100	600	400
Superphosphate . . .	80	5,000	2,500
Zinc Chloride . . .	5	300	150

FORM 2—QUESTION 78 (REVISED SHEET).

CHAMBER ACID.

Production—4,000 tons.

Particulars.	Amount.	Cost per ton.
	Rs.	Rs.
Raw Materials—		
Sulphur, 1,450×116 . .	1,68,200·0	42·050
Nitre, 43·5×180 . . .	7,830·0	1·960
Sulphuric Acid, 22×50 . .	1,100·0	0·275
Labour	3,500·0	0·875
Power and Fuel . . .	5,600·0	1·400
Repairs and Renewals . .	10,000·0	2·500
General service and supervision charges	10,000·0	2·500
Rent, Taxes, Insurance, etc. .	1,600·0	0·400
Cost per ton *ex*-Works .	.....	51·960

Cascade Acid.

Production—700 tons.

Particulars.	Amount.	Cost per ton.
	Rs.	Rs.
Raw Materials—		
Chamber Acid, 770×52 . .	40,040·0	57·2
Labour	2,500·0	3·57
Power and Fuel . . .	10,283·0	14·69
Repairs and Renewals . .	5,600·0	8·0
	58,423·0	
General service and supervision charges	1,355·0	1·9
Rent, Taxes, Insurance, etc. .	433·8	0·62
Selling organisation . .	5,422·50	7·74
Packing charges . . .	7,000·00	10·00
Cost price per ton *ex*-Works .		103·72

Hydrochloric Acid.

Production—350 tons.

Particulars.	Amount.	Cost per ton.
	Rs.	Rs.
Raw Materials—		
Salt, 350 at Rs. 18 . .	6,300·00	18·00
Sulphuric Acid, 300 at Rs. 52	15,600·00	44·50
Nitre Cake, 167 at Rs. 10 .	1,670·00	4·77
Labour	7,000·00	20·00
Power and Fuel . . .	19,250·00	55·00
Repairs and Renewals . .	1,050·00	3·00
	50,870·00	
General service and supervision charges	1,271·75	3·60
Rent, Taxes, Insurance, etc. .	406·96	1·16
		150·03
Less Cakes made, 430×40 .	17,200·00	49·15
		100·88
Selling organisation . . .	*Nil.*	...
Packing charges . . .	4,550·00	13·00
Price per ton *ex*-Works .		113·88

Nitric Acid.

Production—150 tons.

Particulars.	Amount.	Cost per ton.
	Rs.	Rs.
Raw Materials—		
Nitrate of Soda, 167×180 .	30,060·0	200·4
Sulphuric Acid, 167×52 .	8,684	57·9
Labour	1,800·0	12·0
Power and Fuel . . .	1,210·0	8·06
Repairs and Renewals . .	900·0	6·00
	42,654·0	
General service and supervision charges	1,066·3	7·10
Rent, Taxes Insurance, etc. .	345·0	2·30
		293·76
Less Nitre cake, 167×10 .	1,670·0	11·13
		282·63
Selling organisation . .	4,265·4	28·44
Packing charges . . .	1,950·0	13·0
Cost per ton *ex*-Works .		324·07

Phosphoric Acid.

Production—150 tons.

Particulars.	Amount.	Cost per ton.
	Rs.	Rs.
Raw Materials—		
Bones, 594 at Rs. 70 . .	41,580·0	277·20
Sulphuric Acid, 174 at Rs. 52 .	9,048·0	60·32
Labour	5,700·0	38·00
Power and Fuel . . .	1,350·0	9·00
Repairs and Renewals . .	300·0	2·00
	57,978·0	
General service and supervision charges	1,449·4	9·60
Rent, Taxes, Insurance, etc. .	450·0	3·00
Selling organisation . .	5,797·8	38·65
Packing charges . . .	1,950·0	15·00
		450·77

Cost per lb. *ex*-Works = Re. -/3/2.

Copperas.

Production—250 tons.

Particulars.	Amount.	Cost per ton.
	Rs.	Rs.
Raw Materials—		
Sulphuric Acid, 90×52 .	4,680·0	18·72
Iron Scrap, 53×10 . .	530·0	2·12
Labour	375·0	1·50
Power and Fuel . . .	1,437·5	5·75
Repairs and Renewals . .	1,500·0	6·00
	8,522·5	
General service and supervision charges	213·0	0·80
Rent, Taxes, Insurance, etc. .	68·17	0·27
Selling organisation . .	852·25	3·40
Packing charges . . .	1,250·0	5·00
Cost per ton *ex*-Works .		43·56

Copper Sulphate.

Production—150 tons.

Particulars.	Amount.	Cost per ton.
	Rs.	Rs.
Raw Materials—		
Copper Scrap, 39×800 . .	31,200·0	208·0
Sulphuric Acid, 128 at Rs. 90	11,520·0	76·8
Nitric Acid, 2 at Rs. 400 .	800·0	5·3
Labour	1,500·0	10·0
Power and Fuel . . .	1,500·0	10·0
Repairs and Renewals . .	750·0	5·0
	47,270·0	
General service and supervision charges	1,181·7	7·8
Rent, Taxes, Insurance, etc. .	378·0	2·5
Selling organisation . .	4,727·0	31·5
Packing charges . . .	1,050·0	7·0
Cost price per ton *ex*-Works .		363·9

ALUMINA FERRIC.

Production—200 tons.

Particulars.	Amount.	Cost per ton.
	Rs.	Rs.
Raw Materials—		
Bauxite, 72×23 . .	1,656·0	8·28
Sulphuric Acid, 94×52 . .	4,888·0	24·44
Labour	2,000·0	10·00
Power and Fuel . . .	2,200·0	11·00
Repairs and Renewals . .	1,000·0	5·00
	11,744·0	
General service and supervision charges	293·6	1·40
Rents, Taxes, Insurance, etc. .	93·9	0·46
Selling organisation . .	1,174·4	5·87
Packing charges . . .	200·0	1·00
Cost per ton *ex*-Works .		67·45

POTASH ALUM.

Production—1,500 tons.

Particulars.	Amount.	Cost per ton.
	Rs.	Rs.
Raw Materials—		
Sulphuric Acid, 570×52 .	29,640·0	19·76
Bauxite, 435×23 . .	10,005·0	6·67
Potash Sulphate, 345×165 .	56,925·0	37·95
Labour	15,000·0	10·00
Power and Fuel . . .	11,070·0	7·38
Repairs and Renewals . .	7,500·0	5·00
	1,30,140·0	
General service and supervision charges	3,253·3	2·16
Rent, Taxes, Insurance, etc. .	1,000·0	0·66
Selling organisation . .	13,014·0	8·66
Packing charges . . .	10,500·0	7·00
Cost price per ton *ex*-Works .		105·24

Epsom Salt.

Production—700 tons.

Particulars.	Amount.	Cost per ton.
	Rs.	Rs.
Raw Materials—		
Sulphuric Acid, 377×52 .	19,604·0	28·00
Magnesite, 355×45 . .	15,975·0	22·82
Labour	2,450·0	3·50
Power and Fuel . . .	4,200·0	6·00
Repairs and Renewals . .	1,750·0	2·500
	43,979·0	
General service and supervision charges	1,099·4	1·57
Rent, Taxes, Insurance, etc.	350·0	0·50
Selling organisation . .	4,397·9	6·28
Packing charges . . .	4,900·0	7·00
Cost per ton *ex*-Works		78·17

Glauber's Salt.

Production—400 tons.

Particulars.	Amount.	Cost per ton.
	Rs.	Rs.
Raw Materials—		
Salt Cake, 240×40 . .	9,600·0	24·00
Soda Ash, 32×135 . .	4,320·0	10·80
Labour	1,652·0	4·13
Power and Fuel . . .	2,000·0	5·00
Repairs and Renewals . .	400·0	1·00
	17,972·0	
General service and supervision charges	449·0	1·12
Rent, Taxes, Insurance, etc. .	144·0	0·36
Selling organisation . .	1,797·0	4·50
Packing charges . . .	2,800·0	7·00
Cost price per ton *ex*-Works .		57·91

ZINC CHLORIDE.

Production—150 tons.

Particulars.	Amount.	Cost per ton.
	Rs.	Rs.
Raw Materials—		
Zinc Scrap, 75 ton at Rs. 300	22,500·0	150·0
Hydrochloric Acid, 250 tons at Rs. 92	23,000·0	153·2
Labour	675·0	4·5
Power and Fuel	507·0	3·38
Repairs and Renewals	150·0	1·00
	46,832·0	
General service and supervision charges	1,170·0	7·80
Rent, Taxes, Insurance, etc.	374·6	.....
Selling organisation	9,770·0	65·10
Packing charges	2,250·0	15·00
Cost price per ton *ex*-Works		399·98

BONE SUPERPHOSPHATE.

Production—2,500 tons.

Particulars.	Amount.	Cost per ton.
	Rs.	Rs.
Raw Materials—		
Bone Meal, 1,675 at Rs. 77	1,28,975·0	51·58
Sulphuric Acid, 950 at Rs. 52	49,400·0	19·76
Labour	10,000·0	4·00
Power and Fuel	3,500·0	1·40
Repairs and Renewals	12,500·0	5·00
	2,04,375·0	
General service and supervision charges	5,109·3	2·04
Rent, Taxes, Insurance, etc.	1,500·0	0·60
Selling organisation	20,437·5	8·02
Packing charges	17,500·0	7·00
Price per ton *ex*-Works		99·40

(4) *Letter dated the 8th December 1928.*

We regret to inform you that in the costs-sheets of Potash Alum submitted on the 13th November 1928 a typographic error has crept in under the heading of Power & Fuel. Please read Rs. 17·38 instead of Rs. 7·38. We shall thank you to make the necessary correction in the figure and also the grand total. The mistake is very much regretted.

(5) *Letter dated the 8th December 1928.*

We beg to inform you that in the costings of various chemicals submitted, only the actual charges as far as Power, Fuel and Labour are concerned, incurred during working period, were taken into account, as we understood their costings were to be worked out as such. Thus the expenses incurred during the non-working periods and experimental stages were left out in respect of above mentioned items.

While we were explaining this to the members of the Board during their recent visit to our works, they desired us to submit another statement as a rider, showing such expenses year by year. We, therefore, beg to give below the amounts left out:—

	Rs.
1924-25	42,900
1925-26	39,400
1926-27	31,000

For your ready reference, we also attach hereto a statement showing how these amounts will affect the previous costs, if distributed on the same basis as the other indirect charges.

The Statement shwing how the present costs will be affected in case charges for non-working period as per our letter No. 28-3063 are to be included.

Name of the Chemicals.	1924-25.			1925-26.			1926-27.		
	Cost per ton as per statement submitted.	*Add* for non-working period charges.	Total cost per ton.	Cost per ton as per cost sheets submitted.	*Add* for non-working period charges.	Total cost per ton.	Cost per ton as per cost sheets submitted.	*Add* for non-working period charges.	Total cost per ton.
Chamber Sulphuric Acid . . .	75·17	10·0	85·17	57·73	6·8	64·53	58·05	5·6	63·65
Cascade Sulphuric Acid . . .	160·25	27·4	187·65	135·12	19·6	154·72	139·58	15·5	155·08
Hydrochloric Acid	235·66	38·9	274·56	192·61	30·9	223·59	227·24	27·4	254·64
Nitric Acid	563·94	71·1	635·04	518·71	61·1	579·81	558·85	54·6	613·45
Phosphoric Acid	633·55	78·4	711·95	585·21	64·5	649·71	654·10	52·5	706·60
Copperas	62·45	9·9	72·35	52·21	6·89	59·10	52·08	5·6	57·68
Copper Sulphate	642·3	93·5	735·8	569·58	72·8	642·38	576·27	61·6	637·87
Alum	165·88	21·5	187·38	158·36	17·9	176·26	169·11	14·6	183·71
Alumino Ferric	96·75	15·3	112·05	82·46	11·5	93·96	87·24	9·4	96·64
Epsom	131·30	19 8	151·10	103·30	13·1	116·40	108·30	10·5	118·80
Glauber Salt	91·88	9·2	101·08	77·64	7·0	84·64	80·73	5·8	86·53
Soda Sulphide	348·45	34·0	382·45	...	...	...	310·56	20·7	331·26
Zinc Chloride	934·41	169·3	1,103·71	583·58	110·0	693·58	677·06	102·5	779·56
Bone Meal	131·37	13·2	144·57	124·88	11·2	136·08	123·76	8·8	138·56
Bone Super	160·77	19·8	180·57	152 32	16·7	169·02	149·16	11·0	160·16
Pure Acids	1,640·28	150·3	1,790·58	1,504·81	146·0	1,650·81	1,370·4	89·7	1,459·11

Referring to the Board's inquiry regarding despatches to upcountry direct from the works, and the sales in Bombay for the last three years, we give below figures as under. All sales effected in Bombay are not necessarily for the local consumption, but they include resale by merchants to upcountry stations also.

Name of Article.	1924-25.		1925-26.		1926-27.	
	Up-country.	Bombay.	Up-country.	Bombay.	Up-country.	Bombay.
	Tons.	Tons.	Tons.	Tons.	Tons.	Tons.
Sulphuric Acid	183·0	396 12	188·0	406 0	153·0	410 0
Hydrochloric Acid	15·0	27·04	16·0	40·0	22 0	45·0
Nitric Acid	20 0	21 46	26·0	32·0	28 0	42·0
Phosphoric Acid	*nil*	14 00	*nil*	23·0	*nil*	8·0
Alum	*nil*	145·96	19 0	261·0	40·0	222 0
Copperas	*nil*	95·76	5·0	203·0	18·0	158·0
Glauber's Salt	23·0	106·90	25·0	57 0	30 0	50·0
Copper Sulphate	*nil*	20 64	5·0	...	8·0	40·0
Zinc Chloride	(60 % liq.,) 6·0	5 55	4·0	*nil*	*nil*	3 5 (Solid)
Alumina Ferric	75 0	...	93·0	...	84·0	*nil*
Epsom Salts	*nil*	..	7·0	26·0	6·0	78·0
Soda Sulphide	*nil*	12·0	*nil*	*nil*	*nil*	11·0
Fertiliser Mixtures, Superphosphates and Bone Meal.	50·0	...	150·0	...	400·0	...
	372 0	845·43	538·0	1,048·0	789 0	1,067 5

As regards the concessions in Railway Freights we may be allowed to add the following to what we have said before in our reply to Question No. 54.

(1) *Freights on Raw Materials.*—The present railway rates of raw materials such as bauxite, magnesite, etc., are much too high considering the prices of the articles. Again the fact that these articles become subject to railway freights when they are transformed into finished products seem to be lost sight of by Railway Administrations. The f.o.r. Katni price of bauxite is only Rs. 6 or so while the freight on it is Rs. 16. The price of Magnesite f.o.r. Mysore is Rs. 15 while the freight up to Ambernath is Rs. 26. These freights have to be reduced appreciably to make them workable. Bauxite ought not to carry a freight of more than Rs. 6 or so and Magnesite Rs. 10. These freights should at least be made comparable with those current for coal and manganese ores.

Bones.—The freight on bones should also be reduced to about 50 per cent. At present we pay Rs. 12 per ton from Raichur and other Bone Centres in Khandesh. This should be brought down to Rs. 6. It should be emphasised here that this concession should be made applicable only to manufacturers of Bone Products for indigenous use. As the Agricultural Commission has completely ignored the question of raising a tariff wall

against the export duty of bones, the next best alternative that suggests itself to us is that at least such concessional rate should be granted only to genuine manufacturers of Bone-Fertilisers and other products for the use of Indian Agriculture and other industries. By thus making a distinction many of the present exporters also will be tempted to take advantage of this concession to utilise as much quantity as possible for local agricultural use.

Oil Cakes.—The same argument holds good in the case of oil cakes. If oil cakes used in the manufacture of complete manures and those used directly in agriculture receive a concessional freight, larger quantities will surely go to enrich the indigenous agriculture. For this purpose the freights to exporting ports should be much heavier than freights to up-country stations. As for example large quantities of castor cake from Gujrath, Kardi cakes from the Nizam's provinces, Linseed cake from Central Provinces and Berars and Cawnpore, etc., all come to Bombay port for export and they also go to Kopergaon, Belapure, Baramati, Poona, etc., for being applied as manure to the soil or the two latter kinds to serve as a food to cattle. Quantities are taken by fertiliser manufacturers. The freight rates for cakes transported for the two latter purposes should bear the least Railway freight about 50 per cent. of the present wagon load rate on wagon loads and smaller parcels alike and those going to the ports should carry the present freights or even somewhat higher.

(2) *Freights on containers.*—The freights that we have to pay at present are also too high and different rates prevail on different Railways. The Great Indian Peninsula Railway charges empty jars at 4th class and empty carboys at 6th class, while the Bombay, Baroda and Central India Railway charge both the kind of containers at 1st class. The containers when they go with acid are charged at the same class as Acids. What we request is that containers should be charged at special schedule rates, equivalent to half the 1st class rates and that this rate should prevail both when the containers go out of the factory filled with acids and when they are returned as empties to the factory. Again this proposed rate should apply both to wagon loads as well as small consignments.

(3) *Freights on acids.*—At present Nitric and Hydrochloric Acids are placed in the 9th class and Sulphuric in the 6th class. A concession rate on all the three acids for wagon loads is given which works up to about 0·6 to 0·8 of a pie per maund per mile. A very large majority of our consignments of acids are despatched as petty consignments and it is on this that we want a reduction especially. We, therefore, request that this rate of 0·6 of a pie per maund per mile should be made a uniform rate irrespective of the quantity of distance on all acids alike.

(4) *Freights on salts.*—The following table will show how salts are at present classified by the Great Indian Peninsula Railway Company:—

Article.	Classification.	
Copperas and Alum . .	1st class.	
Glauber Salt . . .	3rd class.	(2nd class at Owners' risk.)
Copper Sulphate . .	4th class.	
Epsom Salt, Soda Sulphide and Zinc Chloride . .	4th class.	
Fertilisers	1st class.	

It will be observed from a look at the table that the classification does not seem to be based on any principle. There can be no reason why Copperas should be first class, Epsom Salt 4th class, Glauber Salt 3rd class or why Epsom and Zinc Chloride should be classed together. The classification appears to be quite arbitrary as far as we can see. They are all salts and are packed as suits their nature. We, therefore, propose that these salts be charged at 0·15 pie per maund per mile on smaller consignments and for wagon loads at half this reduced rate, irrespective of distance.

The freight on fertilizers was reduced this year. Petty consignments are charged on the G. I. P. Railway at the rate of 0·45 pie per maund per mile and wagon loads at the rate of 0·12 pie. We beg to propose that a rate of 0·05 of a pie per maund per mile should be placed on Phosphatic fertilizers, Ammonium Sulphate, and other fertilizers of indigenous manufacture irrespective of distance and quantity, such concession being allowed only on consignments from manufacturers' station to obviate such concession being abused.

We beg further to suggest that there should be a uniformity of rates on all the railways as far as possible and concession rates should be granted only to *bonâ fide* indigenous concerns and indigenous articles. The best way to accomplish this last object, concessions should be allowed in the case of raw materials only to stations where they are to be utilised in this country and in the case of finished products the concessions should rule from the manufacturing centres. If a distinction is not made between Indian made goods and Foreign goods any concession that may be given on finished products will fail to act as protective benefit to Indian manufacturers.

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(6) *Letter dated the 9th January 1929.*

During the course of our last oral evidence before the Board, the President desired to obtain certain extracts from the reports submitted by the undersigned to Messrs. D. M. Chemical Company on the manufacture of Zinc Chloride and Soda Sulphide, from experience gained in his visits to different plants in the United States of America.

Enclosed please find six copies of the same and oblige.

Extracts from reports submitted to the D. M. Chemical Company by Mr. Gupta during tour abroad.

REPORT No. 12.

Re *Soda Sulphide.*—(Manufacturers, The Merrimac Chemical Company, Boston, Mass, United States of America.). Being manufactured for over 20 years. Have two reverberatory furnaces (15′×18′×3′) like ours and one rotary furnace recently installed. The detail construction of the latter furnace is shown in two blue-prints in my possession.

The efficiency with the ordinary furnaces run up to about 55—60 per cent. The efficiency with the rotary has reached 65 per cent. and with more workings the same is expected to give better results.

The trouble in the manufacture of this work is the higher per cent. of carbonate. The average melt runs—

44—46 per cent. Na_2S.
16—20 per cent. Na_2CO_3.
4—6 per cent. Na_2SO_4.
20—25 per cent. insoluble.

The coal is used is soft, the ash per cent. never running over 10. Petroleum residue is being used also, which is almost ashless.

On the ordinary furnaces the charges are given as 1,200 lbs. cake (95 per cent.) *plus* 650 lbs. coal of 8 per cent. ash. For the rotary 1,700 lbs. of cake to 750 lbs. coal. Nine charges per day is given in each ordinary furnace and 12 charges in the rotary. Fineness of cake and coal is 20—40 mesh.

While using Nitre Cake, the same is charged first in the furnace, melted, and next the coal is added and mixed from time to time.

The melts are dumped into wheel barrows covered with a layer of cinders, cooled, broken into lumps, passed through a grinder, carried by an elevator to leaching vats. The liq. from leaching system is maintained at 32° Be at 140F. in winter and 33° Be at 140F. in summer. This is taken to a settling

system and pumped to shallow crystallisers where crystals are taken over every 3rd day. The mother liquor obtained (about 28 per cent. Na_2S.) goes to the manufacture of depilatory.

Researches at this place and at the company's laboratory verify the contention that the mass taken out into wheelbarrows being saturated with CO_2, while cooling takes up moisture from humid atmosphere and forms the greater per cent. of carbonate. Gas analyses show also that combustion in the furnace fuel contains practically no CO which is not very desirable. The rotary furnace which is now dust coal fired (supplied by Flynn & Emerich, Baltimore Md.) is now being replaced by oil burners when controlling of combustion gases can be maintained.

To eliminate rapid formation of the carbonate it is intended to put up a tray conveyor. This will carry the melt in thin plates, cool it soon, dispense with the subsequent handling and breaking and make leaching easier and rapid. Consequently production will be increased. This suggestion has been given by me from my experience of operation elsewhere and was discussed with the Head of their Research Department, Mr. Wilson.

At present no conc. soda sulphide is made, but the equipment is in existence.

The daily production from the 3 furnaces, comes to about 13 tons of crystal sulphide.

Cost of production per ton works out to 38$ (for crystals) which includes 8$ overhead charges.

Market price 36—38 $.

The manufacture is maintained partly to bear overhead charges and to keep the market for the supply of depilatory for wool pulling and to supply the tanneries round here with other goods.

I understand that the Dow Chemical Company manufacture the sulphide as a bye-product from the evolution of H_2S—obtained in some of their process and consequently can supply this material very cheap.

The Grasselli Chemical Company is one of the large producers of this material also.

The rotary furnace burns 2½ tons of coal dust per day. The reverberatory burns 380 gallons oil (American 8·3 lbs. a gallon) each per day. The temperature in the flue of rotary is about 750—800°C. and inside 950—1,000°C.

Rotary furnace with all equipment costs 27,000 $.

17 men are on this plant and are paid about 72 $ per day which is approximately the overhead charges on the plant.

Salt Cake is priced at 11 $ a ton and Coal at 3·5 $.

Report No. 13.

The Grasselli Chemical Company—Cleveland, Ohio.

They have several works all over the country—and a dye works at Albany, New York, which I visited also.

At their Cleveland works the following are specialised:—Acids, zinc chloride, ammonium chloride, soda silicate, zinc sulphate, mixed fertilisers, Glaubers' Salt, etc.

Zinc Chloride.—For raw materials they use zinc skimmings from the galvanisers or their roasted blends when available.

The skimmings are of the following composition:—

7—8 per cent NH_4Cl.
15—20 per cent. $Zn\ Cl_2$.
40 per cent. zinc.

When skimmings are used, the material is dissolved in water. Circular tanks made of acid resisting bricks cemented with molten sulphur (square

tanks in their opinion are of weak construction) provided with covered hood and stirrers.

Just sufficient lime is added to precipitate out the zinc chloride, in other words the zinc falls out as metal and hydroxide; ammonium and calcium chloride remain in solution. This is drained off and the residue washed.

This residue is dissolved in circular wooden tanks made as indicated above. Whatever free lime remains, precipitates out the sulphuric acid in the crude hydrochloric acid.

The neutral solution is filtered through wooden filters. Pump used is made of chrome steel. The filtered liquor goes to the purification tank. This is done by means of $NaCLO_3$ instead of $KMnO_4$, etc. The liquor is settled and syphoned off for concentration.

The preliminary concentration is done in glass enamelled pots. Systems arranged in cascade form, 3—4 pots to a system. The final pot can be used as of wrought iron. The firing is done from the finishing end.

Tin lined copper pots as used by us are quite alright, and they use the same also.

The product obtained is not snow white, but that obtained lately by us, and contains about 95—96 per cent. zinc chloride with traces of calcium and ammonium.

Soda Sulphide.—The soda sulphide is manufactured by the company at their New Jersey works which I shall visit on my return to New York. (Visited this plant later on.)

Dr. Taylor who is in charge of the Research Department of this company advises me confidentially that with oil firing and using steam for atomising, we can never efficiently make soda sulphide.

They have tried this and failed, and research proved that steam (moisture) and CO_2 bring about the following reactions:—

$$Na_2S + H_2O + CO_2$$
$$Na_2CO_3 + H_2S.$$
$$2H_2S + 3O_2$$
$$2SO_2 + 2H_2O.$$

which if carried forward can re-convert the Na_2CO_3.....Na_2SO_4.

The inefficient reduction can thus be accounted for.

My experience at the Merrimac Company is also similar. They are, however studying the problem differently.

The Grasselli people are making the product efficiently. Up to recent date this people had also stationary furnaces like us, but have for the last few years taken up the rotary furnaces.

In Canada when power from the falls is very cheap, 0·2 cent per unit or so, a process is worked out for the reduction of Na_2SO_4 in an electric bath using carbon as electrodes with 4—5 per cent. of K_2SO_4; the product analyses as high as 90—95 per cent. Na_2S.

A proper melt from furnaces at the Grasselli works shows—

56—60 per cent. Na_2S.
5 per cent. Na_2CO_3.
3 per cent. $Na_2S_2O_3$.
1 per cent. Na_2SO_4.

The Grasselli Chemical Company—New Jersey.

Soda Sulphise.—Proportion of charge—salt cake 5,500 lbs. to 3,500 lbs. soft coke (12—13 per cent. ash).

The furnace used is rotary, but coal fired. The melt obtained is discharged and carried over to leach boxes by a long tray conveyor.

Both crystals and solid are made. The crystallization takes place in shallow troughs. The conc. system consists of several half round shells (boiler type) coal fired, covered, and provided with long hoods.

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(7) *Letter dated 25th February, 1929.*

As desired by the Board we enclose herewith statements showing the import customs duties levied in different countries, comparative table for the duties in terms of rupees per ton and also the figures in percentages together with our remarks thereon.

The figures for duties levied in different countries other than India have been obtained from the consuls of respective countries in Bombay.

The last statement submitted to you in the course of our last evidence in this connection is incomplete and full of typographic mistakes and as such we desire the same to be treated as cancelled.

Enclosure No. 1.

From the statements accompanying it will be apparent that France which has its own raw materials of bauxites and phosphates, levies the most prohibitive duties against finished products made out of those, *viz.*, alum and phosphoric acid. It puts equally heavy duties on nitric acid to prevent German importation of the cheap synthetic products into its market. Germany puts a duty of about 22 per cent. on alum to prevent France killing its alumina industry by its cheap bauxite. In other articles it is sure of its superior position and the duties levied are comparatively lighter. But the epsom salt in which Germany has the advantage of possessing the raw materials in abundance, it has sufficient high tariff duty to prevent its neighbour France which also possesses similar facilities to some extent from dumping its surplus product there. Italy also puts a high tariff wall against the importation of alum evidently to protect their home manufacture. United States and Italy manufacture their epsom from magnesite like us. They both prevent the same from being imported, by an imposition of high tariff duties of 44 per cent. and 54 per cent. *ad valorem*, respectively. In the United States of America there is a permanent standing Board to the notice of which any national manufacturer can bring evidence regarding a case of dumping as soon as it may be suspected and immediately steps are taken to impose heavier duties on the article so as to prevent its influx into the country's market. France and Japan have been well known to have encouraged their chemical manufacture by subsidies, bounties and by the levy of higher tariff duties on imports. It will be noticed from the accompanying tables that France practically puts prohibitive import duties on chemicals under reference against countries from which she received no preferential treatment. A glance at the above figure will also convince any observer that all the countries are protecting those manufactures wherein they feel they are likely to encounter outside competition. Germany is dumping Indian market with cheap epsom salts and glaubers salts but she has put fairly high duties on the importation of these very products, in fact the highest of all others. Similar is the case with aluminium sulphate and alum. Taking an average it can be generally said that India has the lowest protective duties compared to France, Germany, United States of America, Japan and Italy, and India is the country whose chemical industry is in the most undeveloped stage notwithstanding the fact it possesses facilities of raw material, labour, power and market.

Enclosure No. 2.

(I) Import customs duties levied by different manufacturing countries.

Names of Chemicals.	France.		Germany.	United States.	Japan.	Italy.	India.
	With Treaty Countries.	Against Others.					
	France per 100 Kilograms.		Marks per double Cwt.	Cents per lb.		Lire Gold per quintal.	
	F.	F.				Exempted.	*Ad valorem.* per cent
Salphuric Acid . . .	8	32	·5	free	...	...	15
Hydrochloric Acid . .	10	40	·5	,,	...	...	15
Nitric Acid . . .	40·8	163·2	free	,,	...	4	15
Phosphoric Acid . .	60	240	10	2	...	...	15
					Sens per pical.		
Alum	25	100	4	¾	77	6	15
					Ad valorem. per cent		
Aluminium Sulphate . .	25	100	4	3-10	20	2·4	15
Copperas	1	4	·5	free	20	2	2·5
Zinc Chloride . . .	17·5	70	2	1-3-10	20	...	15
Copper Sulphate . . .	7·75	31	2	free	20	2·5	15
Sodium Sulphide . .	40	160	·25	¾	20	...	15
Epsom Salt	20 4	81·6	3	·5	20	3·6	15
Glauber's Salt . . .	4·25	17	·25	1 per ton.	20	1	15

Enclosure No. 3.

(II) Comparative table of imported duties levied by different manufacturing countries in rupees per ton.

Names of Chemicals.	France.		Germany.	United States.	Japan.	Italy.	India.
	Against Treaty.	Countries Others.					
					Feet.		Feet.
Sulphuric Acid . . .	8·8	35·2	3·26	free	..	Exempted.	...
Hydrochloric Acid . .	11·0	44·0	3·26	,,	...	...	...
Nitric Acid	44·88	179·52	free	,,	...	42·28	....
Phosphoric Acid . . .	65·0	264·0	65 2	123·54	...	...	...
Alum	27·5	110·0	26·08	46·32	16·2	63·42	18·0†
Aluminium Sulphate . .	27·5	110·0	26·08	18·53	24·0*	25·37	18·0†
Copperas	1·1	4·4	3·26	free	16·0†	21·14	2.0†
Zinc Chloride . . .	19·25	77·0	13·04	80·3	60·0*	...	45·0*
Copper Sulphate . . .	8·58	34·1	13·04	free	76·0†	26·43	57·0†
Sodium Sulphide . . .	44· 0	176·0	1·63	42·32	34·0†	...	[25·5†
Epsom Salt	22·44	89·76	19·56	30·88	14·0†	38·05	10·5†
Glauber's Salt . . .	4·68	18·7	1·63	2·76	12·0*	10·57	[9·0*

Equivalent Weights.

Kilogram = ·00098 Tons.
Quintal × 1 cwt.
Pical = 133·33 lbs.

Equivalent Coinage.

124 francs = £ 1.
20·5 Marks = £ 1.
4·85 Dollars = £1.
25·3 Lire Gold = £ 1.
13·375 Rupees = £ 1.
100 Sen = 1 Yen and
100 Yen = Rs. 125.

Based on *Ad valorem* duties levied in India :—

* Valuation based on current Bombay market price.
Aluminium Sulphate Rs. 120 per ton.
Zinc Chloride Rs. 15 per cwt.
Glaubers Salt Rs. 60 per ton.

† At Indian Tariff valuation.
Copperas Rs. 4 per cwt.
Copper Sulphate Rs. 19 per cwt.
Sodium Sulphide Rs. 8·5 per cwt.
Epsom Salts Rs. 3·5 per cwt.
Alum Rs. 6 per cwt.

Enclosure No. 4.

(III) Comparative table of imported duties levied by different manufacturing countries and India.

Names of Chemicals.	France.		Germany.	United States.	Japan.	Italy.	India.
	Against Treaty.	Countries Others.					
	Per cent	Per cent	Per cent	Per cent	Per cent	Per cent	Per cent
Sulphuric Acid	...	...	...	..	...	...	...
Hydrochloric Acid	...	...	...	...	...	..	...
Nitric Acid	...	...	...	...	...	...	...
Phosphoric Acid	...	...	...	..	...	...	...
Alum	22·9	91·60	21·73	38·6	13·5	52·85	15
Aluminium Sulphate	22·9	91·60	21·73	15·42	20	21·14	15
Copperas	13·75	55·0	4·08	free	20	26·43	2·5
Zinc Chloride	6·4	26·40	4·35	20·76	20	...	15
Copper Sulphate	2·24	8·96	3·95	free	20	7·74	15
Sodium Sulphide	25·88	103·52	9·6	27·2	20	...	15
Epsom Salt	31·5	130·28	27·94	41·1	20	54·35	15
Glauber's Salt	7·8	31·20	31·16	46·0	20	17·62	15

(8) *Letter dated the 2nd March, 1929.*

As desired by the Chairman of the Board during the course of our last evidence we are enclosing herewith statements showing particulars of the following for the information of the Board :—

(1) World's exports of chemicals.
(2) World's imports of chemicals.
(3) Annual production of sulphuric acid, superphosphates, etc., of the five countries, *viz.*, Great Britain, Germany, United States of America, France and Italy.

From the statements it will be noticed that the total sulphuric acid (50°Be) production of five chief producing countries amounts to about 12,767,000 tons and that of superphosphate 9,130,182 tons. This clearly brings out the important role which the sulphuric acid industry plays in the development of the fertiliser industry in any country.

Enclosure No. 1.

The world's exports and imports of chemicals.

Countries.	Exports.				Imports.			
	1913.		1925.		1913.		1925.	
	Millions of Dollars.	Percentage of total exports.	Millions of Dollars.	Percentage of total exports.	Millions of Dollars.	Percentage of total imports.	Millions of Dollars	Percentage of total imports.
Germany . .	217	28·4	221	23	116	17·7	57	7·8
United States .	74	10	155	16	123	18·8	167	22·8
Great Britain .	119	15·6	131	13·6	69	10·5	81	11·1
France . .	74	9·7	128	13·3	60	9·1	64	8·8
Chile (Salt Petre) .	112	14·6	107	11·1	...	...	...	...
Italy . . .	14	2	40	4·2	31	4·7	34	4·6
Belgium . .	43	5·6	42	4·3	43	6·5	24	4·5
Netherland .	43	5·6	33	3·5	60	9·1	43	5·9
Switzerland . .	14	1·9	31	3·2	12	1·8	22	2·9
Austria Hungary .	21	2·8	...	...	29	4·3	...	...
Hungary . .	...	...	1	0·1	...	...	7	0·8
Czechoslovakia .	...	...	12	1·3	...	...	24	3·3
Austria . . .	...	...	10	1	...	...	11	1·5
Poland . . .	...	...	3	0·4	...	...	12	1·6
Sweden . . .	8	0·9	15	1·7	8	1·3	15	2·3
Norway . .	10	1·3	11	1·1	3	0·7	7	0·8
Japan . . .	13	1·7	21	2·2	24	3·6	48	6·5
Russia . . .	...	...	...	...	38	5·8	24	3·2
China . . .	...	...	...	...	24	3·6	50	6·8
India . . .	...	...	...	...	115	2·5	36	4·8
Total .	762	100	961	100	657	100	736	100

Source:—The Chemical Industry, League of Nations, Document C. E. I·10. Geneva, 1927.

Enclosure No. 2.

Annual Productions.

Products.	Year	Great Britain.	Germany.	United States.	France	Italy.	Remarks.
		Quantity	Quantity.	Quantity.	Quantity.	Quantity.	
		Tons.	Tons.	Tons	Tons.	Tons.	
Sulphuric Acid 50° Be.	1925	1,300,000	1,800,000	7,004,112	1,840,000	822,900 (66° Be).	
Superphosphates .	1925	539,000	660,400	4,096,442	2,379,760	1,474,600	
Pyrites . . .	1924	6,000	160,000	...	181,000	...	
Salt . . .	1924	2,060,000	2,004,000	2,397,500	1,627,000	542,156	
Aniline Dyes	1924	15,000	72,000	20,000	17,000	...	
Fixed Nitrogen .	1925	88,000	450,000	988,000	33,000	...	
Tar Distilled . .	1925	1,689,493	...	...	...	...	
Rayon . . .	1925	13,000	...	25,951	7,200	...	
Crude Potash Salt .	1925	...	12,044,000	76,819	366,000	..	
Sulphur . . .	1927	...	...	2,111,618	...	272,817	
Ammonium Sulphate	1926	...	..	...	...	61,000	
Calcium Cyanamid .	1926	...	...	...	...	44,000	
Ammonium Nitrate	1926	...	...	...	...	4,000	

Source:—Supplement to Chemical and Metallurgical Engineering, Volume 36, No. 1, January, 1929.

(9) *Statements handed in by Mr. Ramsingh on 26th March, 1929.*

Saree No. 1648A—41″ × 7½ yards × 1 1/16 lbs.

	Oz.
Epsom salt	10·3
Zinc chloride	.?.
Glauber's salt	...
Sodium sulphide	1·28
Magnesium chloride	...

Price of one saree is Rs. 2-1-9.

Coating No. 58000—26″ × 24 yards × 5 lbs.

	Lbs.
Epsom salt	2
Zinc chloride	...
Glauber's salt	...
Magnesium chloride	...
	Oz.
Sodium sulphide	3·1

Price of the piece is Rs. 6-0-7.

Grey khadee No. 2624—24″ × 24 yards × 6 $\frac{1}{16}$ lbs.

	Oz.
Epsom salt	...
Zinc chloride	·56
Glauber's salt	...
Sodium sulphide	...
Magnesium chloride	1·25

Price of the piece is Rs. 4-0-4.

Drill chadder No. 1876—49″ × 4¼ yards × 1¾ lbs.

	Oz.
Epsom salt	...
Zinc chloride	·28
Magnesium chloride	...
Sodium sulphide	...
Magnesium chloride	·64

Price of the piece is Rs. 1-9-5.

Dyed drill No. 1841A—26″ × 42 yards × 9¼ lbs.

	Oz.
Epsom salt	...
Zinc chloride	1·3
Glauber's salt	...
Sodium sulphide	9·6
Magnesium chloride	3·1

Price of the piece is Rs. 8-13-8.

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(10) *Letter No. C/417, dated the 3rd April, 1929, from Messrs. Dharamsi Morarji Chemical Company, Limited.*

As promised to you yesterday we are enclosing herewith 7 copies, each of the cost sheet for manufacturing 5,000 and 10,000 tons rock super a year and hope the same will be found in order.

Enclosure No. 1.

COST SHEET FOR ROCK SUPERPHOSPHATE.

Annual Production 10,000 tons.

For Producing one ton containing 15-16 per cent. P_2O_5.	Rs.
Rock 0·525 tons at Rs. 32 per ton	16·80
Sulphuric Acid 0·337 at Rs. 62-8 per ton	21·00
Power for crushing, etc.	8·00
Labour	2·00
Repairs and Renewals	3·50
General Service and Supervision	0·75
Bagging	5·00
Rent, Taxes, etc.	0·25
Selling organisation	5·00
	62·30

	Rs.	A.	P.	
Depreciation on Plant and Building at 6¼ per cent. on Rs. 1,40,000	8,750	0	0	
Interest on working capital Rs. 2,86,500 at 7½ per cent. .	21,487	5	0	
Head Office charges, etc. . .	45,840	0	0	
Profit 10 per cent. on outlay .	14,000	0	0	
	90,077	5	0	
i.e., per ton . . .				9·007
Cost per ton				71·307

Enclosure No. 2.

COST SHEET FOR ROCK SUPERPHOSPHATE.

Annual Production 5,000. tons.

For Producing one ton 15-16 per cent. P_2O_5.

	Rs.
Rock 0·525 tons at Rs. 32 per ton . . .	16·80
Sulphuric Acid 0·337 at Rs. 62-5 per ton . .	21·00
Power for crushing, mixing, etc. . . .	8·00
Labour	2·00
Repairs and Renewals	3·50
General Service and Supervision	1·00
Packing	5·00
Rent, Taxes, etc.	0·50
Selling organisation	5·00
	62·80

	Rs.	
Depreciation on Plant and Building at 6¼ per cent. on Rs. 1,00,000 . .	6,250	
Interest on working capital Rs. 1,44,500 at 7½ per cent.	10,837	
Head Office charges	23,120	
Profit 10 per cent. on outlay . .	10,000	
	50,207	
i.e., per ton		10·04
Cost per ton		72·84

Eastern Chemical Company, Ltd., Bombay.

(1) *Letter dated the 13th October 1928.*

We have the honour to advise you that we have this day despatched to you by separate registered post our replies to the Board's questionnaire with six spare copies.

Introductory.

1. The Company is a public limited company, and was registered on the 7th January 1913.

2. Out of 98,800 Ordinary Shares, 30,493 are held by Indians, and the latter hold 2,488 deferred shares out of 10,000. There are five Directors, none of whom are Indians. The superior management consists of two men only, both of whom are Europeans. The two assistant chemists are Indians.

3. Sulphuric Acid (all strengths and qualities).
Nitric Acid (pure and commercial).
Hydrochloric Acid.
Epsom Salts.
Glauber's Salts.
Green Copperas.
Washing Soda.
Turkey Red Oil.
Killed Spirit.
Distilled Water.*
Precipitated Chalk.*
Disinfectants (11 brands).*
Disinfecting Powder.*
Paint Remover.*
Larvaecide.*
Printing Ink (3 kinds).*
Sodium Bisulphate.*
Salt Cake.*
Lime.*
Anti-corrosive Paint.*
Soluble Oil.*
Tree Killer.*
Undercoating for galvanized iron.*
Wood Preservatives.*

Products marked with an asterisk are listed, because we assume that a full list of all products that we manufacture is required. They will not, however, be discussed as protection is not asked for on behalf of these.

4. In July, 1914.

	Tons per annum.
5. Chamber Acid	5,400
Concentrated Sulphuric Acid	3,600
Nitric Acid	540
Hydrochloric Acid	115
Epsom Salts, Glauber's Salts, Washing Soda *	3,600
Green Copperas	1,100
Turkey Red Oil	120
Killed Spirit	120

The items marked above with an asterisk are grouped together because they are interchangeable. That is to say, we could make 3,600 tons of any one of them or could divide this production between any two or all three.

6.

Production.	1923-24.	1924-25.	1925 26	1926-27.	1927-28.
	Tons.	Tons.	Tons.	Tons.	Tons.
Chamber Acid	1324·0	1449·8	1580·5	1583·4	1274·9
R. O. V.	1068·7	1119·2	1242·3	1149 8	1019 6
Nitric Acid	64·84	58·54	77·68	76 72	91·0
Hydrochloric Acid . . .	48·63	68·29	76 42	74 96	49·41
Epsom Salts	...	377·8	402·1	228·6	45·8
Glauber's Salts . . .	193·25	159·8	63 9	122·5	102·9
Copperas . . .	12·57	110·2	290·9	187·9	262·3
Turkey Red Oil	...	...	...	1·70	17·825
Killed Spirit	...	...	6·05	6·86	1·53

7. The Company's works are situated at the North-East end of Bombay Island, the postal address being Rowlee Hill, Sion and the railway station Wadala on the Bombay Port Trust Railway.

(*a*) No raw materials for our present products are to be found in the Bombay Presidency, with the exception of Salt, large quantities of which are available from the numerous salt pans lying in the immediate vicinity of the Works, to the East, West, and South. The principal raw materials, however, which are used in our manufactures are sulphur, and nitrate of soda, and as both these commodities have to be imported we can claim to be as advantageously situated as any other chemical factory in India, and more so than those further from a sea port. Magnesite, on the other hand, which used to be purchased in large quantities when we were able to manufacture Epsom Salts, and which would again be required in the event of the protection we seek enabling us once more to market this product, is obtained from Salem. The excessive freight from Salem to Bombay makes the situation of our Works disadvantageous in respect of this article. No factory in India, however, can be advantageously situated for all its raw materials, whether they be imported from abroad, or are available in the country.

(*b*) Yes. Our last remark in the preceding paragraph applies also in this instance. We use coal and liquid fuel, and while it is true that we might consider ourselves more advantageously situated if we were in the neighbourhood of a coalfield, the benefits derived from such a situation would be more than outweighed by the distance we should then be from the principal market in this Presidency, namely Bombay. It is generally recognised that the acid industry is one which is always carried on locally, and in England, for example, it is seldom if ever the case that sulphuric acid is transported more than 100 miles. In our own case transportation has to be carried out over greater distances owing to the limited number of chemical works in India, but the fact remains that if our Works were situated in what might be considered a more advantageous position as regards sources of power or fuel, we should be seriously handicapped in regard to our output in this market, and would be quite unable to compete with the foreign importer. It must be remembered that freight on the finished acid constitutes a very important factor, and is a far more serious consideration than the relatively small additional cost which we have to incur by reason of our distance from a coal-producing area.

(*c*) Yes, on the whole. We are at a disadvantage in the case of certain of the up-country markets, where rival chemical works have been started for the manufacture of Hydrochloric acid from imported Sulphuric, and for the sale of the latter as such. Where such works are conveniently situated as regards the imported product we are unable to market our own acids in competition owing to railway freights. As an example we may cite the Kathiawar Ports, to which shipments of foreign acids are regularly made for two chemical factories situated at Bhavnagar and Petlad. After allowing for the railway freight which we have to pay, we are unable to supply our own acids to consumers in these and the surrounding districts at prices which leave any profit.

(*d*) We consider that our Works are advantageously situated in all other respects. The necessary labour is recruited locally, and we have no difficulty in obtaining as much as we require.

8. (*a*) Yes. Taken as a whole our products are in no way inferior to similar chemicals manufactured in other countries. Our nitric and sulphuric acids compare very favourably with the imported article, the latter being preferred as a general rule by local dealers, owing to the fact that the imported sulphuric contains a certain percentage of impurities by the time it arrives here through corrosion of the containers. In the case of Epsom Salts our product in our opinion is superior. The "commercial" salt which we have supplied to the Mills of Bombay in past years is equal to the "medical" quality imported for pharmaceutical purposes.

(*b*) Generally speaking, the imported article fetches a slightly higher price, with the exception of sulphuric acid. Imported sulphuric fetches a lower price for the reason mentioned in our reply to the preceding question.

(*c*) The reason for this is that the bazaar dealer is never prepared to pay quite so much for Indian-made goods as for those imported from abroad. We believe we are right in saying that this applies to every other industry competing with foreign products, and although, as in our own case, there may be no grounds for it whatsoever, there exists a strong conviction that anything "made abroad" must be superior to the home-made article. We feel sure that any textile concern in Bombay will bear us out when we say that a Mill which produced, for example, sheetings, actually superior in quality to similar imported goods, would always be obliged to sell them at lower prices.

(*d*) We are glad to say that there is no prejudice of any kind against our products, all of which have a very high reputation for purity and uniformity.

9. (*a*) The following is a list of the principal industries in which our more important products are used:—

Textiles (wool and cotton).

Manufacture of phosphatic fertilisers.

Electrical and allied industries.

Oil refining.

Mineral water manufacture.

Gold refining.

Manufacture of explosives.

Manufacture of other chemicals.

Sheet metal work, and process printing.

Pharmacy.

(*b*) Sulphuric acid is used for dyeing, bleaching, and wool carbonisation in the textile industry, for the manufacture of carbon dioxide in mineral water manufacture, as an electrolyte in accumulators, for the clarification and washing of mineral oils, for cleaning metallic surfaces in sheet metal work, galvanising and tinplating.

Nitric acid is used for the removal of silver and base metals in gold refining, for the preparation of blocks in process printing, and for explosives. [See section (*c*).]

Hydrochloric Acid is used in dyeing, for soldering and pickling metals.

Epsom Salts are used in medicine, and for sizing purposes in the textile industry.

Glauber's Salts are used in medicine, and for dyeing and finishing in the textile industry.

Copperas is used as a mordant in dyeing and in the treatment of leather, and also in some methods of water purification and sewage treatment.

Turkey Red Oil is used in certain important dyeing processes, and in finishing.

(*c*) Both sulphuric and nitric acids are used in the manufacture of nitroglycerine and gun cotton, and hence in other explosives made by blending these two.

10. No. We are unable at present to manufacture all the year round, but this is due solely to economic reasons, as we have found that in the existing state of the industry we are put to less loss by working for a time in order to build up stocks, and then shutting down. The "casual" labour which is obtained locally can then be dismissed, and re-engaged subsequently. As regards climatic conditions we are only at a disadvantage where the crystallization processes are concerned. During the hotter months of the year the latter are naturally delayed, and the output of marketable salts is less, and costs consequently higher.

11. *Sulphuric Acid* is made by the Chamber Process from crude sulphur, and concentrated in a Vitreosil Cascade Plant.

Nitric Acid is made by the Valentiner Process.

Hydrochloric Acid is made in cast iron cylinders, and not obtained as a by-product in the manufacture of salt cake.

Epsom Salts are made by treating crude magnesite with sulphuric acid.

Glauber's Salts are made from salt cake and nitre cake by neutralisation and purification.

Copperas is made from iron scrap by solution in Sulphuric acid.

Raw Materials.

12. *Sulphur* for sulphuric acid.
Nitrate of Soda for nitric acid and sulphuric acid.
Salt for hydrochloric acid.
Iron scrap for Copperas.
Magnesite for Epsom Salts.
Castor Oil for Turkey Red Oil and disinfectants.
Sulphuric Acid for nitric and hydrochloric acids, Epsom Salts, Glauber's Salts, and Turkey Red Oil.

	Tons.
13. Sulphur	1,800
Nitrate of Soda	760
Salt	230
Iron scrap	270
Magnesite	800
Castor Oil	560
Sulphuric Acid	2,600

14. 6½ cwts. Sulphur
20 lbs. Nitrate of Soda } per ton of Sulphuric Acid.

27 cwts. Nitrate of Soda
32 cwts. Sulphuric Acid } per ton of Nitric Acid.

2 tons Salt	per ton of Hydrochloric Acid.
1¾ tons Sulphuric Acid . .	
8 cwts. Magnesite . .	per ton of Epsom Salts.
8½ cwts. Sulphuric Acid . .	
5 cwts. Iron Scrap . .	per ton of Copperas.
8 cwts. Sulphuric Acid . .	
10 cwts. Castor Oil . .	per ton of Turkey Red Oil.
2 cwts. Sulphuric Acid .	

15. Sulphur is obtained from America or Sicily, most of the sulphur which is imported into India coming from the latter country.

Nitrate of Soda is obtained from Chile.

Salt is obtained locally.

Iron Scrap is obtained locally.

Magnesite is obtain from Salem, India.

Castor Oil is obtained from Cochin, Calicut, or Navsari.

Sulphuric Acid we manufacture ourselves.

16. As will be seen from our answer to the preceding question.

A. The first two raw materials are imported from abroad.

B. The remainder are obtained in India, and, in the case of products which are manufactured, made in India.

A. *Sulphur*—

(*a*) America or Sicily.

(*b*) $ 33·20 per ton c.i.f. Bombay. (We do not buy f.o.b.)

(*c*) Bombay.

(*e*) Port Trust charges, Rs. 3 per ton; clearing charges Rs. 2-8 per ton.

(*f*) Rs. 2-8 per ton.

(*g*) *Nil.*

A. *Nitrate of Soda*—

(*a*) Chile.

(*b*) £12-5 per ton c.i.f. Bombay. (We do not buy f.o.b.)

(*c*) Bombay.

(*e*) Port Trust charges Rs. 3 per ton; clearing charges Rs. 2-8 per ton.

(*f*) Rs. 2-8 per ton.

(*g*) *Nil.*

Salt.	Iron Scrap.	Magnesite.	Castor oil.
(*a*) Rs. 1-10 per Md.	Nominal (we utilise our own).	Rs. 7-8 per Ton.	Rs. 5-10 per Md.
(*b*) *Nil* . . .	Rs. 5 per ton.	Rs. 32-8 per Ton.	Re. 0-2 per Md.
Manufactured by—		Magnesite Syndicate, Limited	Tata Mills and others.
At—		Suramangalam, Salem.	Cochin.
Obtained from—Locally.	Locally.		
At—Factory site.	Factory site or local tinsmiths.		

17. It will be noticed from our preceding replies that the only two raw materials not already obtained from India are sulphur and nitrate of soda, both of which are minerals incapable of manufacture. It is true that a synthetic nitrate is now manufactured on the Continent, but it is unlikely that synthetic nitrate of soda will be made in India in the near future. The reason for this is that it requires cheap electric power which is not at present available. The whole world's supply of natural nitrate of soda is obtained from Chile, and none is known to exist in India. Sulphur is a monopoly of America and Sicily, and none exists in India. An alternative is Pyrites, which contains about 45 per cent. of sulphur, and in other countries where there are plentiful supplies of Pyrites this factor acts as a restraining influence on the price of American or Sicilian sulphur. If there are any deposits in India of Pyrites they are so located that their use for the manufacture of Sulphuric Acid is out of the question. It will be appreciated that if the Pyrites contains only 45 per cent. of available sulphur, the transportation charges on the unserviceable balance of the product would make its employment an uneconomical proposition.

18. (*a*) We get special rates of railway freight for magnesite from Salem Junction, near Madras, to Bombay. This was obtained after prolonged negotiations, but is still quite insufficient to make the manufacture of Epsom Salts a profitable undertaking, now that the price of imported Epsoms has been so substantially reduced. The magnesite costs us at the mine head about Rs. 7 per ton, but by the time the railway freight has been added the cost to us at our Works is about Rs. 40 per ton. We also obtain from the railways a small concession in freight on acids when these are transported in not less than a wagon load at a time. Beyond this we receive no special rates of freight.

(*b*) Yes. We have pointed out in our preceding reply that the freight rate on magnesite makes the manufacture of Epsom Salts unprofitable, and as this commodity is one whose manufacture on a large scale would be of enormous benefit to us we are at a considerable disadvantage in this respect. The ease with which foreign manufacturers have entirely captured the market for Epsom Salts can be largely traced, in our opinion, to the high transport charges on magnesite. We are also at a disadvantage in regard to the railway freight on acids, which is unduly heavy, and which tends to increase the price of our acids to a prohibitive degree if they have to be railed anything over 100 miles. We have already shown in our reply to question 7 (*c*) above that this high rate of freight on acids as forced us out of all markets which are within easy reach of the Kathiawar ports. Similarly, the high rate of coastwise freight, and the difficulties raised by the B. I. S. N. Co. (who have the monopoly of this traffic), in shipping acids from Bombay to Karachi have resulted in European manufacturers capturing the Karachi acid market at the expense of chemical companies situated in India.

(*c*) Seeing that the import into Bombay of magnesite from Salem has practically ceased altogether, we are of the opinion that it would pay the railway companies, or failing this the steamship companies, to fix a very special rate of freight by rail or sea as the case may be, for magnesite. This, together with a protective duty on the lines indicated in our preliminary statement to Government and further outlined below would once more enable us to enter the market. We are also of the opinion that neither the railways nor the B. I. S. N. Co. would be losers if they were to reduce their rates for the transport of acids by rail or sea. It should be remembered that owing to the form of containers which has to be utilised and the special method of packing which we are obliged to adopt for the transportation of acids, a high rate of freight makes the final cost to the consumer out of all proportion to the value of the acids themselves. Modern methods of packing make the transport of acids no more dangerous than many other commodities which are railed all over India every day, and a substantial concession in freight rates from the companies concerned would go a long way towards assisting us to recapture the Karachi and certain of the up-country markets.

19. (*a*) Yes.

(*b*) Yes.

20. (*a*) and (*b*) We have dealt with this matter fully in our reply to question No. 17 above.

21. Yes. In the event of our being unable to obtain supplies of sulphur, the manufacture of the following products would automatically cease:—

Sulphuric Acid.	Epsom Salts.
Hydrochloric Acid.	Glauber's Salts.
Nitric Acid.	Turkey Red Oil.
Copperas.	

Sulphuric acid itself is necessary for the manufacture of the other products mentioned above, and our production of all these would therefore cease if we were unable to manufacture the acid. It would be possible to produce the articles in question from imported sulphuric acid, if the latter could be obtained, but as the cost of manufacture would probably become prohibitive such a course would not be feasible. The manufacture of Nitric Acid would also cease if we were unable to obtain Nitrate of Soda. The latter has been shown as an ingredient of Sulphuric Acid as well, but the latter could be made with Indian Potash instead of Nitrate of Soda, if the latter became unobtainable. Nitric Acid could not be made with Indian Potash as it would then become too costly, and on the score of unnecessary cost Potash is not ordinarily used in the manufacture of Sulphuric Acid.

22. (*a*) Sulphur is a monopoly of America and Sicily, while Nitrate of Soda is a monopoly of Chile.

(*b*) Both the sources of supply of sulphur are controlled by a syndicate which has limited the annual deliveries to various countries, including India, in accordance with a schedule agreed upon by producers in America and Sicily. We have dealt with the operation of this arrangement at some length in our preliminary statement to Government. Nitrate of Soda is also controlled by a combine composed of the producers in Chile.

Labour.

23. Yes, in connection with the Sulphuric acid process. It may be added that as the number of chemical factories in India is strictly limited, the opportunities available to Indian chemists are few.

24. Two, the Works Manager, and the Works Chemist. The same number would be sufficient if the factory were working to full capacity.

25. (*a*) In the preliminary stages of manufacture special labour was imported from abroad. Thereafter Indian labour has been trained so as to replace this, and a large number of Indians have passed through our hands who have attained a very high degree of efficiency. The chargemen, foremen, etc., are all Indians trained in our service, and as already shown the number of imported workmen has been reduced to two. It will therefore be seen that considerable progress has been made in this direction.

(*b*) This is a matter which the Company will always have well before it, and should the time ever come when a substitution on the lines suggested could, in the opinion of the Directors, successfully be accomplished, it will receive their most careful attention. On the score of a general reduction in costs, apart from other reasons, such a substitution must be regarded as most desirable wherever it can be brought about. There are, however, certain other considerations (such as the fact that the Works Manager acts also in the capacity of sole representative in India of the Head Office in London), which, in so far as they may be said to affect the general policy of the Company, would require to be carefully weighed before effecting a change of this nature.

(*c*) As it is practically impossible to find men already equipped with the necessary experience and training, it follows that all new men engaged have

to be given the requisite facilities to acquire that training. The dearth of qualified men has already been explained as due to the limited number of chemical factories in this country, and for the same reason there is no demand from men wishing to serve as apprentices.

26. We regret that we have no information in this connection. We have referred the matter to our London Office, but have not yet received any reply from them.

27. (*a*) 90 to 140 workmen according to the number of plants working.

(*b*) *Process workers*—

Muccadums, Rs. 1-6 to Rs. 1-12 per day.

Coolies, Rs. 1-2 per day.

Artisans—

Plumber, Rs. 3-4 per day.

Carpenters, Rs. 3-4 per day.

Masons, Rs. 3-4 per day.

Boiler engineers and fitters, Rs. 2-12 to Rs. 4-4 per day.

General Labour—

Heavy gang, Rs. 1-4 per day.

Coolies, Re. 1 per day.

Watchman, Rs. 25 per month.

Firemen, Rs. 1-4 per day.

Women, Re. 0-10-0 per day.

Motor Drivers, Rs. 60 to Rs. 87 per month.

	Rs.	A.	P.
28. 1923-24	60,958	7	0
1924-25	51,212	6	0
1925-26	55,335	11	0
1926-27	51,642	1	0
1927-28	50,851	10	0

This is for Indian labour only, and does not include the wages of subordinate and clerical staffs.

29. (*a*) Yes.

(*b*) Yes, from the vicinity of the factory.

30. (*a*) Certainly.

(*b*) Generally speaking, he is not found to be so efficient. A larger labour force is found necessary out here than would be required in England for a factory of similar capacity.

31. As will be noted from our reply to question 29 (*b*) above, our labour is all recruited from the immediate vicinity of the Works. This being so, the question of making arrangements for housing it scarcely arises. So far as labour is concerned our position cannot be regarded as comparable with that of the local Mills. We have used, in our reply to question No. 10, the expression "casual labour", meaning that the men and women who are employed as and when required are not necessarily given the same work to do more than once. The purposes for which such labour is required, (*e.g.*, filling jars and carboys with acid, packing bags or cases with crystals, conveying sulphur from the sulphur bins to the burners, etc., etc.), calls for the most part for but little skill, and it is therefore a matter of no consequence whether the same workmen are engaged each time that it becomes necessary to recruit such labour, or whether an entirely fresh set of employees is taken on. As the number of hands available in the immediate vicinity is limited, it follows that in actual practice we do get much the same men each month, but the point

we are emphasizing is that the workmen engaged for this type of work do not regard their employment in the factory as a means of livelihood '*per se*', but are free to accept similar work wherever it may be offering. In other words, only a relatively small number of such workmen are "specialists".

Power (including fuel).

32. (*a*) For the most part, steam. The latter is essential for the Chamber process, and as we have to raise steam for this it is more economical to utilise steam power for practically every other purpose. Where steam is not used, we employ liquid fuel, it having been found cheaper under present circumstances to instal oil engines than to make use of electric power.

(*b*) The fuel used is C. P. Pench coal. As there is no coal available in the Bombay Presidency this has to be purchased through local dealers.

33. We have taken the working of the last complete year as a basis for making this calculation, and during that period we consumed 1,210 tons of coal, and 149½ tons of liquid fuel. The latter is equivalent to 372 tons of coal, making a total of 1,592 tons of coal consumed. Our total production during the year was 3,466·34 tons, so that the consumption of coal per ton produced works out at 0·456 tons.

34. (*a*) *Coal* . . . Rs. 7 approximately at pit head.
Liquid Fuel . . Rs. 38 per ton *ex*-installation.
(*b*) *Coal* . . . Rs. 15 per ton.
Liquid Fuel . Rs. 40-10 per ton.

35. Electric power is not used.

Market.

36. We have not been able to find that there is any census of production of chemicals in India.

37. We would refer the Board to statement "A" enclosed with our letter to Government dated 1st August 1925. A copy is attached for ready reference.

38. We do not at the present time know of any particular factor which should tend to increase the demand substantially in the near future. It follows, however, that as India is a country whose resources have by no means been fully developed as yet, continued progress will result in continually increasing demand. It may be pointed out, moreover, that if the Chemical factories in India are placed in a position which will enable them to manufacture fertilisers on an economic basis, this will result in an enormous increase in consumption both of the fertilisers themselves and of other products whose manufacture would thereby be cheapened. It will be remembered that in our preliminary statement to Government in 1925 we made it clear that to create a demand for fertilisers was the primary object of our application for protection. We also at that time quoted from the Geological Survey of India, Volume XLVI, pp. 295-296, wherein Sir Thomas Holland pointed out that this country is robbed every year of over 90,000 tons of phosphatic fertilisers, and that it is compelled to pay over 20 millions sterling for products obtained in Europe for minerals identical with those lying idle in India. India is essentially an agricultural country, and it has been shown on innumerable occasions by authorities competent to speak on the subject that the use of chemical fertilisers as a means of increasing her production has not yet been developed to anything like its full extent. If the Chemical factories of India are enabled, by increasing the demand of such important products as Epsom Salts, so to reduce the cost of manufacturing Sulphuric Acid that they can produce fertilisers at a price which the agriculturist can afford, it will remain but a question of time before the latter is educated to use them in a measure which will permit him to reap the full benefit of the country's vast agricultural potentialities.

39. Bombay Presidency, Ahmedabad, Indore, Nagpur, and Secunderabad (Deccan), constitute our chief markets, and to a small extent, Karachi. By far the largest proportion of our business is done locally, but many of the local dealers purchase from us on account of their up-country constituents.

40. (*a*) No. The fact that we are ourselves situated at a port puts us on a par so far as freight is concerned with the importers of foreign products.

41. This is by no means impossible. We already export battery acid, and have received in the past occasional orders for Sulphuric Acid from the Anglo-Persian Oil Company. We are at the moment negotiating with firms in Penang, and in Kobe, Japan, who desire to import from us the chemicals we manufacture. In the case of the former, however, the business would be principally in acids, and the difficulty of obtaining freight for this class of goods makes the question of shipment to Penang problematical. It is as yet too early to hazard an estimation of the volume of business which might be available either from these or other countries, but we have not lost sight of the possibility of exporting our products in time to come, provided of course that we are placed in a position to manufacture on a competitive footing.

42. (*a*) The following products have been or are regularly purchased by Government and/or other Public bodies:—

Pure Brimstone Sulphuric Acid for batteries.
Sulphuric Acid Commercial.
Nitric Acid.
Hydrochloric Acid.
Sodium Carbonate.
Epsom Salts (medical).
Glaubers Salts.
Green Copperas.

42. (*b*) (*i*) We regret that we have no accurate records available to show the prices paid and the quantities delivered during the war.

(*ii*) *Pure Brimstone Sulphuric Acid* :—

	Quantity in Tons.	Average price per ton.
		Rs.
1923-24	36·9	327
1924-25	53·8	303
1925-26	8·7	257
1926-27	36·0	245
1927-28	315·6	305

	Sulphuric Acid—Commercial 1,840.		Nitric Acid 84° Tw.	
	Quantity in Tons	Average price per ton.	Quantity in Tons.	Average price per ton.
		Rs.		Rs.
1923-24	13·7	233	0·3	922
1924-25	33·8	225	0·9	686
1925-26	13·3	134	0·17	828
1926-27	16·6	140	0·08	688
1927-28	34·6	225	1·2	840

	Hydrochloric Acid 32° Tw.		Washing—Soda Crystals.	
	Quantity in Tons.	Average rate per ton.	Quantity in Tons.	Average rate per ton.
		Rs.		Rs.
1923-24	4·7	303	13·0	119
1924-25	5·4	298	9·7	118
1925-26	3·6	274	14·0	120
1926-27	1·1	338	15·4	120
1927-28	10·9	420	47·0	105

	Epsom Salt—Medical.		Glaubers Salt.	
	Quantity in Tons	Average rate per ton	Quantity in Tons.	Average rate per ton.
		Rs.		Rs.
1923-24	...	...	...	...
1924-25	48·0	110	2·0	110
1925-26	50·0	110	...	...
1926-27	...	...	...	...
1927-28	...	...	...	...

	Green Copperas.		Disinfecting Powder.	
	Quantity in Tons.	Average rate per ton.	Quantity in Tons.	Average rate per ton.
		Rs.		Rs.
1923-24	...	...	...	...
1924-25	...	...	...	...
1925-26	1·6	70	...	...
1926-27	...	...	4·3	231
1927-28	...	...	3·0	230

	Disinfectants.		Distilled Water.	
	Quantity. Glns.	Average rate per gln.	Quantity. Glns.	Average rate per gln.
		Rs. A. P.		Rs.
1923-24	5,043	2 4 0	...	...
1924-25	2,710	2 3 9	...	...
1925-26	4,095	2 4 0	70	1
1926-27	2,556	2 1 6	...	...
1927-28	2,500	2 4 0	...	...

Foreign Competition.

43. By far the keenest competition is experienced from Germany. This is the exporting country not only of products manufactured there, but of all products manufactured in other countries by factories which are included in the I. G. Farbenindustrie Aktiengesellschaft, Frankfurt G/M (Germany) combine. As this combine controls all the chemical factories on the Continent which are of any importance, Germany itself may be regarded for all intents and purposes as the competing country. Next in order of importance we would place Great Britain. Here too all the chemical works of any size are controlled by one combine, operating on a huge scale all over the world. In this case, however, we do not meet with the same competition, because at the moment those chemicals which are being exported to India are not at present the same as those on which we are ourselves dependent. It cannot be denied,

nevertheless, that in Great Britain we have, at least potentially, a very formidable competitor, and that if a serious bid were to be made by the companies concerned for the control of the Indian market the Indian industry would have even less hope of survival than we see for it at present. Even as things are, we have to sell, for example, Copperas, in the face of keen competition from England, while as an example of the manner in which the English combine is in a position, should it desire, to force us out of the market altogether, we may cite the case of Caustic Soda. Our Factory, soon after its inception, erected an elaborate and very expensive Caustic Soda plant, and for some time we were able to manufacture Caustic Soda quite successfully. Prices of the English-made article, however, became lower and lower each year, until we were eventually obliged to discontinue the manufacture of Caustic Soda altogether, and dismantle the plant, which has now been out of use for a number of years. Protection is not sought for in the case of this product, and we are not suggesting that it will ever again be possible for us to compete with the imported Caustic, (a monopoly of which is enjoyed by the combine already referred to), but we have given the example as indicative of the dangers which lie in wait for the Indian industry so long as it has little or no protection against the large European syndicates.

44. The essential difference between conditions of manufacture in India and the chief competing countries lies in the fact that in the latter the production of Sulphuric Acid as such is not regarded as an important part of chemical manufacture. In these countries only a very small proportion of their output of Sulphuric is sold as such, by far the greater portion being utilised for the manufacture of the more profitable secondary manufactures. To develop a factory on these lines is the object of every chemical works, but the Indian industry is unfortunately unable to do the same. Owing to the very much larger demand for such products which our competitors enjoy together with cheaper means of manufacture, they are able to export the commodities in question at prices which make it impossible for us to sell our own secondary products without loss, and by continual "dumping" to capture the market from us altogether. Indian manufacturers are therefore obliged to fall back upon the sale of Sulphuric and other acids as their chief means of livelihood, and it is only thanks to their geographical position, which makes the transport of acids in bulk to India a matter of some difficulty, that they are able to do even this. The benefits, however, which India has hitherto derived from her geographical position are rapidly being nullified. Since we first prepared our case for protection and submitted it to Government in 1926, an increasingly large quantity of Sulphuric, Nitric and Hydrochloric Acids has been imported into India at prices which have forced us to bring down our own all round and which are leading every day to still further reductions. We have as a consequence no longer any control in regard to the prices at which we can sell our own acids, these being governed to-day solely by the prices at which imported acid is being sold. It may further be remarked that the production of those products in which foreign competitors have already captured this market being the primary concern for the manufacturers in question, the acid has become a surplus product which can be exported at prices which, even after freight has been added, are well below those at which we ourselves were previous selling. We therefore view the increasing import of foreign acid with the gravest apprehension.

45. Yes. In India cheap electric power is not available, whereas in the chief competing countries chemical manufacture is being conducted to an increasingly large extent by electrolitic processes. For the manufacture of Nitric Acid, for example, we have adopted the Valentiner process, whereas in Europe and America manufacturers are tending more and more to make it synthetically from the atmosphere by electric processes, cheap power being available from hydro-electric schemes. Similarly we manufacture Hydrochloric acid and utilise the Salt Cake, if possible, whereas in Europe Salt Cake is the princila product, and Hydrochloric Acid is a by-product. Increasing amounts are now made synthetically from the excess chlorine produced in the

electrolytic alkali process by combining it with hydrogen under conditions which permit acid of much higher strengths to be made.

In Europe, moreover, Epsom Salts (magnesium sulphate), are made from Kieserite from the Stassfurt deposits by solution and purification. The deposits are worked chiefly for potassium salts, and magnesium sulphate is more or less a by-product. We manufacture it from magnesite by treatment with sulphuric acid.

46. (*i*)

	C. I. F Bombay Per ton. £	s.	Duty per cent.	Landing charges Per Ton.
Sulphuric Acid . . .	11	0	15	3
Nitric Acid	35	0	15	3
Hydrochloric Acid . . .	30	0	15	3
Epsom Salt	3	18	15	3
Glaubers Salts	4	0	15	3
Copperas	4	18	2½	3
Washing Soda	7	10	15	3

47. (*a*) The sources from which information in this respect can be obtained are many. In the first place there is the local market itself, where such articles as imported Copperas. Copper Sulphate and Epsom Salts are freely obtainable at certain standard prices. It follows that if the retail price to the consumer is below our own selling price the price to the importer is still lower. For while the local dealer may be prepared on occasion to dispose of imported goods at a loss, no dealer is going to sell regularly at a loss, month in, month out. In the case of acids we are in a position to obtain authoritative evidence in the shape of actual invoices. In Bombay the sale of our Sulphuric, Nitric and Hydrochloric Acids is in the hands of a syndicate composed of four Indian merchants. We do not sell these acids in Bombay to anyone outside this syndicate, with the exception of local Mills, Government, and public bodies. We have dealt with these merchants for a number of years, and receive from them the closest co-operation. They are in a position to obtain information regarding imported acid which might not otherwise be available, and it is as a consequence of the very definite information which they have produced from time to time in this connection that we have been obliged to reduce the prices of our own acids to withstand the foreign competition. We have every confidence in the good faith of the parties in question, but apart from this as the retail price of our acids is also fixed by us and we are in a position to see that those prices are maintained there would be nothing to be gained by conveying false information regarding competitors' prices. In point of fact, our own dealers have to be content with a smaller margin of profit now that imported acid is freely available. There are also the local Mills, many of which are under the control of our own Managing Agents, and Government and other public bodies. The information obtained from these sources regarding the prices of imported goods may certainly be regarded as thoroughly reliable. Lastly there are the indenting houses themselves, from whom we have been able to obtain on occasion confirmation of the facts ascertained elsewhere.

(*b*) From our reply to the preceding question it will be seen that we are in a position to assert without fear of contradiction that the information obtained from the sources we have mentioned may be regarded as entirely dependable.

48. (*a*) We have already dealt with this subject in our reply to question 43 above. The two combines mentioned therein constitute, for all practical purposes, our only competitors, and of the two the I. G. Farbenindustrie Aktiengesellshaft is responsible for by far the most serious competition.

(*b*) Both combines have been formed comparatively recently, the moving spirit in the case of the British combine being Lord Melchett. The activities

of both are world-wide, and both companies are backed by enormous financial resources.

(*c*) We have already traced the manner in which the operations of these two chemical combines have forced us out of the market altogether in the case of Epsom Salts, the dumping of which is already on record, and are obliging us day by day to dispose of our three principal acids at prices which tend to become less and less remunerative. It may be definitely stated, in fact, that if the manufacturers in question were to make a serious bid for the acid market by dumping Sulphuric and the other two acids in India as was done in the case of Epsom Salts, the Indian industry would be finally crippled beyond recovery, seeing that the other products, such as Copperas and Glaubers Salts, are already sold at a loss. We realise, however, that generalisations such as this are bound to be accepted by the Tariff Board with a certain degree of reserve, and as we are asked in this question to explain in what way we have been affected by foreign competition we feel that a concrete instance of the difficulties we are faced with may not be out of place.

The new refinery for H. M. Mint, Bombay, which is now in course of construction will require about 200 tons or more of Nitric Acid per year. This is more than double our present output of Nitric Acid, and the securing of this order would be of the utmost benefit to us. In spite, however, of Government's known desire to patronise Indian concerns wherever possible, we can see no hope whatsoever of obtaining this business owing to the fact that a German firm has quoted, we understand, a price of 0-2-3 per pound of 100 per cent. pure Nitric Acid delivered in Bombay in returnable drums. The lowest price which we could possibly afford to quote for a similar quality of Nitric Acid would not be below Rs. 0-3-0 per pound, and even at this price we should not make anything. The saving to Government on the very large quantity they require for the Mint which will accrue to them by placing the order with our foreign competitors is so marked that in spite of the greater convenience which they would derive from having stocks ready and available in Bombay the order will undoubtedly be placed with Germany, *unless a protective measure of duty is recommended which will place us on an equal footing with our competitors*. The source from which we have obtained the information we have given in connection with this order is entirely trustworthy, and we feel that the facts will serve to show the hardship of our position. On the one hand we have Government urging a policy of support to Indian industries, and, by their reference to the Tariff Board of our application for protection, admitting the desirability of investigating our position, and on the other hand we find foreign competitors offering such favourable rates to Government for the supply of a product no better than that manufactured by ourselves that we are obliged to resign ourselves to the prospect of seeing our position usurped by another country. It will possibly be argued that in a case such as this where a very considerable saving to Government is involved, there can be no choice in the matter. We maintain, however, that if Government regards the question as one which demands no other consideration than that of immediate expense, it will be following a short-sighted and inequitable policy. Throughout the course of our application for protection we have stressed the importance to this country, particularly in time of war, of a live and up-to-date chemical industry. We are already suppliers to the Ammunition Factory, Kirkee, of acids, etc., and in times of emergency we have a plant which would be capable of supplying it with all its requirements. We have repeatedly pointed out, however, that unless Government is prepared to place the chemical factories of India on their feet once more by imposing protective duties for a sufficient number of years, the industry, already moribund, will become within a very short time defunct.

49. No.

50. (*a*) We have dealt with this in our reply to question 44 above.

(*b*) In order to manufacture Epsom Salts from Kieserite we would import the latter, but as the cost of converting it into Epsom Salts would be slightly

more than the difference in freight between the latter and the Kieserite, it would be unprofitable to do so.

By manufacturing Epsom Salts from magnesite we utilise an Indian raw material, and also Sulphuric Acid, which helps to bring our production of the latter nearer to the economic limit.

Again, in Europe Salt Cake is an important product used for alkali manufacture by the Leblanc process for the manufacture of sodium sulphide, and for glass manufacture, whereas in India Salt Cake has no market value except very occasionally for the manufacture of Glaubers Salt.

51. The keenest competition in imported acids is experienced in Ahmedabad, Petlad, Bhavnagar and other places in that neighbourhood, and also in Karachi. In Bombay there was not, until fairly recently, very serious competition in acids, but more and more shipments have been arriving here of late, and our local dealers are complaining of foreign competition on all sides. In other products, such as Epsom Salts, Copperas, etc., foreign competition is general, and widespread, dumping having taken place in these articles on an extensive scale.

52. (*a*) Yes.

(*b*) We have already explained that the keenest competition is met with from Germany and other European countries whose chemical industries are under the control of the German syndicate. This being so, it will, we think, be obvious that it is only since the war and the subsequent reinstatement of Germany's trade that she has been able to export on the present large scale, and it is therefore only since the war that the prices of her chemicals have been stabilised on the existing low basis. Added to this, it may be pointed out that the development of the I. G. Farbenindustrie Aktiengesellschaft to its present magnitude (which makes it the most powerful combine in the world), has been a matter of recent years only, and that although a chemical combine on the same lines existed before the war it is only since the termination of hostilities that it has expanded so enormously.

(*c*) Except in the unlikely event of another war involving all the chemical-producing countries of Europe, the causes contributing to the present low prices must be regarded as definitely permanent. The combine in question, moreover, has such a powerful organisation behind it with such vast resources in the way of finance and potential output that we have no hesitation in saying that should it determine to make a serious bid for the whole of the Indian market the chemical industry in India would have no chance whatsoever, under existing conditions, of surviving for more than a very short time.

53. Our main market in India, as we have mentioned already, is Bombay itself. We have therefore no freight to pay in order to reach it. The sea freight payable by the importing houses on foreign chemicals we have ascertained to be approximately as follows:—

	Rs.	
Sulphuric Acid Nitric Acid Hydrochloric Acid	100	per 1015 kilograms or 40 c. ft., ship's option.
Potash Alum	25	
Copperas	40	
Copper Sulphate	55	per 1015 kilograms.
Glaubers Salt	32-6	
Epsom Salt	30	

All rates *plus* 10 per cent. less 5 per cent. less 10 per cent.

54. So far as Bombay itself is concerned, we are, of course, on a par with the importer in the case of freight from Bombay to any up-country market. We have already mentioned, however, the disadvantage we are put to through imported goods arriving *vid* Port Okha, and a comparison of the freight rates from that port to the neighbouring markets with the freights from Bombay

to the same places may therefore serve to answer the purposes of this question. Confining ourselves to acids, and choosing Ahmedabad, Petlad, and Vartej, as three representative markets, we find that the rates work out as follows:—

Stations.	Mileage.	Rate for Sulphuric per Maund.	Rate for Nitric per Maund.	Rate for H. C. L. per Maund.
		Rs. a. p.	Rs. a. p.	Rs. a. p.
Bombay to Vartej	486	2 0 8	3 0 4	3 0 4
Okha to Vartej	308	0 14 11	1 4 3	1 4 3
Bombay to Ahmedabad . . .	308	1 6 6	2 1 3	2 1 3
Okha to Ahmedabad	312	0 14 0	1 3 6	1 3 6
Bombay to Petlad . . .	282	1 5 0	1 14 11	1 14 11
Okha to Petlad	366	1 1 9	1 9 2	1 9 2

55. (*a*) Yes. All plant and machinery has to be imported from abroad, and the extra cost incurred by reason of freight and duty constitutes a disadvantage to the Indian manufacturer.

(*b*) Yes. The very high standard of living expenses in India makes it necessary for the Indian manufacturer to pay a proportionately higher wage to expert labour.

(*c*) Yes. The lower cost of ordinary labour is more than offset by the lower standard of efficiency.

(*e*) Yes. On consumable stores, and on the principal raw material, sulphur, the Indian manufacturer has to pay in any case freight, and in some cases freight and duty. The freight on sulphur, for example, from Sicily or America to India is obviously higher than the freight on the same article to England or any other country in Europe. In addition to this it has already been pointed out that the lack of available supplies of pyrites in India leaves us at the mercy of the syndicate controlling sulphur when it comes to a question of price.

(*f*) No.

(*g*) The higher rate of interest which the Indian manufacturer has to pay for finance makes the maintenance of stocks of spare parts a slightly larger capital expense. The average rate of interest payable by the Indian producer is between 6 per cent. and 7 per cent. while in England, for example the rate is about 5 per cent. or lower. It is also necessary to carry larger stocks owing to the difficulty of obtaining them at short notice.

(*h*) Yes. To mention only one example, we pay 15 per cent. duty on silica ware, which is largely used in the various plants and which is imported from England where it is made.

(*i*) Generally speaking, it is more difficult to raise money in India for industrial enterprises of this nature than it is in other countries.

56. The disadvantages mentioned above must all be regarded as permanent with the possible exception of those under the heading (*b*) and (*c*). A reduction in living expenses and an increase in the efficiency of Indian labour would do something to mitigate the disadvantages in these two cases. It is, however, impossible to express an opinion as to when, if ever, this may be expected to come about.

Internal Competition.

57. (*a*) and (*b*) The principal Indian manufacturers of chemicals in addition to ourselves are:—The Dharamsi Morarji Chemical Co., Ltd., Ambernath, Messrs. D. Waldie & Co., Calcutta, and Messrs. Parry & Co., Madras. To the best of our knowledge and belief there is now no serious competition between any of these. It will be seen that with the exception of the Dharamsi Morarji Chemical Co., and ourselves the firms we have mentioned are, by their very situation, unable to operate in any but their own markets. Each company is consequently content to find a market for its products in the territory which comes under its immediate control. We deal with the Dharamsi Morarji Chemical Co., in our reply to the next question.

The firms we have mentioned above are the principal manufacturers inasmuch as they possess genuine chemical factories, and make their products from the raw material, in the case of these, for the reasons given, there is little or no internal competition. We are, however, suffering to an increasing extent from competition from two other factories, which are importing Sulphuric Acid from abroad, and selling it as such, and also making from the imported product large quantities of Hydrochloric Acid. We refer to the Bhavnagar Chemical Works, and to a factory in Petlad. The former are actually selling Hydrochloric Acid in the Bombay market in competition with ourselves, and owing to the initial cost of the imported Sulphuric being low, the price at which their Hydrochloric Acid can be sold in Bombay, even after allowing for the freight from Bhavnagar, is lower than our own market price. The other manufacturer is understood to be financed by the Petlad Turkey Red Dye Works, and is supplying the Mills in Petlad and the vicinity with their requirements of Sulphuric and Hydrochloric Acids. We had formerly a very good outlet for Hydrochloric Acid in the Petlad market, which we regarded as one of our best sources of consumption. Since this manufacturer has started business, however, we find that we have lost the market altogether. Shipments of the imported acid are obtained *viâ* Port Okha, and as the process of conversion to Hydrochloric Acid is simple and inexpensive one, the freight to Petlad on our own product precludes us altogether from selling there.

58. Yes. From May, 1922 to May 1927 we were obliged to compete in all our more important products with the Dharamsi Morarji Chemical Co. This led eventually to intensive price-cutting, and consequent loss to both companies, a state of affairs which was to be strongly deprecated as detrimental to the interest of the whole industry. Owing to this, and to the alarming increase in foreign competition, it was felt that a compromise between the two companies would be to their mutual benefit, and as a result of considerable negotiation a scheme was finally formulated whereby our own Managing Agents became the selling agents for both companies, a scale being drawn up which allotted to each factory the share in production to which its past records entitled it. This scheme applies to acids only, since it was in these that the internal competition was most severe. So far as other products were concerned, the interests of the two factories were not considered to clash, the Dharamsi Morarji Chemical Co. being manufacturers for the most part of fertilisers, copper sulphate, potash alum, and one or two other products which we were not ourselves making, while we were concentrating on Epsom and Glauber's Salts, Sodium Carbonate, Turkey Red Oil, and Copperas. To prevent, however, the possibility of competition even in these other products, it was mutually agreed at the same time that each company would continue to confine itself to its respective specialities, and would not, without previous notice, commence the manufacture of any other product which it was not already making, and which would then be common to both. Further, in the case of Copperas, which both factories produce, a standard of prices was fixed which the two companies agreed to maintain. This "pool" arrangement has now been in force since May, 1927, and the results have amply justified its initiation.

There is one other very much smaller concern, the Baroda Chemical Works, with whom a compromise has also been effected, whereby they undertake not to sell their products outside Baroda, provided we and the Dharamsi Morarji Chemical Co., agree not to sell within their territory. This arrangement has also been found to be eminently satisfactory.

59. (*a*) Yes.

(*b*) We find it difficult to express an opinion in this connection. As a rough approximation we would place the figure in each case at half the figure given in our reply to question No. 5.

60. No. With the exception of pumps, and similar accessories, there is practically no machinery required at all, and nothing that can be termed elaborate. The plant required for the manufacture and concentration of Sulphuric Acid is the largest and most costly portion of the plant employed, the remainder being comparatively simple in design, although somewhat expensive to instal.

61. 60·41 per cent.

62. A brief description of our plant and machinery will best be understood if arranged according to the various products.

1. *Steam Power Plant* consists of three Lancashire Boilers complete with economisers, feed water tanks and pumps. Steam conveyed to plants *viâ* lagged 7″ main and exhaust returns *viâ* 4″ main to preheater tank. Town's water used for boiler feed and C. P. Coal used for fuel.

2. *Chamber Plant* consists of five sulphur burners and three nitre pots leading to Glover Tower thence to five leaden chambers, two of 17,445 c. ft and three of 36,445 c. ft. gas space, *viâ* two reaction towers to Gay Lussac Tower. Draught supplied by boiler chimney, Chamber fitted with steam jets. Eight process tanks, two vertical Pearns compressors, and three eggs used for circulation of acid in Towers.

3. *Concentrators.*—Two in number, fed by gravity from Chamber Plant and consisting of silica trays and basins feeding into silica coolers and thence to lead coolers. Heated by liquid fuel, and waste gases return to earthenware packed lead scrubber fitted with Kestner fan. Two blowing eggs are provided and each concentrator is capable of producing five tons 95 per cent. acid per day.

4. *Nitric Acid Plant* consists of two one ton coal fired cast iron stills in brickwork setting. Gases condensed in Valentiner vacuum type plant, comprising three stoneware coils and four 40 gln. receivers. Vacuum is maintained by a special pump of 12″ stroke, and nitrecake is run into five cast iron pans. Leaden feed tank is connected to Chamber and Concentrator.

5. *Hydrochloric Acid Plant* consists of three cast iron cylinders heated by coal fires. Gases are condensed in silica coils and absorbed in stoneware receivers. Leaden feed tank is connected to Chamber Plant and concentrator. Cast iron doors are removed by chain blocks, in case of two stills fitted to a jit crane.

6. *Crystals Plant* consists of four dissolvers, four settlers, one filter press, two evaporators, fifty-one coolers, two hydro-extractors. Grinding machinery by Sturtedant is used for ore crushing. Plant can be used for Epsom Salts, Glauber's Salt and Soda Crystals simultaneously or alternately.

7. *Distilled Water.*—Steam from the main passed through lead coil immersed in wooden vat filled with salt cooling water.

8. *Copperas Plant* consists of three dissolvers, ten coolers, one evaporator, sumps and two settlers. Acid fed direct from Chamber Plant by gravity.

9. *Workshop* contains two lathes, two vertical drilling machines, one circular saw, one sawing and one screwing machine all driven by a Robson Oil engine.

10. *Cooling Water.*—This is contained in two reservoirs and water is drawn by two Ruston centrifugal pumps driven by Ruston and Crossley Oil Engines.

Cooling water for Chamber Plant is drawn from concrete reservoir filled from above reservoirs pumped into overhead storage tank by Ruston centrifugal pump and Ruston Oil Engine.

11. *Turkey Red Oil Plant* consists of two leaden vats in cooling tanks. Contents are hand stirred during process.

We have also complete plant for disinfectants, printing inks, etc., but as these products are not under discussion we have omitted a detailed description of the plant.

63. It has already been remarked, at the time of presenting our application to Government, that protection is only sought for a limited number of years, sufficient to put the industry on its feet once more. If protective duties are established which will prevent the dumping of foreign goods, we shall be able to compete so long as those duties are in force, and when the time comes to repeal them the industry will have strengthened its position sufficiently to enable it to continue unaided. Given the assurance, however, of a period of prosperity long enough to permit it to reach that position, it would be our object to equip our factory with newer and more efficient plant, so as to place ourselves on a more equal footing with our foreign competitors when the duties were abolished. We take it that this would be the aim of the industry as a whole, and with the aid of (1) protection for a sufficiently long period, (2) the installation of fresh plant, we are confident that it could successfully compete with the foreign manufacturer. It will be readily understood that at the present time there is neither the incentive nor the necessary capital to instal fresh plant.

64. In 1921 we installed an additional condensation set to our Nitric Acid Plant consisting of silica-ware Hart's type condonsers. This was found to work unsatisfactorily for two reasons: (i) the temperature of cooling water was too high during the greater part of the year and (ii) the acid produced contained too high a percentage of chlorine to satisfy the local market where the acid is used for gold refining.

65. The only parts of the machinery or plant made in India are the cast iron cylinders and doors used in the Hydrochloric acid plant. We have been able to obtain from one manufacturer certain earthenware and stoneware used in the hydrochloric and Concentration plants.

Capital Account.

66. (*a*) ***Nil.***

(*b*) ***Nil.***

(*c*) Rs. 5,13,953-8-11.

(*d*) Rs. 9,21,288-11-10.

(*e*) Rs. 1,35,662-2-5.

67. The figures given in the answer to the last question represent the cost price of the assets mentioned as they stood in our books at 31st March 1928. Against this we had at that date a depreciation reserve fund of Rs. 3,83,359-15-8.

68. We are fortunately in a position to give a very accurate reply to this and the succeeding question. We have recently had a fresh valuation of our Works carried out by Messrs. Gilbert-Lodge & Co., Bombay, our Directors having decided that the time had come to determine whether the amount set aside for depreciation was more or less than enough, and what would be the present replacement cost of a factory similar to our own. This re-valuation, which has been most carefully carried out, has been drawn up with the latter object in view, *i.e.*, it is intended to show present day replacement costs. From our reply to the following question it will be seen that the amount set aside for depreciation hitherto exceeds the amount which should be necessary, according to the valuation, by Rs. 45,031-9-6.

	Rs.
69. (*a*) Buildings, etc.	6,24,144
(*b*) Plant, machinery, etc.	6,08,432

These figures have been taken from the valuation referred to above. The factory having been in existence now for over 14 years, it may be assumed that the operating cost of a new Works would now be lower than our own, due to the fact that advantage could be taken of the many new processes of manufacture which have been introduced during the last ten years. Replacement costs would also be much lower for some time to come. It may be pointed out, however, that the cost of erecting a similar factory, that is to say, the cost of the actual labour which would be necessary, would be greater to-day than it was in our own case, because of the great increase in wages which has taken place since pre-war days.

70. The authorised capital of the company is £100,000, divided into 99,000 Participating Ordinary shares of £1 each, and 10,000 Deferred shares of 2 each, and it is fully subscribed and paid-up.

71. There are no Preference shares, but the rights attaching to the two classes of shares mentioned above are as follows:—the Participating Ordinary shares carry with them the right to a dividend at the rate of 10 per cent. per annum, which is non-cumulative, and they rank, both as regard dividend and capital, in priority to the Deferred shares. Surplus profits, or in the event of a winding-up, surplus assets after repayment of capital, are to be divided in the proportion of one-third to the holders of the Participating Ordinary shares, and two-thirds to the holders of the Deferred shares.

72. Please refer to our reply to the preceding question.

73. No debenture loans exist.

74. The rupee figure has been given in our answer to question 67, and the sterling equivalent, as shown in the balance sheet for the year ended 31st March 1927 is £25,668-12-10. It should be explained that the conversion of all assets and liabilities from rupees to sterling is done at 1/4 to the rupee. In our replies to question 67 *et seq.*, we have given figures in rupees because the final balance-sheet, with sterling equivalents, for the last complete year is not yet available. The reserve fund has been accumulated from surplus profits.

Works Costs.

76. (*a*) We appreciate the importance to the Board of having as full information as possible regarding works costs, and we desire to co-operate in this respect to the best of our ability. We have therefore completed the forms attached to the questionnaire in the manner required, and shall be pleased to give any other information in this connection which the Board may require. These remarks, however, apply to Works Costs only. When we come to Overhead charges we feel that any information given in this connection is of necessity of so private a nature that we must ask the Board to treat as confidential any disclosures we may make regarding them. For this reason we must request that our reply to question No. 79 hereunder be treated as private. We have adopted a system of cost accounting, but this system deals with the whole cost of each product, including overheads, *i.e.*, it purports to show the final production cost in its relation to selling price.

77. Yes. In none of these years were the Works working to full capacity. The Works costs were increased in each of the three years given, due to low production. In each year the works were shut down for periods totalling at least three months during which time general labour had to be maintained to cope with deliveries, repairs and maintenance, therefore these items are proportionately increased. Fuel costs are also increased because full use cannot be made of the boiler capacity when working on low productions. Fires have to be banked and coal burned when no steam is actually being used. Steam losses occur due to excessive condensation when starting up and the wear and tear of steam pipe joints is considerably increased. Maintenance costs are

increased as corrosion takes place as rapidly when plants are idle as when they are working. The probable reduction in all other items except raw materials would be, at a conservative estimate, about 20 per cent. if a full output had been obtained.

79. The system of cost accounts now in force has only recently been introduced. We have therefore no figures available for the past years' working. Previous to the introduction of the system now in use a system was adopted which did not include all the overheads and which was felt in many ways to be unsatisfactory. We do not therefore wish to give any figures arrived at under this system. The new system provides for costs to be determined every three months, or sooner, and for the private information of the Board we give below the costs of certain of our products, including all overheads, as determined by the latest cost sheets. Beyond the information given in our reply to question No. 81 hereunder, we do not, however, propose to discuss in any detail the nature of the system. The reason for this is that the system as employed has to provide for the costs of all our products, and therefore includes those products mentioned in our reply to question No. 3 which do not enter into our case for protection. We are therefore obliged to treat the subject in a broad way only. The particular costs referred to above are as follows:—

	Per ton		
	Rs.	A.	P.
Sulphuric Acid	180	0	0
Nitric Acid	737	10	0
Hydrochloric Acid	787	3	3
Copperas	68	2	0
Glauber's Salt	51	6	8
Washing Soda	90	15	5

N.B.—We have not manufactured any Epsom Salts for over a year.

80. We regret we have no information in this connection.

81. Under the system we have adopted, the overheads are allocated at a rate per unit of output. The proportionate rate which each product should bear is determined by the employment of a factor which is a combination of the estimated average monthly output with the estimated gross profit over raw cost. The resulting share of the estimated average monthly overheads is then added to the cost of raw materials and labour. Thus if there are three products whose average monthly output is 80 tons, 25 tons, and 1 ton respectively, on which a gross profit over raw costs of 20 per cent., 36 per cent. and 2 per cent. is made, the factors will become:—

$$80 \times \frac{20}{100} \text{ or } 16.$$

$$25 \times \frac{36}{100} \text{ or } 9.$$

$$\text{and } 1 \times \frac{2}{100} \text{ or } \cdot 002.$$

Total of factors 25·002.

Then if X = the estimated total of the overhead expenses for the whole year, the share of those expenses to be borne by each of these products *per ton* will be:—

$$(1) \quad \frac{\frac{16}{25\cdot002} \times \frac{X}{12}}{80}$$

$$(2) \quad \frac{\frac{9}{25\cdot002} \times \frac{X}{12}}{25}$$

$$(3) \quad \frac{\cdot002}{25\cdot002} \times \frac{X}{12}$$

1

(i) Depreciation.

82. (*a*) The rate allowed by the income Tax authorities is, on buildings 5 per cent., on machinery 7½ per cent.

(*b*) & (*c*) It is a little difficult for us to reply to these two questions. In our own case a sufficient depreciation reserve fund was created out of profits in the early days of the company, and since then it has not been considered necessary to make any substantial additions to this. For the purposes of calculating the cost of our products, therefore, depreciation has not had to be taken into account, and we have no practical experience of suitable rates or depreciation in so far as they enter into costs. Generally speaking, we are of the opinion that the rates allowed by the Income Tax authorities should be sufficient in all ordinary cases. A chemical plant does not depreciate to any considerable extent, owing to the fact that it is continually being renewed, although on the other hand it must be remembered that the buildings in which the various plants are housed depreciate much more rapidly than ordinarily, owing to the injurious effect on them of the chemical processes taking place therein. If anything, therefore, the rate on buildings should be increased.

(ii) Working Capital.

83. The factory has never yet, since its inception, worked to full capacity. It is difficult, therefore, to estimate the capital which would be required in the event of it doing so. As a rough approximation we would say that Rs. 5,00,000 would be sufficient, although a little more than this might be required in the initial stages.

84. It is necessary to borrow additional capital to provide for the Company's working expenses.

85. The amount borrowed varies between Rs. 3 and 3½ lacs. The rate of interest is one per cent. above the Imperial Bank rate, with a minimum of 6 per cent.

86. The total works cost in any one month for the total amount produced fluctuates to so considerable an extent, according to whether all plants are working or whether certain of them are shut down, that we are unable to produce with any degree of accuracy a comparison between the working capital and the total monthly works expenditure. At the present time the average amount of working capital which is employed is in the neighbourhood of Rs. 3 lacs. From the figures submitted in Form I herewith the total annual expenditure on account of the works costs only can be ascertained. It is therefore possible to estimate very approximately the relation between one month's expenses on account of Works costs and the amount of working capital involved. We would emphasise, however, that this estimate must necessarily be very approximate.

87. About Rs. 85,000. Between production and payment there is normally an interval of about three months.

88. We do not require to hold stocks of coal, as we purchase our supplies under contract as and when found necessary. The principal raw materials of which we have to keep stocks are sulphur and nitrate of soda. The average value of the stocks held of these two are Rs. 18,000 and Rs. 7,000 respectively.

(iii) Agents' Commission & Head Office Expenses.

89. The Head office of the Company is in London, and in India the Company is controlled by the Managing Agents, Messrs. E. D. Sassoon & Co., Ltd.

90. (1) Head Office expenses are nominally consolidated in the form of a monthly allowance of £300. Actually, however, this is only drawn as required, and under normal conditions does not amount to as much as this. In addition to the allowance the London office draws a small commission of 1 per cent. on shipments.

(2) The Managing Agents receive a commission of 4 per cent. on sales, and an additional 1 per cent. del credere commission. In return for the latter they guarantee payment of all debts incurred on behalf of the Company. They also receive an office allowance sufficient to cover the wages of the staff required, pay for the rent of the offices, and meet the other expenses necessary for a suitable organisation in connection with the sale of the Company's products. They receive 10 per cent. of the net profits made in any year.

91. On the sale value of all sales actually concluded.

93. Between 7 and 10 per cent.

Claim for Protection.

94. We dealt with this question very fully in our letter to Government dated the 1st August, 1925, (a copy of which has been forwarded to the Board), and expressed therein the opinion that the conditions required by paragraph 97 of the Fiscal Commission's Report were abundantly satisfied.

95. (*a*) Large scale production, and the advantages derived therefrom, is not only capable of achievement but is a positive necessity for the economical development of the industry. Increasing output cannot but result in increasing economy of production, and our whole aim in applying for protection is to secure for ourselves the additional output which is so essential to economic working. This condition of paragraph 98 of the Fiscal Commission's Report is therefore fulfilled.

(*b*) In our letter to Government of the 1st August, to which we have referred in our reply to question No. 94, we pointed out that our own factory is itself capable of supplying the whole requirements of India for Epsom Salts and Copperas, while our Acid Plant is large enough to supply the whole of Western India with its present requirements of acids several times over. We are therefore in a position to state quite definitely that the whole needs of the country could be very easily supplied by the home production, and this condition is therefore also satisfied.

96. Both in our preliminary statement to Government of the 23rd January, 1925, and in our subsequent letter of the 1st August we stressed the importance of our industry on national grounds, and emphasised that it deserves protection apart from economic conditions.

97. An industry may presumably be considered suitable to the economic conditions of the country in which it is carried on if there are abundant supplies of the raw materials needed for the processes of manufacture. We have dealt with available supplies of raw materials in our letter to Government of the 1st August, and also in our replies to the earlier questions herein. With practically one exception only, sulphur, the necessary raw materials are available in India, and as the products which the industry manufactures are necessities to the country we consider that the industry does undoubtedly possess features which make it suitable to Indian economic conditions.

98. We would refer the Board to our reply to question 101 hereafter.

99. (*a*) The following are the customs duties on certain chemicals:—

	Per cent.	
Acids	15	*ad valorem.*
Copper Sulphate	15	on tariff valuation of Rs. 19 per cwt.
Copperas	2½	*ad valorem.*
Copperas (in bulk)	2½	on tariff valuation of Rs. 4 per cwt.
Epsom Salts	15	on tariff valuation of Rs. 3-8-0 per cwt.
Glauber's Salts	15	*ad valorem.*
Lump Alum	15	on tariff valuation of Rs. 6 per cwt.
Washing Soda	15	*ad valorem.*

(*b*) In our reply to question No. 53 above we have given freight rates from the Continent on various imported chemicals. As, however, we have no information with regard to transport charges in the producing countries from factory to outward ports, insurance, or trade charges, we are unable to estimate with any degree of accuracy the protection which the industry enjoys in this connection.

100. Both in our preliminary statement to Government and in our letter of the 1st August, 1925, we dealt at some length with the amount of protection considered necessary, and intimated that this would be better left to the discretion of the Board after it has collected the necessary evidence. We feel that after the Board has obtained the information it requires, both in the replies to the questionnaire and in the course of oral examination, regarding cost prices to the various Indian manufacturers of the products in question, it will be in a position to assess the amount of duty in each case which should be levied, bearing in mind that all the industry asks for is a measure of protection sufficient to enable it to sell its own goods in competition with foreign imports.

101. If it is felt that nothing short of considerably increased duties will provide the required protection, and that the imposing of such duties will not be feasible, we would recommend that the present duties should be increased to the extent thought fit, and the revenue derived therefrom applied for the benefit of the industry in the form of a subsidy on Sulphuric Acid. The latter, as we have emphasised all along, constitutes by far the most important product of the Indian industry, and cheap Sulphuric Acid would go a long way towards enabling us to withstand foreign competition. It is not too much to say, in fact, that a substantial subsidy, in the shape of a bonus on every ton of Sulphuric Acid produced by the Indian manufacturer, might alone be sufficient to enable him to compete successfully with outside producers, both in the acid itself and in the subsidiary products made from it.

STATEMENT "A".

(Reference page 8 of our letter E. C. L. No. of August 1925.)

Approximate Extent of the Indian Market.

Name.	Quantity.	Remarks.
	Cwts.	
Sulphuric Acid . . .	78,400	*Note (b)*—These figures are based on the following data:—
		(1) Average figures of imports for Bombay and Bengal as shown in the Indian Government Returns for these Presidencies for the years 1920-21, 1921-22, 1922-23.
		Plus.
Nitric Acid . . .	10,200	(2) Average sales of country manufactured goods in the Bombay Presidency for the same years.
		Plus.
Hydrochloric Acid . .	6,300	(3) Allowances for Manufactures in Bengal and Madras.
Epsom Salt . . .	37,300	

Name.	Quantity.	Remarks.
	Cwts.	
Green Copperas . . .	16,200	*Note* (*c*)—Figures for imports into Madras are not included.
Alum	34,900	*Note* (*d*)—*Hydrochloric Acid*—Figures for this acid are included in the group of other acids in the Government Returns and therefore the imports of Bombay, Bengal and Madras have been omitted in the case of this Acid.
Aluminium Sulphate . .	61,800	*Note* (*e*)—All the markets of the above commodities are increasing in extent, some of them very rapidly and the above average figures may therefore be taken as a very conservative estimate for current markets.
		Note (*f*)—*Sulphuric Acid*—The production of Sulphuric Acid by the Steel Industry is not included in these figures. Such production would add some 50 to 60 tons *a day* to the Sulphuric Acid figures.

FORM I.

Statement showing the aggregate expenditure incurred at the Works on the total output of our factory for each of the last three years.

——	1925-26.	1926-27.	1927-28.
	Rs. A. P.	Rs. A. P.	Rs A. P.
1. Raw materials	1,66,794 5 3	1,12,54[illegible] 5 3	1,29,812 1 4
2. Works labour	55,335 12 0	51,642 1 0	50,851 10 0
3. Power and Fuel	57,614 0 1	41,950 9 1	28,034 15 11
4. Ordinary current repairs and maintenance of buildings, plant and machinery.	29,637 13 0	22,910 8 10	11,321 10 7
5. General services supervision and local office charges.*	55,264 11 0	55,253 11 0	21,471 8 0
6. Miscellaneous, *e.g.*, rent, municipal taxes, insurance, etc.	32,585 4 5	27,127 7 5	20,680 9 9
7. Any other single item not enumerated above which amounts to 5 per cent. or more of the total expenditure.	..	...	...
Total .	3,97,231 13 9	3,11,434 10 7	2,92,172 7 7

* By this we understand that the wages of the Works European and Indian staff is intended, other labour charges being shown against 2. We have therefore given the cost of works salaries for the years under review.

We attach Form II duly completed for six products. Items of expenditure 1 to 5 inclusive may be taken as accurate, the amounts shown being allocated as incurred. For item 6 we have taken an equal share of the total per ton of each product, *i.e.*, we have divided the total expenditure under this heading by the total in tons of these six products. The amount per ton being comparatively small there is little to be gained by differentiating between the various products, and the flat rate per ton which we have taken in each case may be regarded as sufficiently accurate for the present purpose.

FORM II.

Statement showing the Works cost per unit of each finished product for each of the last three years.

——	1925-26.	1926-27.	1927-28.
Chamber Acid (per ton).	Rs. A. P.	Rs. A. P.	Rs. A. P.
1. Raw materials	40 4 6	33 15 1	33 11 2
2. Works labour	19 6 6	23 0 10	26 8 8
3. Power and fuel	23 6 11	16 5 6	10 0 10
4. Ordinary current repairs and maintenance of buildings, plant and machinery.	7 8 6	5 14 5	9 13 7
5. General services, supervision and local office charges.	7 11 2	8 0 2	6 13 5
6. Miscellaneous, *e.g.*, rent, municipal taxes, insurance, etc.	7 1 0	6 2 3	5 10 6
7. Any other single item not enumerated above which amounts to 5 per cent. or more of the total expenditure.	...	...	...
Total	105 6 7	93 6 3	94 10 2

FORM II.

Statement showing the Works cost per unit of each finished product for each of the last three years.

——	1925-26.	1926-27.	1927-28.
Concentrated Sulphuric Acid (per ton).	Rs. A. P.	Rs. A. P.	Rs. A. P.
1. Raw materials	93 12 3	88 8 0	89 6 0
2. Works labour	21 14 8	14 8 1	15 9 8
3. Power and fuel	7 2 2	5 10 4	7 6 1
4. Ordinary current repairs and maintenance of buildings, plant and machinery.	7 12 10	11 7 8	9 4 5
5. General services, supervision and local office charges.	8 6 8	6 8 9	7 5 0
6. Miscellaneous, *e.g.*, rent, municipal taxes, insurance, etc.	7 1 0	6 2 3	5 10 6
7. Any other single item not enumerated above which amounts to 5 per cent. or more of the total expenditure.	.	...	...
Total .	146 1 7	132 13 1	134 9 8

FORM II.

Statement showing the Works cost per unit of each finished product for each of the last three years.

——	1925-26.	1926-27.	1927-28.
Nitric Acid (per ton).	Rs. A. P.	Rs. A. P.	Rs. A. P.
1. Raw materials	549 14 11	479 10 7	591 6 10
2. Works labour.	50 14 5	95 2 10	67 13 4
3. Power and fuel . . .	33 14 0	22 13 3	21 7 11
4. Ordinary current repairs and maintenance of buildings, plant and machinery.	56 4 1	39 15 2	41 3 1
5. General services, supervision and local office charges.	31 9 7	26 11 7	17 9 9
6. Miscellaneous, *e.g.*, rent, municipal taxes, insurance, etc.	7 1 0	6 2 3	5 10 6
7. Any other single item not enumerated above which amounts to 5 per cent. or more of the total expenditure.	...	...	...
Total .	729 10 0	670 7 8	655 3 5

FORM II.

Statement showing the Works cost per unit of each finished product for each of the last three years.

——	1925-26.	1926-27.	1927-28.
Hydrochloric Acid (per ton).	Rs. A. P.	Rs. A. P.	Rs. A. P.
1. Raw materials	300 12 10	260 15 6	269 13 6
2. Works labour.	103 14 0	193 7 1	193 4 10
3. Power and fuel	67 15 9	47 13 0	4 3 3
4. Ordinary current repairs and maintenance of buildings, plant and machinery.	69 2 10	54 7 0	61 5 5
5. General services, supervision and local office charges.	13 0 3	9 14 3	11 8 6
6. Miscellaneous, *e.g.*, rent, municipal taxes, insurance, etc.	7 1 0	6 2 3	5 10 6
7. Any other single item not enumerated above which amounts to 5 per cent or more of the total expenditure.	...	...	...
Total .	561 14 8	572 11 1	582 14 0

FORM II.

Statement showing the Works cost per unit of each finished product for each of the last three years.

——	1925-26.	1926-27.	1927-28.
Epsom Salts (per ton).	Rs. A. P.	Rs. A. P.	Rs. A. P.
1. Raw materials	61 13 3	62 4 11	70 15 6
2. Works labour	36 12 1	12 12 0	14 7 1
3. Power and fuel	11 6 7	10 13 2	14 11 4
4. Ordinary current repairs and maintenance of buildings, plant and machinery.	16 1 6	16 12 11	12 0 1
5. General services, supervision and local office charges.	11 4 3	10 11 2	11 13 5
6. Miscellaneous, *e g.*, rent, municipal taxes, insurance, etc.	7 1 0	6 2 3	5 10 6
7. Any other single item not enumerated above which amounts to 5 per cent. or more of the total expenditure.	...	...	...
Total	144 6 8	119 8 5	129 9 11

FORM II.

Statement showing the Works cost per unit of each finished product for each of the last three years.

——	1925-26.	1926-27.	1927-28.
Copperas (per ton).	Rs. A. P.	Rs. A. P.	Rs. A. P.
1. Raw materials	38 6 5	42 8 6	64 3 5
2. Works labour	26 7 11	14 10 1	14 12 6
3. Power and fuel	14 10 2	10 12 4	11 11 6
4. Ordinary current repairs and maintenance of buildings, plant and machinery.	6 14 3	10 5 5	10 10 2
5. General services, supervision and local office charges.	7 10 4	6 7 6	7 0 7
6. Miscellaneous, *e.g.*, rent, municipal taxes, insurance, etc.	7 1 0	6 2 3	5 10 6
7. Any other single item not enumerated above which amounts to 5 per cent. or more of the total expenditure.	...	...	...
Total	101 2 1	90 14 1	94 0 0

(2) *Letter, dated 12th November, 1928.*

We have the honour to send herewith the following statements, six copies of each:—

(1) Form 2A., showing actual costs per ton of products shown therein of raw material, Works' labour, power and fuel, together with percentages.

(2) Form D., showing the relation between the total sales in Bombay and the total sales up-country, together with percentages.

(3) Form E., showing Sulphuric Acid 95 per cent. required for average annual consumption of products in Bombay Presidency and Sind.

(4) Form F., showing Railway rates from Bombay to various stations.

(5) Form G., showing gross, net, and tare weights of various packages for Railway transport of Sulphuric, Nitric, and Hydrochloric Acids.

(6) Statement embodying our proposals with regard to Railway freight.

(1) FORM 2A.—*Giving actual costs per ton of products shewn of raw materials, Works Labour and Power and Fuel, together with percentages.*

	Chamber Acid 95 per cent.		Concentrated Sul. Acid 95 per cent.		Nitric Acid 100 per cent.		Hydrochloric Acid 100 per cent.		Epsom Salt.		Green Copperas.	
	Actual Cost.	Percentage.	Actual Cost.	Percentage.	Actual Cost.	Percentage.	Actual Cost.	Percentage.	Actual Cost.	Percentage.	Actual Cost.	Percentage.
	Rs. A. P.		Rs. A. P.		Rs. A. P.		Rs. A. P.		Rs. A. P.		Rs. A. P.	
Raw Materials .	33 11 2	47·92	89 6 0	79·54	501 6 10	84·87	269 13 6	54·6	70 15 6	70·91	44 3 5	62·52
Works Labour .	26 8 8	37·78	15 9 8	13·90	67 13 4	11·48	193 4 10	39·09	14 7 1	14·41	14 12 6	20·87
Power and Fuel .	10 0 10	14·30	7 6 1	6·56	21 7 11	3·65	31 3 3	6·31	14 11 4	14·68	11 11 6	16·61
	70 4 8	100·00	112 5 9	100·00	590 12 1	100·00	494 5 7	100·00	100 1 11	10·000	70 11 5	100·00

(2) FORM D.—*Total Sales in Bombay and Up Country.*

Product.	Total Sales 1927-28.	Bombay Sales	Up Country Sales, Rail and Ship.	Percentages of Bombay Sales to Total.	Percentages of Up Country Sales to Total.
	lbs.	lbs.	lbs.	Per cent.	Per cent.
Acid Sulphuric 95 per cent.	1,717,351	1,262,731	454,620	73·54	26·46
Acid Nitric 100 per cent.	179,692	115,275	64,417	64·15	35·85
Acid Hydrochloric 100 per cent.	105,134	62,156	42,978	59·12	40·88
	Tons.	Tons.	Tons.		
Epsom Salts . .	55·35	36·60	18·75	66·12	33·88
Green Copperas .	224·41	197·16	27·25	87·85	12·15
Soda Crystals . .	162·58	127·18	35·40	78·22	21·78
Glauber's Salt . .	162·10	108·70	53·40	67·06	32·94

(3) FORM E.—*Sulphuric Acid 95 per cent. required for average annual consumptions of products in Bombay Presidency and Sind.*

Product.	Total consumption, Bombay Presidency and Sind.	E. C. C Plant Capy.	Factor *i.e.* 95% Sulphuric Reqd. per ton of Product.	Total 95% Sulphuric Reqd. Tons.
Acid Sulphuric .	1,560 tons.	5,400 T.	...	1,560
,, Nitric .	100 ,, As. 100 % 143 ,, As. 84 Tw.	540 (100%)	1·74	174
,, Hydrochloric .	75 ,, 100 % 238 ,, 32° Tw.	115 (100%)	1·75	130
Epsom Salt . .	2,890 ,,	3,600	0·435	1,257
Green Copperas .	720 ,,	1,100	0·4	288
Turkey Red Oil	120 ,,	120	0·1	12 No import figures are given.
Copper Sulphate .	313 ,,	...	0·8	250 Not at present made by E. C. C.
Aluminous ,, .	723 ,,	...	0·47	340 Not at present made by E. C. C.
Alum . . .	2,631 ,,	...	0·4	1,052 Not at present made by E. C. C.
Fertilizers .	1,000 ,,	...	0·4	400 Not at present made by E. C. C.
Total	...	...	...	5,463

NOTE.—The above figures are taken from Total productions of E. C. C. & D. M. Co.'s *plus* Average Imports for years 1922-23, 1923-24, 1924-25, 1925-26, 1926-27, extracted from annual statement of Sea Borne Trade.

Nitric Acid.—If we were successful in obtaining H. M. Mint contract for 200 tons of Nitric acid as 84° Tw. (*i.e.*, 140 tons as 100 per cent.) an additional 224 tons of Sulphuric Acid 95 per cent. would be required.

(4) FORM F.—*Railway Rates (per Railway maund of 82·29 lbs.)*

Station.	I.	II.	III.	IV.	V.	VI.	VII.	VIII.	IX.	X.
B., B. & C. I, Railway.	Rs. A. P.	Rs. A. P.	Rs. A. P.	Rs. A. P.	Rs. A. P.	Rs. A. P.	Rs. A. P.	Rs. A. P.	Rs. A. P.	Rs. A. P.
Surat . .	0 6 5	0 6 11	0 9 2	0 9 8	0 11 9	0 12 7	0 14 4	0 15 6	1 2 4	1 11 10
Ahmedabad . .	0 10 11	0 11 11	1 0 1	1 1 1	1 4 11	1 6 6	1 9 10	1 11 10	2 1 3	3 1 2
Petlad . .	0 10 3	0 11 3	0 14 11	0 15 11	1 3 5	1 4 10	1 7 10	1 9 10	1 14 9	2 13 3
Indore . . .	0 14 3	0 15 9	1 5 7	1 7 1	1 12 7	1 14 9	2 3 7	2 6 5	2 14 2	4 14 11
G. I. P. Railway.										
Poona . . .	0 4 7	0 5 0	0 6 6	0 6 11	0 8 0	0 8 11	0 10 1	0 10 11	0 12 11	1 2 9
Nagpur . . .	1 1 4	1 3 1	1 9 11	1 11 8	2 2 1	2 4 8	2 10 3	2 13 9	3 6 9	5 1 5
Sholapur . . .	0 9 10	0 10 9	0 14 5	0 15 4	1 2 10	1 4 3	1 7 3	1 9 1	1 14 0	2 12 4
Secunderabad . .	1 0 6	1 2 7	1 9 1	1 10 9	2 0 11	2 3 4	2 7 7	2 10 9	3 3 2	4 11 10

Sulphuric Acid charged at 6th class only.
Hydrochloric and Nitric charged at 9th class only.
Green Copperas charged at 1st class only.

Glauber's Salt charged at 3rd class and 2nd class at owner's risk.
Soda Crystals charged at 2nd class only.
Epsom Salt charged at 4th class only.

(5) FORM G.—*Statement showing gross net and tare weights of various packages for Railway Transport of Sulphuric, Nitric and Hydrochloric Acids.*

Packing.	Tare of Package.	Sulphuric acid 95 %.				Acid Nitric 84 Tw.				Acid Hydrochloric.			
		Net Wt. of acid.	Gross.	Tare of Gross.	Net of Gross.	Net Wt. of acid.	Gross.	Tare of Gross.	Net of Gross.	Net Wt. of acid.	Gross.	Tare of Gross.	Net of Gross.
	lbs.	lbs.	lbs.	per cent.	per cent.	lbs.	lbs.	per cent.	per cent.	lbs.	lbs.	per cent.	per cent.
66 Gal. Steel Drum .	180	1,215	1,395	12·9	87·1	...	...	...	...	...	...	...	...
5 Gal. Carboy .	36	92	128	28·12	91·87	70	106	33·96	66·04	55	91	39·56	60·44
2 Jar Case . .	54	84	138	39·13	60·87	56	110	49·1	50·90	56	110	49·1	50·90

(6) *Proposals regarding Railway Freight.*

We have been requested by the Board to submit our definite proposals, if any, with regard to rates of freight charged to us by the Railway Companies.

So far as finished goods generally are concerned we are of the opinion that as a reduction in freight would give us no advantage that the importer would not equally share, nothing is to be gained by urging a reduction. We would make an exception, however, in the case of freight on acid containers, where we are definitely at a disadvantage compared to the importer. We pack our acids either in jars and cases, or in carboys and crates, and the rate of freight applicable to acids is charged on the full weight of the consignment including the containers.

To illustrate the manner in which this operates to our disadvantage, we beg to submit the following figures:—

(1) When acids are packed in 5-gallon carboys and crates, the Tare of crate and package being 36 lbs.

For every 100 tons of *Nitric Acid* we pay freight on 154·1 tons (weight of acid 70 lbs. per carboy).

For every 100 tons of *Hydrochloric Acid* we pay freight on 165·4 tons (weight of acid 55 lbs. per carboy).

For every 100 tons of *Sulphuric Acid* we pay freight on 140 tons (weight of acid 92 lbs. per carboy).

(2) When acids are packed in jars and cases, the Tare of 2 jars and a case being 54 lbs.

For every 100 tons of *Nitric* or *Hydrochloric Acid* we pay freight on 192 tons (weight of acid 28 lbs. per jar).

For every 100 tons of *Sulphuric Acid* we pay freight on 165 tons (weight of acid 42 lbs. per jar).

We would therefore suggest that the freight charged in containers should be at the package rate, in the lowest possible class, and that we should only pay the acid rate on the net weight of acid railed. We shall in this way reduce the advantage derived by the importer of acid in large drums, because even if he also obtains the benefit of the reduced rate his method of packing will not result in much reduction in the total freight paid.

This revised rate should apply, we submit, not only to wagon loads but to all consignments of acid packed in jars or carboys. We are not, it will be noted, asking the Railways for any concession, but only for what we regard as fair treatment.

In our reply to Question 54 of the Questionnaire, we have shown the Board the large discrepancy between freight rates from Bombay to such places as Petlad and Ahmedabad, and freight to the same places from Port Okha. As imports of acid are received *viâ* Port Okha it would materially assist us if freight rates from Bombay could be placed on the same basis as from Port Okha, or made lower.

As regards freight on raw materials, we have shown that the only raw material which we obtain by rail is Magnesite, and here we would ask for special treatment. The present rate per ton is about Rs. 28. We cannot, as things are, afford to obtain it unless the rate is not more than Rs. 7 per ton. We realise that at this rate the Railway Companies are not likely to entertain the business, but as it might be possible for us to re-enter the Epsom's market, given a bounty on Sulphuric Acid and/or some other form of protection, a substantial reduction in freight on Magnesite would also be something to assist us.

We have no other proposals to make as regards freight.

(3) *Letter, dated 15th November 1928.*

We have the honour to enclose the following further statements, six copies of each—

1. Statement H showing actual weights, freights and percentages of various acids at concessional rate from Bombay to Ahmedabad.
2. Statement J showing actual weights, freights, classification and percentages of small consignments of acids from Bombay to Ahmedabad.
3. Statement K giving notes on railway freights.
4. Statement L showing actual and theoretical production together with efficiencies of various products manufactured by the Eastern Chemical Company, Limited.
5. Statement M showing English prices of various alkalies compared with Bombay invoice prices of the same.

STATEMENT H.

Statement shewing actual weights, freights and percentages of various acids booked at concession rate of Rs. 1-1-1 per maund of minimum quantity of 200 maunds from Bombay to Ahmedabad.

Description.	Packing.	Gross weight.	Tare weight.	Net weight.	Total freight paid.	Per cent. freight paid as Tare to Total.	Per cent. net freight paid to Total.	Remarks.
		Mds. Sers.	Mds. Sers.	Mds. Sers.	Rs. A. P.			
Sulphuric Acid .	252 Cases .	419 0	165 18	253 22	447 5 0	39·44	60·56	
,, ,,	126 ,, .	209 20	82 29	126 31	223 11 0	39·38	60·62	
,, ,, .	102 Carboys .	158 0	85 36	114 2	213 9 0	42·60	57·40*	* Freight charged on minimum of 200 maunds for concession rates. If charged at ordinary rates of Rs. 1-6-6 per maund total freight would have cost Rs. 222-3.
Hydrochloric and Nitric.	252 Cases .	330 20	159 3	171 17	352 14 0	46·1	51·9	
Hydrochloric and Nitric.	126 ,, .	165 8	115 0	85 20	213 9 0	57·3	42·7†	† Freight charged on concession rate of 200 maunds. If at ordinary rate of class 9, at Rs. 2-1-3, freight would have cost Rs. 342-14-5.
Hydrochloric .	102 Carboys .	116 35	140 24	69 16	213 9 0	65·26	37·74‡	‡ Freight at concession rate. If at ordinary class 9 (Rs. 2-1-3) it would have cost Rs. 242-2-0.
,, .	126 Cases . 102 Carboys in tiers.	284 30	139 24	155 6	304 0 0	45·31	54·69	

STATEMENT J.

Statement shewing actual weights, freights, classification and percentages of small consignments of Sulphuric, Nitric and Hydrochloric Acids despatched from Mahim (Bombay) to Ahmedabad at ordinary rates.

Description.	Packing.	Gross weight.	Tare.	Net.	Class.	Rate per maund.	Total freight paid.	Freight on Tare.	Freight on Net.	Per cent. freight on Tare.	Per cent. freight on Net.
		lbs.	lbs.	lbs.		Rs. A. P.	Rs. A. P.	Rs. A. P.	Rs. A. P.		
Sulphuric Acid . .	1 Carboy .	128	36	92	6	1 6 6	2 7 0	0 11 0	1 12 0	28·2	71·8
Hydrochloric Acid .	1 ,, .	92	36	56	9	2 1 3	2 10 0	1 1 0	1 9 0	40·5	59·5
Nitric Acid . . .	1 ,, .	106	36	70	9	2 1 3	3 2 0	1 0 9	2 1 3	33·5	66·5
Sulphuric Acid .	1 Case .	138·8	56	82·8	6	1 6 6	2 7 0	1 0 6	1 6 6	42·3	57·7
Hydrochloric or Nitric	1 ,, .	112	56	56	9	2 1 3	3 2 0	1 9 3	1 8 9	50·5	49·5

STATEMENT K.

Notes on Railway Freights.

Certain concession rates as detailed below for minimum quantities of various acids are granted by the various Railway Companies.

Empties—Jars and Carboys.—The B., B. & C. I. Railway allow these to be carried at Class I rate.

G. I. P. Railway charges 4th Class for jars and carboys carried at owner's risk.

CONCESSIONS.

Sulphuric Acid.

Carried at 4th Class instead of 6th Class for minimum quantities of 300 maunds broad gauge and 2,300 maunds metre gauge on B., B. & C. I., G. I. P. and E. I. Railways.

Hydrochloric and Nitric Acids—

B., B. and C. I. Railway—

To Ahmedabad at Rs. 1-1-1 instead of Rs. 2-1-3, minimum 200 mds.
To Potlad at Rs. 1-0-1 instead of Rs. 1-14-0, minimum 200 mds.
To Surat at Re. 0-9-0 instead of Rs. 1-2-4, minimum 200 mds.

G. I. P. Railway—

To Nagpur at Rs. 1-11-0 instead of Rs. 3-6-9, minimum 120 mds.
To Poona at Re. 0-7-2 instead of Re. 0-12-11, minimum 120 mds.
To Sholapur at Re. 0-15-7 instead of Rs. 1-14-0, minimum 120 mds.

STATEMENT L.

Table showing actual and theoretical productions together with efficiencies of Chamber, Nitric and Hydrochloric Acids, Epsom Salts and Green Copperas extracted from Eastern Chemical Company, Limited.

OFFICIAL RECORDS.

Product.	Raw Materials (lbs.)						Actual Yield lbs.	Theoretical yield lbs.	Per cent. age efficiency.	Period considered.
	Sulphur. lbs.	Nitre. lbs.	Sulphuric Acid 95 per cent.	Magnesite. lbs.	Salt lbs.	Iron Scrap lbs.				
Chamber Acid as 95 per cent.	5,760	120 =2,088 %	...	...	...	...	16,800 as 95% of which 10,540 lbs. conc. to 95%	18,173	92·44 % Includes conc. losses	Per 24 hours.
Nitric Acid 100 per cent. .	...	1,205	1,452	...	...	...	840½	857	98·08%	Per 24 hours.
Hydrochloric Acid 100 per cent.	...	...	9·41	..	987 82% Naol.	...	470½	504	93·21%	Per 24 hours.
Epsom Salts . . .	...	...	3,20,931½	3,45,275	...	...	7,47,484	7,66,064	97·567%	9 months in 1926.
Green Copperas . . .	...	...	1,24,681	...	...	903·47	3,28,534	3,35,766	97·846%	5 months in 1928.

STATEMENT M.

Statement showing English prices of various alkalies together with Bombay invoice prices.

Product.	English price.	Equivalent Rupee cost. Rupee Cal. at 1-6	Authority.	Bombay Selling prices.	Authority.
	£ s. d.	Rs. A. P.		Rs. A. P.	
Soda Ash 58 per cent.	6 2 6 Ton	61 10 7 Ton	Chem. Trades Journal, 18th October 1928	140 0 0 Ton	Brunner Mond Invoice, 2nd October 1928.
Sodium Silicate	8 0 0 ,,	106 10 7 ,,	Do.	182 8 0 ,,	Brunner Mond Invoice, 16th October 1928.
Bichromate of Potash	1 17 4 Cwt	24 14 0 Cwt.	Do.	29 12 0 Cwt.	Brunner Mond Invoice, 28th October 1928.
Calcium Chloride	5 0 0 Ton	66 10 7 Ton	Do.	90 0 0 Ton	Brunner Mond Invoice, 24th September 1928.
*Bleaching Powder	7 0 0 ,,	93 5 3 ,,	Do.	175 0 0 ,,	Brunner Mond Quot., 8th November 1928.
Caustic Soda 98-99 per cent. . . .	19 0 0 ,,	255 3 3 ,,	Industrial Chemist October 1928.	340 0 0 ,,	Brunner Mond Invoice, 20th September 1928.

* NOTE—*Bleaching Powder.*—Brunner Mond informed us by telephone on 14th November 1928 that they were out of stock, but their last price on about the 8th instant was Rs. 175 per ton. The Bazar price from dealers holding stocks of Brunner Mond's bleaching powder on 14th November 1928 was Rs. 210 per ton.

1927-28.

	Rs.	A.	P.
Total turnover	4,93,675	0	0
Commission to sub-agents	11,964	1	0
	i.e., about 2·5%		
Acid business	2,77,289	0	0
Commission to sub-agents	10,800	0	0
	i.e., about 4%		

Evaluation of Potash Cake.

	Rs.
Cost of $NaNo_3$ per ton	**181**
Cost of KNo per ton	300
	lbs.
Weight of $NaNo_3$ 96 per cent. required for 1 ton Nitric Acid	3,306
Weight of KNo_3 96 per cent. required for 1 ton Nitric Acid	3,928
Cost of 3,928 lbs. KNo_3 @ 300 pper ton . . .	**526**
Cost of 3,306 lbs. $NaNo_3$ @ 181 per ton . .	**267**
∴ Extra cost of using KNo_3 . . .	**Rs. 259**
Production of $KHSO_4$	**lbs. 5,290**
∴ Value of $KHSO_4$ per ton $= \frac{259 \times 2240}{5290}$	**. Rs. 110**

Raw Material Costs for Potash Alum.

$$2\ KHSO_4 \text{ and } 2\ H_2SO_4 \text{ and } Al_2O_3 = K_2SO_4\ Al_2(SO_4)_3\ 24\ H_2O$$
$$272 \qquad 196 \qquad 102 = \qquad 946$$

Assume bauxite 50 per cent. Al_2O_3 and allow 25 per cent. excess.

Assume yield to be 896 lbs. **Potash Alum.**

Multiplying throughout by 2½—

	Rs.	A.	P.
680 lbs. Potash Cake @ 110 per ton . . .	33	8	0
490 lbs. Sulphuric Acid @ 100 per ton . .	22	0	0
638 lbs. Bauxite @ 30 and 34 freight . .	18	4	0
Yield 1 ton potash alum .	75	12	0
Selling price.			

(4) *Letter dated the 27th November 1928.*

We have the honour to enclose the following further statements, with five additional copies of each:—

(1) Statement "N", showing the amount of duty paid on various stores imported during 1924, 1925, 1926, 1927 and 1928.

(2) Statement "O", showing the selling prices of Epsom Salts, Green Copperas, and Glauber's Salts, from 1924 to 1928.

(3) Statement "P" showing the prices charged to the acid-selling syndicate for the three acids, during the period of the agreement.

(4) Form 2, revised, showing costs per ton of Sulphuric, Nitric, and Hydrochloric Acids, and Copperas.

We also beg to take this opportunity of informing you that the rates and classification of goods given in our statement "K" have been extracted from the two following sources:—

(1) Indian Railway Conference Association Red Pamphlet No. 8—Rules and Rates for the conveyance of explosives and other dangerous goods by rail. From 1st January 1928.

(2) Indian Railway Conference Association—Indian Railways General Classification of Goods, and General Rules, No. 12. From 1st January 1928.

We now await further instructions from the Board as to the date or dates on which we shall be required to give further evidence.

(1) STATEMENT N.—*Statement of duty paid by E. C. Co. for various stores and raw materials.*

Month and date.	Particulars.	No.	Quantity.	C. Duty.	Invoice value.	B. P. T.
1924.			T. C. Q. lb.	Rs. A. P.	£ s. d.	Rs. A. P.
12th Mar.	Oil Creosote . .	16 Drums	11 6 0 7	443 4 0	201 1 7	30 9 0
28th Apl.	Empty Bottles .	2,112	...	54 5 0	44 2 6	5 5 6
8th Oct.	Oil Creosote . .	22 Drums	10 0 0 14	394 3 0	194 19 7	29 9 0
21st ,,	Filma Fuel Oil Burners.	2	.	31 4 0	95 15 9	5 11 0
30th ,,	S. W. Jars . .	300	...	108 12 0	53 11 5	29 10 0
13th Nov.	Winchester Quart Bottles.	176	...	...	7 4 11	3 11 0
28th Dec.	Filma Fuel Oil Burners Fittings for Concentrator.	2 Cases	...	6 15 0	20 9 7	0 8 0
1925.						
8th Jan.	5 cases Machinery Parts for Ink Plant.	5 Cases	...	74 5 0	219 1 8	...
4th Feb.	Do. .	4 ,,	...	247 10 0	730 5 11	54 11 0

Statement of duty paid by E. C. Co. for various stores and raw materials— contd.

Month and date.	Particulars.	No.	Quantity. T. C. Q. lb.	C. Duty. Rs. A. P.	Invoice value. £ s. d.	B. P. T. Rs. A. P.
1925						
12th Mar.	Oil Creosote . .	50 Drums	24 0 0 0	769 8 0	357 9 11	59 3 0
30th ,,	S. W. Jars . .	503	...	181 8 0	91 7 7	47 10 0
5th Apl	Saw Machine and Tools.	1 Case	...	10 12 0	Const. A-C	3 1 0
24th ,,	Oleic Acid . .	3 Casks	0 12 0 7	40 1 0	19 18 7	3 8 0
,, ,,	Carbon Black .	9 Cases	1 3 1 7	111 12 0	55 17 1	3 0 0
7th May	S. W Jars . .	892	...	328 8 0	163 19 1	84 14 0
6th July	Do. . .	685	...	249 10 0	126 3 4	65 7 0
,, ,,	Steel Pipes and Valves for Boilers.	8 / 1 Case	...	295 10 0	213 9 0	4 6 0
10th ,,	S. W. Jars . .	200	...	75 0 0	37 19 11	18 12 0
23rd ,,	Do. . .	636	...	225 5 0	108 3 5	60 6 0
29th ,,	Do. . .	232	...	82 15 0	40 11 10	22 8 0
24th Aug.	Do. . .	687	...	243 5 0	119 16 9	65 3 0
7th Sept.	Do. . .	1,490	...	546 0 0	270 16 5	141 6 0
8th ,,	Do. . .	842	...	276 4 0	146 16 7	79 11 0
25th ,,	Do. . .	1,123	...	396 2 0	196 4 3	106 4 0
12th Oct.	Do. . .	1,499	...	545 2 0	264 1 0	141 6 0
14th ,,	Do. . .	835	...	295 6 0	143 1 3	79 10 0
20th ,,	Do. . .	797	...	279 12 0	135 10 6	76 4 0
23rd ,,	Do. . .	505	...	181 8 0	85 2 4	46 14 0
9th Nov.	Do. . .	500	...	175 15 0	85 3 9	48 6 0
13th ,,	Do. . .	1,497	...	543 5 0	277 10 2	141 6 0
23rd ,,	Do. . .	600	...	217 10 0	105 14 2	56 4 0
27th ,,	Carbolic and Cresylic Acid.	6 Drums	...	106 8 0	54 6 5	6 12 0
1st Dec.	Stoneware Coils, 2" Bore, for Nitric Acid Plant.	4 only	...	70 4 0	215 2 11	48 8 0
8th ,,	S. W. Jars . .	493	...	177 0 0	87 3 5	79 5 0
12th ,,	Do. . .	882	...	327 12 0	162 10 5	85 2 0
19th ,,	Do. . .	401	...	145 3 0	72 7 0	37 8 0
1926.						
17th Jan.	S. W. Jars . .	275	..	97 3 0	49 5 6	51 0 0
17th Feb.	Oil Creosote . .	13 Drums	5 19 1 21	176 9 0	90 4 8	15 0 0

Statement of duty paid by E. C. Co. for various stores and raw materials—contd.

Month and date.	Particulars.	No.	Quantity.	C. Duty.	Invoice value.	B. P. T.
1926.			T. C. Q. lb.	Rs. A. P.	£ s. d.	Rs. A. P.
10th Mar.	Oil Creosote . .	16 Drums	4 19 2 24	212 11 0	69 3 7	14 4 0
13th Apl.	Acid Valves, Cortin Patent, for Sulphuric Towers.	6 only	...	24 5 0	17 15 3	4 0 0
,, ,,	Obsidianite Packing	1,505	...	85 1 0	42 18 3	8 0 0
,, ,,	Red Tiles for Crystallizers.	677	...	84 0 0	42 2 0	24 3 0
5th May	S. W. Jars . .	101	...	36 12 0	18 5 11	14 4 0
14th ,,	Acid Scrubber Packing.	64 Cases	...	218 11 0	Rs. A. P. 1,645 15 0	69 11 0
26th ,,	Rope Blue Asbestos	...	0 1 0 2	12 12 0	£ s. d. 6 8 9	3 0 0
29th ,,	S. W. Jars . .	1,391	...	496 1 0	248 15 6	132 0 0
10th June	Do. . .	1,686	...	625 10 0	312 5 7	159 15 10
30th ,,	Do. . .	1,679	...	600 0 0	290 17 2	158 12 0
31st July	Do. . .	808	...	177 14 0	146 5 11	42 0 0
3rd Sept.	Pins of Small Kek .	500	...	12 7 0	6 6 2	0 5 0
,, ,,	S W. Jars . .	1,979	...	706 15 0	346 14 9	187 4 0
5th Oct.	Do. . .	1,224	...	435 0 0	219 2 7	115 11 0
22nd ,,	Do. .	1,874	...	674 11 0	335 19 7	177 12 0
30th ,,	Silica Basins . .	31	...	84 5 0	41 5 11	3 14 10
11th Nov.	S. W. Jars . .	1,671	...	598 1 0	299 3 2	105 10 0
,, ,.	Stoneware Cocks for Nitric Acid Plant.	1 Crate	...	14 6 0	7 3 1	0 12 0
6th Dec.	S. W. Jars . .	1,137	...	410 4 0	203 16 9	108 6 0
30th ,,	Stonew are Taps, 2 Ways, Single Bib, 2" Bore.	2 only	...	28 8 0	14 3 1	1 2 0
31st ,,	S. W. Jars . .	1,687	...	498 5 0	247 19 6	131 9 0
1927.						
12th Jan.	S. W. Jars . .	1,295	...	469 3 0	219 4 7	125 10 0
3rd Feb	Do. . .	1,392	...	493 8 0	248 17 9	132 0 0
10th ,,	Do. . .	700	...	249 0 0	125 4 0	67 2 0
,, ,,	Do. . .	1,086	...	391 8 0	196 9 2	102 9 0

Statement of duty paid by E. C. Co. for various stores and raw materials—concld.

Month and date.	Particulars.	No.	Quantity.	C. Duty.	Invoice value.	B. P. T.
1927.			T. Q lb.	Rs. A. P.	£ s. d.	Rs. A. P.
8th Apl.	S. W. Jars . .	765	...	276 14 0	138 14 3	73 7 6
2nd Dec.	Do. . .	979	...	354 10 0	170 7 11	95 4 0
30th ,,	Do. . .	953	...	334 8 0	171 11 1	90 2 0

(2) STATEMENT O.—*Statement showing the selling prices of Epsom and Glauber's Salts and Green Copperas from 1924 to 1928.*

Year.	Rate of Epsom Salt, Sun Brand, to Mills.	Rate of Glauber's Salt to Mills.	Rate of Green Copperas to Market.
1924 . .	Rs. 4-12-0 to 5-0-0 per cwt.	Rs. 2-14-0 to 4-4-0 per cwt.	Rs. 3-4-0 per cwt. in bags.
1925 . .	Rs. 4-0-0 to 4-4-0 per cwt.	Rs. 4-2-0 to 4-8-0 per cwt.	Rs. 3-4-0 cwt. less 2 per cent. in bags. Rs. 3-8-0 in casks cwt.
1926 . .	Rs. 4-4-0 per cwt. .	Rs. 4-4-0 to 4-8-0 per cwt.	Rs. 3-0-0 cwt. less 2 per cent in bags. Rs. 3-4-0 in casks cwt.
1927 . .	Rs. 4-2-0 per cwt. .	Rs. 3-12-0 cwt. .	Rs. 3-0-0 cwt. less 2 per cent. in bags. Rs. 3-8-0 cwt. in casks.
1928 . .	.....	Rs. 2-13-6 cwt. to 3-0-0 cwt.	Rs. 4-1-0 cwt.. in bags less 2 per cent. Rs. 4-9-0 cwt. in cask less 2 per cent.

(3) STATEMENT P.—*Prices of Acids to the Syndicate during the period of the Agreement.*

	Wholesale.	Retail.	Percentage of profit to the Syndicate.
	Rs. A. P.	Rs. A. P.	Per cent.
1st July 1927—			
Sulphuric Acid S. G. 1·840 .	1 9 0	1 15 0	24
Nitric Acid 84 Tw. . .	0 4 6	0 5 6	22·2
HCL Acid 32° Tw. . .	0 2 6	0 3 6	40
1st August 1927—			
Sulphuric Acid S. G. 1·840 .	1 12 0	2 2 0	21·4
Nitric Acid 84 Tw. . .	0 5 0	0 6 0	20
HCL Acid 32° Tw. . .	0 3 0	0 4 0	33⅓
5th August 1927—			
Sulphuric Acid S. G. 1·840 .	2 2 0	2 8 0	17·6

Prices of Acids to the Syndicate during the period of the Agreement—contd.

	Wholesale.	Retail.	Percentage of profit to the Syndicate.
	Rs. A. P.	Rs. A. P.	Per cent.
10th December 1927—			
Nitric Acid 84° Tw. . .	0 5 6	0 6 6	18
6th June 1928—			
Sulphuric Acid S. G. 1·840 .	1 12 0	2 0 0	14·3
Nitric Acid 84° Tw. . .	0 5 6	0 6 6	18
HCL Acid 32° Tw. . .	0 3 0	0 4 0	33

(4) *Revised Costs.*

SULPHURIC ACID.

Costing for the quarter July—September 1928.

Item.	Cost per ton. Rs. A. P.
1. Sulphur	30 6 0
2. Nitrate of Soda	2 11 4
3. Labour	2 1 5
4. Fuel	12 6 0
5. Maintenance and repairs	5 3 0
6. General supervision, local office charges, etc.	14 5 0
TOTAL .	67 0 9

This is for 95 per cent. acid: for 100 per cent., approximate cost Rs. 70.

N.B.—Items 1 to 4 inclusive directly allocated. Items 5 and 6 allocated according to instructions of Tariff Board.

NITRIC ACID.

Costing for quarter July—September 1928.

Item.	Cost per ton. Rs. A. P.
1. Nitrate of Soda	294 10 8
2. Concentrated Sulphuric Acid	104 5 0
3. Chamber Acid	16 10 1
4. Labour	28 14 11
5. Fuel	29 8 3
6. Maintenance and repairs	45 3 0
7. General supervision, local office charges, etc. .	124 0 4
TOTAL .	643 4 3

This is for 100 per cent. acid: for 70 per cent., approximately Rs. 449

N.B.—Items 1 to 5 inclusive directly allocated. Items 6 and 7 allocated according to instructions of Tariff Board.

HYDROCHLORIC ACID.

Costing for quarter July—September 1928.

Item.	Cost per ton. Rs. A. P.
1. Raw materials	169 4 0
2. Labour	75 6 8
3. Fuel	43 12 7
4. Maintenance and repairs	31 0 0
5. General supervision, local office charges, etc.	87 0 3
TOTAL	406 7 6

This is for 100 per cent. acid: for 30 per cent., approximately Rs. 134.

N.B.—Items 1 to 3 inclusive directly allocated. Items 4 and 5 allocated according to instructions from Tariff Board.

COPPERAS.

Costing for quarter July—September 1928.

Item.	Cost per ton. Rs. A. P.
1. Raw materials	20 8 0
2. Labour	4 8 0
3. Fuel	19 15 0
4. Maintenance and repairs	5 0 0
5. General supervision, local office charges, etc.	13 14 0
TOTAL	63 13 0

Items 1 to 3 inclusive directly allocated. Items 4 and 5 allocated according to instructions from Tariff Board.

(5) *Statement handed on the 16th November 1928.*

1927-28.

	Rs.
Total turnover	4,93,675
Commission to sub-agents	11,964-1
	i.e., about 2·5%
Acid business	2,77,289
Commission to sub-agents	10,800
	i.e., about 4%

(6) *Letter dated the 20th December 1928.*

We have the honour to enclose a statement with five additional copies, showing our estimated costs per ton of sulphuric acid on outputs of 4,000 and 5,400 tons per annum. We have taken the opportunity of embodying, for purposes of comparison, the cost of sulphuric acid made by The Tata Iron and Steel Company, Limited.

Enclosure.

Tables showing comparative cost of Messrs. Tata's Sulphuric Acid with E. C. C. Actual and estimated costs of Productions for 4,000 and 5,400 Tons per annum.

	Actual cost. July/September 1928, 361·007 tons, *i.e.*, 1,444 tons per annum.		4,000 tons per annum.		5,400 tons per annum		Messrs. Tata's figures reduced to 95% basis.		Messrs. Tata's figures on 14,796 tons per year, from p. 77 of Statutory Enquiry acid 68·353%	Messrs. Tata's Allocations.
	Amount.	Percentage.	Amount.	Percentage.	Amount.	Percentage.	Amount.	Percentage.	Amount.	
	Rs. A. P.	%	Rs. A. P.	%	Rs. A. P.	%	Rs. A. P.	%	Rs. A.	
Sulphur	30 6 0	45·32	30 6 0	61·99	30 6 0	64·35	32 9 11	69·56	23 7·52	Sulphur.
Nitrate of Soda	2 11 4	4·10	2 11 4	5·49	2 15 4	6·28	2 10 7	5·69	1 14·72	Nitrate of Soda.
Labour	2 1 5	3·17	0 12 0	1·52	0 8 11	1·18	5 10 3	12·03	4 0·96	Labour.
Fuel	12 6 0	18·47	6 6 0	13·05	5 10 0	11·92	Note.—Messrs. Tata make no allowance for fuel.			
Maintenance and Repairs	5 3 0	7·65	2 4 0	4·56	2 6 0	5·03	3 10 0	7·74	2 9·76	Stores, tools and supplies.
General Supervision, Local office charges, etc.	14 5 0	21·27	6 9 6	13·39	5 4 10	11·24	2 5 4	4·98	1 10·88	Service Cost.
Total	67 0 9	100·00	49 0 10	100·00	47 3 1	100·00	46 14 1	100·00	33 11·84	...

NOTE.—Tata's costs extracted from Statutory Inquiry 1926 Steel Industry, Volume 2, page 77.

Cost of Sulphur to Messrs. Tata's = Rs. 97-13·75 per ton.

" " per ton of acid produced = Rs. 23-7·52.

$\therefore$ Tons of acid produced per 1 ton of Sulphur $= \frac{97{\cdot}8593}{23{\cdot}47} = 4{\cdot}1695$ tons.

1 ton of 98 per cent Sulphur produces 3 tons of 95 per cent Sulphuric acid @ 95 per cent yield.

$\therefore$ percentage of strength Messrs. Tata's acid $= \frac{3 \times 95}{4{\cdot}1695} = 68{\cdot}353$ per cent.

Messrs. Tata's costs are based on 68·353 per cent acid.

(7) *History of Eastern Chemical Company, Limited.*

At present Director, Mr. H. N. Morris, was introduced to Bullock Bros. & Co., who sent him to Rangoon to look into the possibility of starting a Sulphuric Acid Plant there, to supply the oil companies in Burmah.

This scheme was abandoned because of the possibility of the oil companies putting up their own plants.

Mr. Morris then investigated the possibilities of the erection of a plant in some other part of India, and finally recommended Bombay, as it was without any such works, whereas both Calcutta and Madras were provided with them.

Sir Thomas Holland who was then Professor of Geology at Manchester University strongly urged the formation of a company in Bombay, joined the Board on February 3rd, 1913, as a Director and remained as such until April 12th, 1916, when he had to resign to take up his appointment on the Indian Munitions Board.

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(8) *Letter dated the 25th October 1928, from Mr. J. Smythe to Mr. Sinclair.*

Referring to my conversation with you yesterday I have to-day had a long talk with Mr. Clanahan, Chairman of the English Epsom Salts Association, who, owing to his position, would not care to put anything in writing with respect to Epsom Salts, but said "I could tell you that owing to German dumping of the product in this and other countries, the Home industry had been ruined."

He explained that the German Potash manufacturers evidently had a profitable outlet for their main products and are compelled to produce a certain amount of Keiserite which cannot be marketed as such. It is, therefore, converted into Epsom Salts and is sold at prices with which the English and other manufacturers could not pretend to compete.

For instance, the price in this country is £3-6-0 per ton *ex*-store Manchester, and when Manchester Ship Canal Tolls, landing charges, transport and storage charges are deducted, not to mention sea freight, insurance, continental rail, etc., the price of the Epsom Salts at the German works must be some absurdly low figure.

No doubt somewhat similar conditions prevail in India and I think you will agree with me that it is absolutely impossible for the product to be made there from Indian made Sulphuric Acid and Indian Magnesite unless some substantial increase in the duty is imposed.

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(9) *Particulars of prices of imported chemicals.*

I.—Epsom Salts—

1. *Invoice*, dated 28th January, 1929, of Havero Trading Co., Ltd., 250 bags of 2 cwts., £3-15-0 a ton, c.i.f. Bombay.
2. *Invoice*, dated 5th February, 1929, of Havero Trading Co., Ltd., 50 bags of 2 cwts., £4-0-0 a ton, c.i.f. Bombay (equivalent landed duty paid price Rs. 3-4-0 a cwt.).
3. *Local sale*, dated 23rd February, 1929, Note of Bazar dealer, 50 bags of 2 cwts., Rs. 6-14-0 a bag *ex*-godown.

II.—Copperas—*Nil.*

III.—Potash Alum—*Invoice*, dated 25th February, 1929, of I.C.I. 50×¼ cwt. Potash Alum, £8-12-6 a ton, c.i.f. Bombay.

This chemical is sold under a contract which contains a fall clause.

IV.—Glauber's Salt, 98/99 per cent. Desiccated—Quotation of Havero Trading Co., Ltd., Rs. 4-14-0 a cwt., delivered Mills, Bombay.

V.—Copper sulphate, 98/99 per cent.—

1. *Invoice*, dated 31st January, 1929, of London shipper, 10 tons German, £27-10-0 a ton, c.i.f. Bombay.
2. Offer to indent from the Sizing Materials Co., Ltd., made this 3rd week of March, 5 tons English, £29 a ton, c.i.f. Bombay.

VI.—Zinc Chloride, 98/100 per cent.—*Copy of indent*, dated 2nd March, 1929, of Fr. Klein, 30 tons, £19, c.i.f.c.i. Bombay.

VII.—Sodium Sulphate—

1. *Bazar dealer's invoice*, dated 7th March, 1929, Japanese quality, Rs. 6-8-0 a cwt., *ex*-godown, Bombay.
2. *Havero's quotation*, dated 7th March, 1929, German quality, Rs. 6-12-0 a cwt., delivered Mills.
3. *I.C.I. quotation*, dated 7th March, 1929, English quality, Rs. 6-12-0 a cwt., delivered Mills.

N.B.—The above note was prepared by Mr. St. J. Cowper, Eastern Chemical Company, at the request of the Board. It was supported in each case by the actual documents, invoices, indents, etc. These were returned to him on 28th March, 1929, as they were required by the parties concerned.

R. L. WALKER,
28th March, 1929.

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(10) *Handed in by Mr. St. John Cowper, Eastern Chemical Co., Ltd., at Boards sitting on 26th March 1929.*

Please reply to Mills Department.
Special Tender—E. D. S. T. R. Dye Works, Mill.

E. D. Sassoon Building,
Dougall Road, Ballard Estate,
Bombay, the 13th February, 1929.

To
Messrs. Havero Trading Co.

Please submit your tender immediately stating discount, if any, for the following articles for delivery at the above Mill.

Yours faithfully,
for E. D. S. & Co., Ltd.,
Agents.

Indent No. 19. (Sd.) Illegible.

Description.	Quantity.	Make or quality.	As per sample or otherwise.	Rate	Per
				Rs. A. P.	
Pyroglinate of Iron . . .	5 Cwts.	...	...	...	...
Mineral White	2 Tons.	...	...	...	...
Farina Dutch Double sifted .	2 ,,	...	...	...	...
Sodium Ferborate	1 Ton.	I. G.	...	0 15 0	lb.
Glauber's Salt	5 Tons.	(98/99 % desiccated white fine ground)		4 14 0	cwt.
Acid Formic	6 Carboys of 75 lbs. each.	I. G.	...	0 5 6	lb.

Yours faithfully,
for HAVERO TRADING Co., Ltd.,
(Sd.) Illegible.

Bombay,
14th February 1929.

(11) *Letter No. ECL. 72/124, dated the 6th April 1929.*

As desired by the Board, we send herewith a statement showing quantities of chemicals contained in certain cloths and trust that the information embodied therein will be what is required.

We also send you herewith our estimated costs of Superphosphate made from rock phosphate, statement A on the basis of 5,000 tons per annum and statement B on the basis of 10,000 tons per annum. We trust that you will find them in order.

Enclosure No. 1.

5,000 tons per annum.

Estimated cost of Rock Superphosphate.

	Rs.
0·525 tons of 66 per cent. Rock at Rs. 32 per ton	16·8
0·337 tons of Sulphuric Acid 100 per cent. at Rs. 62·5 per ton	21·06
Power for crushing, mixing, etc.	8·00
Labour	2·00
Repairs and Renewals	3·50
General supervision	1·00
Rent and Taxes	0·5
Cost *Ex*-Works per ton	52·86
Selling Charges	5·00
Packing	5·00
Cost *Ex*-godown per ton	62·86

	Rs.	
Plant and Buildings Rs. 1,00,000 at 6¼ per cent.	6,250·00	
Working Capital 52·86 × 2,500 tons = Rs. 1,32,150 at 7½ per cent.	9,911·25	
Head Office Charges and Agents' Commission Rs. 2,64,300 at 8 per cent.	21,144·00	
Profit 10 per cent. on Rs. 1,00,000	10,000·00	
Charges for 5,000 tons	47,305·25	
Charges for 1 ton = $\frac{47,305·25}{5,000}$		9·46
TOTAL		72·32

Say Rs. 73 per ton.

Enclosure No. 2.

10,000 tons per annum.

Estimated cost of Rock Superphosphate.

	Rs.
0·525 tons of 66 per cent Rock at Rs. 32 per ton	16·8
0·337 tons of sulphuric acid 100 per cent. at Rs. 62·5 ton	21·06
Power for crushing, mixing, etc.	8·00
Labour	2·00
Repairs and Renewals	3·50
General supervision	0·75
Rent and Taxes	0·25
Cost *Ex*-Works per ton	52·36
Selling Charges	5·00
Packing	5·00
Cost *Ex*-godown per ton	62·36

	Rs.	Rs.
Plant and Buildings Rs. 1,40,000 at 6¼ per cent.	8,750·00	
Working Capital 52·36 × 5,000 tons = Rs. 2,61,800 at 7¼ per cent.	18,980·50	
Head Office Charges and Agents' Commission Rs. 5,23,600 at 8 per cent.	41,888·00	
Profit 10 per cent. on Rs. 1,40,000	14,000·00	
Cost for 10,000 tons	83,618·50	
Cost for 1 ton = $\frac{83,618·5}{10,000}$		8·36
TOTAL		70·72

Say Rs. 71 per ton.

Enclosure No. 3.

Statement showing quantities, etc., of Chemicals contained in certain cloths.

Description of Goods.	Dimensions of Piece.	Magnesium Chloride in piece.	Zinc Chloride in piece.	Epsom Salt in piece.	Sodium Sulphide in piece.	Glauber's salt in piece.	Price per piece of cloth.
							Rs. A. P.
A.—Grey Piece Goods.							
1. Japanese Sheeting Grey . . .	36 in. × 40 yds. × 13¼ lbz.	3 oz.	1½ oz.	*Nil*	*Nil*	*Nil*	11 1 3
2. Japanese Drill Grey	29/29½ in. × 40 yds. × 13½ lbs.	3¼ „	1⅜ „	*Nil*	*Nil*	*Nil*	11 2 0
3. (Half pound Light) Long Cloth Grey .	36 in. × 37½ yds. × 8½ lbs.	2 „	1 „	*Nil*	*Nil*	*Nil*	8 12 3
B.—Fancy Woven Piece Goods.							
4. Sholapur Coating (Finished) Black .	27 in. × 24 yds. × 5½/6½ lbs.	1½ ozs.	¾ oz.	12 ozs.	6 ozs.	6 ozs.	5 10 0
5. Hunting Cloth (Finished) Black and Blue Grandrella).	26 in. × 24 yds. × 6/6½ lbs.	1½ „	¾ „	8 „	4 „	7 „	6 8 0
C.—Piece Dyed Piece-Goods.							
6. Black Dyed Shirting	36 in. × 39 yds. × 9⅜ lbs. .	*Nil*	1 oz.	*Nil*	12 ozs.	8 ozs.	10 0 6
7. Black Dyed Shirting	39 in. × 36 yds. × 5 11/16 lbs. .	*Nil*	¾ „	*Nil*	8 „	6 „	7 1 0
8. Sulphur Khaki Dyed Shirting . .	26 in. × 24 yds. × 3½ lbs. .	*Nil*	½ oz.	*Nil*	3 „	6 „	4 1 0
9. Fancy colours Dyed Shirting . .	43 in. × 20 yds. × 4⅛ lbs. .	*Nil*	⅜ „	*Nil*	*Nil*	8 „	4 15 0

Enclosure No. 4.

Copy of Telegram from Teccold, London, dated the 4th April, 1929.

TRANSLATION.

Referring to your telegram of the 26th f.o.b. Red Sea 3*d.* unit equal to *Sh.* 15 per ton percentage approximate freight Bombay 500 tons £1-5-0 3,000 tons *Sh.* 17/6. Red Sea Mediterranean freight to Holland full cargo possibly *Sh.* 15, 6/6 *Sh.* respectively.

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(12) *Statements handed by the Eastern Chemical Co. on the 9th April, 1929.*

NITRIC ACID PLANT—VALENTINER VACUUM TYPE.

	Rs.
Complete Valentiner Plant in stoneware	4,526·00
Vacuum pump for above	1,791·00
Still	3,000·00
Setting for Still	2,250·00
Lime Tank for Vaccum pump	160·00
Cooling tanks and staging for coils for Valentiner Plant	1,300·00
Chimney—½ Value for 1 Still	150·00
Seatings for Valentiner Plant	320·00
Erection	2,500·00
TOTAL	15,997·00
Cost for 2 units	32,000·00
Building complete	23,000·00
Bi-Sulphate Pans	1,650·00
TOTAL	56,650·00

Cost of Plant with 2 units=Rs. 57,600.

5,000 TONS UNIT MILLS PACHARD TOWER.

	Rs.
Plant to be shipped from England	2,08,620·00
Sulphur Burner House	5,000·00
Housing over Gay Lussac and Glover Towers	4,500·00
Roofing over Chambers	5,000·00
Sulphur storage bins	12,000·00
Acid storage tanks	25,000·00
Foundation and Preparation of site	80,000·00
Erection	1,00,000·00
TOTAL	4,40,120·00

Say Rs. 4,50,000.

HYDROCHLORIC ACID.

32°TW.

	£	s.	d.
Per case of 4 jars each 12 kilos=48 kilos . .	1	7	6
Equals per ton—$\frac{27=6\times1016}{48}$ . .	29	2	0
15 per cent. duty	4	7	4
Landing and Delivery say	0	12	8
TOTAL .	34	2	0
Deduct—Value of Jars Say 84 Jars at 3/6*d.*	14	14	0
TOTAL .	19	8	0

	Rs.	A.	P.
At Exchange 1/6*d.* per ton of 2,240 lbs. .	258	10	8
Equals per lb. (without profit or interest) .	0	1	10·2

London, the 7th February, 1929.

(13) *Letter, dated 10th April, 1929, from the Eastern Chemical Company, Limited, Bombay.*

CAUSTIC SODA EVAPORATION FIGURES.

We enclose herewith actual fuel consumption on our caustic soda plant, the period taken being from January, 1920, until July, 1921, when 1,049,203 lbs. of solid caustic soda was produced.

The plant used was a Mirless Watson Yaryan Evaporator, Triple effect, from which 62·5° Tw. liquor was sent to storage boilers Nos. 1 and 2.

This 62·5° Tw. liquor was settled and at atmospheric temperature run through a small steam pre-heater (3) into a battery of three C. I. Caustic finishing pots of 1,550 gallons capacity each, the liquor entering No. 4 and after a certain amount of concentration it was transferred to pots (5) or (6) for finishing as per diagramatic sketch attached.

The heating was done by direct firing, using A. P. O. C. Fuel oil of 19·500 B. T. U. Calorific value, the burners being gravity fed, steam atomised, no account is taken in the fuel figures given for the fuel used for steam for the atomization of the liquid fuel, nor for the Yaryan evaporator, the figures being of fuel used for finishing only.

We think that these figures may be taken as a fair comparable basis for your calculations of fuel required for evaporating sodium sulphide and zinc chloride—we also enclose figures giving percentage composition of various twaddles for sodium sulphide and zinc chloride.

Caustic Soda.

January, 1920—July 1921.

Liquor of 62·5 Tw.=25 per cent. NaOH.

Solid caustic made 1,049,203 lbs.

Liquid fuel used 415 tons 12 cwts. 3 qrs. 17 lbs.

∴ 1 ton solid caustic 98—99 per cent. required 0·8874 tons liquid fuel for evaporation.

Sodium Sulphide.

22° Tw. contains 9·64 per cent. Na_2S.

36° Tw. contains 16·12 per cent. Na_2S.

Solid contains 62 per cent. Na_2S.

Zinc Chloride.

100° Tw. contains 46 per cent. $ZnCl_2$.

Solid contains 98-99 per cent.

Water to be evaporated.

NaOH. Caustic soda 62·5° Tw. consists of 28 per cent. NaOH and 72 per cent. water.

∴ 1 ton solid caustic soda 98 per cent. was associated with $\frac{98 \times 2,240 \times 72}{28} = 5,645$ lbs. water.

Na_2S. Sodium sulphide at 22° Tw. = 9·64 per cent. Na_2S and 90·36 per cent. water.

∴ 1 ton solid sodium sulphide was associated with $\frac{62 \times 2,240 \times 99·38}{9·64}$ = 13,018 lbs. water.

or for 36° Tw. $\frac{62 \times 2,240 \times 83·88}{16·12} = 7,226·6$ lbs. water.

$ZnCl_2$. Zinc chloride at 100° Tw. = 46 per cent. $ZnCl_2$ and 54 per cent. water.

∴ 1 ton solid zinc chloride was associated with $\frac{98 \times 2,240 \times 54}{46}$ = 2,577 lbs. water.

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(14) *Letter dated the 19th April, 1929.*

Electrical Power.—As requested by the President we have interviewed Messrs. Tata and Company, with regard to supply of electrical energy, and they inform us, that they would be willing to supply, on a 10 years minimum contract, a minimum of 5,00,000 units per year, which is equivalent at 0·8 units per B. H. P. per hour to 6,25,000 B. H. P. per year.

The cost for this amount would be 0·725 annas per unit; provided the cost of leading in the power was normal, any extras due to an unusual location would have to be borne by the consumer.

Zinc Ash.—Messrs. Tata and Company, inform us that they have approved 20 tons in stock at the present moment and anticipate a further production of 5 tons per month.

They state they have several enquiries for this material, and desire us to indicate the price we would be prepared to pay for it and also the destination.

Copper Ore.—We enclose original letter from the Indian Copper Corporation which is self explanatory. We have taken up the question of quantities and will revert on receipt of their reply.

Superphosphates.—We received the following letter from our London office:—

"*Phosphate Rock.*—With further reference to your telegram of 26th March, we are not yet in a position to reply fully. Up to the present we have a quotation from the Egyptian Phosphate Company, Limited, who offer Tribasic Phosphate of lime, dry at 3*d.* per unit f.o.b. Safaja (Red Sea). This material, we understand usually contains about 60/70 per cent. Phosphate so the cost per ton of 60 per cent. would be 60 × 3*d.* = 15*s.*

The freight to Bombay would probably be procurable at about 25*s.* per ton on 500 ton lots, 20*s.* per ton on 1,000 ton lots and 15*s.* to 17-6*d.* per ton on 34,000 ton lots.

Suppliers say it would not be practicable to ship small lots *viâ* Holland as the cost would be prohibitive, but what we are trying to get is a quotation for 100/500 ton parcel from the people who import cargo lots into Holland."

"*P. S.*—Since writing the above we have got an indication as to probable freight rates on cargo lots from Red Sea and Mediterranean ports to Holland, *viz.*, 15-0*d.* and 6-6*d.* respectively, but these are only quite approximate".

We are cabling you to-day as follows:—

"Referring to your telegram of 26th f.o.b. Red Sea 3*d.* unit equal to 15-0*d.* per ton 60 per cent. approximate freight Bombay 500 tons 25-0*d.* 3,000 tons 17-6*d.* Red Sea Mediterranean freight to Holland full cargo possibly 15-0*d.* and 6-6*d.* respectively.

Enclosure.

Copy of letter dated the 12th April, 1929, from the Indian Copper Corporation Limited, to Messrs. Eastern Chemical Company, Limited.

Reference yours of 8th instant, we are not now agreeable to the sale of copper ore, but would possibly consider the sale of sulphide of copper concentrates assaying 26—27 per cent. Copper.

Sales would be in bags f.o.r. Ghatsila, B. N. Ry. and based on market price of copper content. Further details as to quantities required should be given as we are not interested in the sale of small quantities.

Baroda Chemical Works, Baroda.

(1) *Letter dated the 10th October 1928.*

With reference to your letter No. 105-T., dated the 13th September 1928, we herewith send you six copies of our replies to your questionnaires.

Answers to questionnaires for Protection to Sulphuric Acid, Hydrochloric Acid and Glauber's Salt by the Baroda Chemical Works, Baroda.

1. This firm was established in May 1926, and is an unregistered private Company.

2. All the capital is invested by Indians and Indians only are employed in the superior staff and labour.

3. We manufacture commercial Sulphuric and Hydrochloric Acids and Glauber's Salt.

4. As we purchased a going concern which had gone into liquidation, after some repairs we began to manufacture Acids from September 1926.

5. If working to capacity, we can manufacture Sulphuric Acid 216 tons, Hydrochloric Acid 108 tons and Glauber's Salt 100 tons per annum.

6. Sulphuric Acid 140·2 tons from 1st September 1926 to 31st October 1927.
Sulphuric Acid 107·1 tons from 1st November 1927 to 31st July 1928.
Hydrochloric Acid 61·0 tons from 1st September 1926 to 31st October 1927.
Hydrochloric Acid 37·8 tons from 1st November 1927 to 31st July 1928.
Glauber's Salt 14·2 tons from 1st September 1926 to 31st October 1927.
Glauber's Salt 10·3 tons from 1st November 1927 to 31st July 1928.

7. At Baroda, Goya-gate Road, Baroda State. It is advantageously situated in respect of market and labour supply.

8. (*a*) Our products equal in appearance to imported chemicals.

(*b*) They command the same price in competition with foreign products.

(*c*) Our Acids can be used for Military purposes, but as the manufacturing of explosives is in the hands of the British Government, they do not buy our Acids.

(*d*) There is no prejudice against our products apart from lower rates of foreign imported chemicals.

9. (*a*) Acid Sulphuric is required in manufacturing all heavy and fine chemicals.

(*b*) Especially we sell our products to dye houses, Aerated water factories, gold, silver, copper and brass-smiths.

10. We are not able to manufacture Glauber's Salt in both the summer and rainy seasons, as we do not get good crystals at high temperature of the said seasons.

11. Sulphuric Acid by Lead Chamber Process, and Hydrochloric Acid is manufactured with the help of iron retorts and receivers.

Glauber's Salt from salt-cake by the process of crystallization.

Raw Materials.

12. In Sulphuric Acid, Rock Sulphur and Nitrate of Soda. In Acid Hydrochloric, common salt and Acid Sulphuric. In Glauber's Salt, salt-cake, the bye-product of Hydrochloric Acid.

13. Rock Sulphur 80 tons per annum.

Soda Nitrate 20 tons per annum.

Common salt 80 tons per annum.

14. One pound of Rock Sulphur gives 2·733 lbs. of Sulphuric Acid of Sp. Gr. 1·830.

One pound of Common salt and one pound of Sulphuric Acid together give 1·40 lbs. of Hydrochloric Acid.

15. Sulphur we get from Italy through English firms, Nitrate of Soda from Chilli in South America through Bombay merchants, Salt from Government Salt Works of Dharasana in Surat District.

16. (A) 1. Sulphur.

(*a*) Sicily.

(*b*) C.i.f. Bombay, £7-5-6.

(*c*) Landing and clearing charges, Rs. 6 per ton.

(*f*) Rs. 16-1-0 per ton.

(A) 2. Soda Nitrate.

(*a*) Chilli in America.

(*b*) F.o.r. Bombay, at Rs. 185 per ton.

(*c*) Rs. 18-5-0 per ton.

(B) Common Salt.

(*a*) Re. 1-7-9 per Bengal maund.

(*b*) Re. 1-0-0 per Bengal maund, approximately.

17. At present we use Rock Sulphur, which is not likely to be manufactured in India; but in its place Iron Pyrites can be used which are found in India. This could much cheapen our finished product, but as it requires extra machinery and expert labour, which will ultimately need more capital, we have postponed the use of the same to some future date when our works are in a better financial position.

Nitrate of Soda is not likely to be manufactured in India, but in its place Nitrate of Potash which is manufactured in India, can be used.

18. (*a*) No special rates.

(*c*) We wish that the railway should give special rates for our raw materials.

19. We are sure that there will be sufficient supply of raw materials (required for this industry) from foreign and domestic markets for a very long period.

20. Yes; Sulphur can be replaced by iron and copper pyrites and zinc blends and soda by Potash Nitrate. Pyrites exist in Central Provinces and in Indian States as Sirohi and Baluchistan. Potash Nitrate in the Punjab and United Provinces.

21. Yes; it will cease until, we begin to use pyrites in place of Sulphur and Nitrate of Potash in place of Nitrate of Soda. We don't use Nitrate of Potash at present although it is manufactured in India as it is dearer compared with Nitrate of Soda.

22. Yes; we hear that in Italy they have formed an association to keep up the price of Sulphur.

Labour.

23. We use skilled labour and expert supervision of Indians.

24. *Nil.*

25. *Nil.*

26. *Nil.*

27. (*a*) Nineteen Indian labourers are employed.

(*b*) Their average wages are Rs. 20 per month and all of them are on monthly salaries.

28. Wages Bills—

Rs. 3,431-15-3 from 1st September 1926 to 31st October 1927.

Rs. 2,029-1-9 from 1st November 1927 to 31st July 1928.

29. (*a*) Yes.

(*b*) Drawn from the vicinity of the factory and also from North India.

30. Yes.

31. We have sanitary quarters with water taps and small pieces of open ground before their quarters. All our labourers are housed in the factory.

Power.

32. (*a*) Steam.

(*b*) Coal and wood.

Wood is available locally in sufficient quantities and coal is received from Bengal.

33. The total quantity of coal used to produce and concentrate 40 lbs. of Acid Sulphuric is approximately 48·16 lbs.; and, the total weight of wood used to manufacture 28 lbs. of Acid Hydrochloric is approximately 2·11 maunds (1 maund=40 seers of 40 tolas).

34. (*a*) Price of coal at source of supply, Rs. 5-8-0 per ton. Price of wood at source of supply, Rs. 9-0-0 per ton.

(*b*) Price of coal at works is Rs. 20 per ton. Price of wood at works is Rs. 14 per ton.

35. *Nil.*

Market.

36. Sulphuric Acid 22,000 tons, Hydrochloric Acid 600 tons and Glauber's Salt 1,000 tons, approximately, are manufactured in India for the last five years, in each year.

37. Indian demand is approximately Sulphuric Acid 23,000 tons, Hydrochloric Acid 600 tons and Glauber's Salt 3,000 tons.

38. The demand is sure to increase in near future with the prosperity of chemical industry in India, as Sulphuric Acid is the basis of all chemicals.

39. Our principal markets are Ahmedabad, Petlad, Broach, Surat and the surrounding area within a radius of 100 miles from this Works.

40. *Nil.*

41. Ceylon, China, Afghanistan and Persia. Chemical industries in these countries have not began as yet.

42. Yes, by railways.

Foreign competition.

43. Germany and Holland are competing in Acids and Glauber's Salt.

44. In foreign countries Acid manufacturing is done on a mass scale which lower their cost of production. Moreover, there the number of industries using acid is much more than in India.

45. We have got smaller Lead Chamber plants, so the cost of manufacture to us is higher, while they have huge contact process units fit for mass production.

46. (*i*) Sulphuric Acid, £11-10-0 per ton, c.i.f. Bombay.

(*ii*) Last year we realised on an average:—

Sulphuric Acid, concentrated, Rs. 4-4 per 40 lbs.

Hydrochloric Acid, concentrated, Rs. 4-4 per 28 lbs.

This year we are getting on an average:—

Sulphuric Acid, concentrated, Rs. 4 per 40 lbs.

Hydrochloric Acid, concentrated, Rs. 4-2 per 28 lbs.

The above prices are f.o.r. Ahmedabad or Petlad.

47. Messrs. Kantawala Nanavati & Co., 36, Tamarind Lane, Fort, Bombay.

48. We do not know about it, but it is evident that foreign competition if allowed unchecked will kill our acid industry.

49. With their huge capital the foreigners have centralised many chemical industries into one; and, now-a-days to them Sulphuric Acid has become only a bye-industry. In order to manufacture coal-tar products and other fine and heavy chemicals they require Acid Sulphuric. For this they have raised very big Acid Plants which lower their cost of production. Out of their output, they use a lot in their own works, and the surplus they can naturally send to India at a nominal price.

50. (*a*) As shown in 49, to foreigners Acid Sulphuric is a bye-industry and also Acid Hydrochloric is a bye-product of Le Blanc Soda process.

(*b*) We are not in a similar financial position to start huge works so that our acids manufacturing might also become bye-industry.

51. Near the ports.

52. (*a*) It has substantially fallen.

(*b*) Mostly due to foreign competition and to some extent, to increment in the number of Acid works in India.

(*c*) Internal competition is not likely to be permanent.

53. *Nil.*

54. On Acid Sulphuric and Hydrochloric Acid special rate Re. 1-1-1 per Bengal maund from Bombay to Ahmedabad.

On Acid Sulphuric Re. 0-5-4 per Bengal maund from Baroda to Ahmedabad.

On Acid Hydrochloric Re. 0-7-7 per Bengal maund from Baroda to Ahmedabad.

55. (*a*) We get from England our Lead Sheets, Fused Silica-ware concentration plants, Stone-ware jars and sundry materials, which are absolutely necessary articles for the manufacture of Acid Sulphuric. Our cost of these articles is much higher than it is with the European manufacturers, who get almost at their door.

(*d*) Raw materials are dear to us as mentioned before, because, we have to buy the same from foreign countries.

(*f*) In proportion to distance we have to pay much higher freight than foreign manufacturers.

(*g*) As mentioned before, we get our concentration plants, lead sheets, etc., from foreign countries and hence we have to keep a large stock of the said spare parts to prevent our works being stopped at the time of breakage and accidents. Foreign manufacturers could arrange to buy them whenever they require.

(*i*) As Indian Public has not yet realised full benefit of industrial investments on account of foreign competition and other difficulties, it is very difficult to raise capital from the masses for chemical industry on low interest.

56. From our answers to question 55, we feel (*a*) almost permanent, (*d*) temporary, (*i*) temporary.

Internal competition.

57. We do feel some competition from Messrs. The Eastern Chemical Co., Ltd., of Bombay, and from Messrs. The Dharamsi Morarjee Chemical Co., Ltd., of Bombay, in Sulphuric Acid. But we believe when there will be no foreign competition, internal competition will not affect us.

58. No agreement has been made by us.

Equipment.

59. (*a*) Yes. Ours is the smallest unit which can be worked with economy.

60. No. It does not require very elaborate machinery, but expensive it does.

61. We have purchased a running concern from an auction and hence we cannot give exact figure about the cost of plant and machinery.

62. We are using Lead Chamber Process for the manufacture of Acid Sulphuric. We have one Lead Chamber measuring (75″×14″×12″) and the other (7″×8″×15″) with four sulphur burners and other necessary connecting pipes. One boiler for generating steam. Cascade system concentration plant to concentrate 1,230 lbs. Acid Sulphuric per day. One brick-work chimney, 75 feet high, to create draft.

For Acid Hydrochloric, we have an Iron Retort with a set of receivers, capable of decomposing (12×40) lbs. of common salt.

63. No. We don't consider it sufficiently up to date to enable us to compete with foreign manufacturers; and we are unable to reach that state until our financial condition improves by means of protection.

64. No.

65. Till recently, no part of the machinery was manufactured in India, but under our guidance and instructions. Messrs. The Perfect Pottery Works of Jubbulpore and Messrs. The Sorab Dalal Tile Works of Than Road have begun to manufacture Acid Proof pipes and receivers as well as stone-ware jars for Hydrochloric Acid Industry.

Capital Account.

66. (*a*) As we purchased the factory from auction, we cannot give the value of Plants, machinery, building and other things separately. Our total capital invested in purchasing and remodelling the factory stands Rs. 26,973-14-6.

(*e*) Other miscellaneous assets, *i.e.*, packing materials and tools and implements, Rs. 12,457-12-3.

67. The figures given show actual costs of various assets. Our total Depreciation and Reserved Fund for the 14 months ending 31st October 1927 is Rs. 304-1-3, only a nominal sum.

68. The actual amount set aside for Depreciation and Reserved Fund is much less than what it ought to be.

69. It would cost much large amounts about triple the expense than the actual amount spent by us. It would cost about Rs. 75,000 to Rs. 80,000 including building and machinery.

70. Ours is a private partnership.

71. to 75. *Nil.*

(*a*) Cost of Production.

76. Please refer to the forms attached at the end.

77. *Nil.*

78 to 80. *Nil.*

(*b*) Overhead charges.

81 and 82. *Nil.*

83. Working capital Rs. 20,000 (twenty thousand).

87. The average value of finished goods held by the Company is Rs. 5,000. Generally three months elapse between production and payment.

88 to 92. Ours is a private partnership.

93. We consider interest (profits) 12 per cent. on the capital invested as sufficient.

Claim for protection.

94. (*a*) We consider that there is sufficient supply of labour, fuel and Home market and also of raw material, when we begin to use Pyrites in place of sulphur.

(*b*) We think without protection to Acid Sulphuric, not only this industry but other chemical industries will also suffer.

(*c*) Yes, we think it will be able to face world competition after some years for the following reasons:—

When with the aid of protection instead of sustaining losses, we would be in a position to show the public some profits, they will have confidence in this industry, and, it would be easy to raise capital and extend the works, to go in for other bye-products, and try experiments for using iron pyrites instead of Sulphur and also to equip the factory with the most modern machinery used by foreigners.

95. (*a*) Yes. In this industry, the advantages of the large scale production can be achieved and that increasing output would mean increasing economy of production.

(*b*) Yes, the whole requirements of the country could be supplied within a very small period.

96-97. In fact industrial and more or less agricultural prosperity of a nation is the result of flourishing Chemical Industry. India is mainly an agricultural country and it can never have too much of chemical manures, the manufacture of which (superphosphates) depends on flourishing acid industry.

99. At present Customs duty on acids entering India is 15 per cent. on invoice price, but this duty is nullified by the recent appreciation of rupee as due to present exchange rates, foreigners get clear advantage of about 12½ per cent.

100. As the Indian demand of Acid Sulphuric and Hydrochloric is met by Indian production, we recommend at least 60 per cent. duty on imported acids for twenty years to enable us to stand on our legs by getting some interest on the capital invested, in the industry. We believe, that after that period, we would be able to face world competition.

101. We do not recommend any other sort of assistance in place of protective duty.

FORM I.

Statement showing the aggregate expenditure incurred at the works on the total output of this factory for the period of nine months from 1st November 1927 to 31st July 1928.

		Acid Sulphuric.			Acid Hydrochloric.		
		Rs.	A.	P.	Rs.	A.	P.
1.	Raw materials	7,807	11	6	6,232	1	0
2.	Works labour	3,810	8	3	800	0	0
3.	Fuel (coal)	2,382	1	6	1,882	9	3
4.	Repairs	2,321	1	6	1,000	0	0
5.	General services	3,095	10	6	600	0	0
6.	Miscellaneous expenses	731	11	0	101	0	0
7.	Packing charges, freight, selling commission, etc.	2,211	10	0	2,950	12	0
	TOTAL	22,360	6	3	13.566	6	3

FORM II.

Statement showing the works cost per unit of 40 lbs. Acid Sulphuric and per unit of 28 lbs. Acid Hydrochloric for the period of nine months from 1st November 1927 to 31st July 1928.

1st November 1927 to 31st July 1928.		One jar of 40 lbs. Acid Sulphuric.	One jar of 28 lbs Acid Hydrochloric.
		Rs.	Rs.
1.	Raw materials	1·300	2·080
2.	Works labour	0·635	0·260
3.	Fuel	0·398	0·627
4.	Repairs	0·387	0·333
5.	General services, etc.	0·516	0·200
6.	Miscellaneous expenses	0·122	0·034
7.	Packing charges, Railway freight, selling commission, etc.	0·369	0·983
	TOTAL	3·727	4·517

(2) *Letter dated the 15th December, 1928.*

Re PROTECTION TO SULPHURIC ACID INDUSTRY.

In continuation of our letter of the 10th November, 1928, we have to say that if bounties are to be given to the Acid manufacturers to protect the Acid Industry, we herewith again request you to consider us also as one in British India. Further please note that we are prepared to appear before you for oral examination, if there be any need for that in your opinion.

The Industrial Chemical Works, Kirloskarvadi.

Letter dated 12th October, 1928.

As per your previous letter of 10th September, 1928, we are enclosing herewith a copy of our representation to Tariff Board and the remaining copies will follow very soon.

The representation consists of two parts: part first* consists of introductory information, whereas the second part consists of answers to such questions as is possible for us at present to reply. Our main aim of sending in representation is embodied in the answer to question No. 49 of your questionnaire.

Enclosure.

REPLIES TO THE QUESTIONS ISSUED BY THE TARIFF BOARD.

1. The Industrial Chemical Works, Kirloskarvadi is established in 1927 and is a proprietory concern.

2. All capital is Indian.

3. At present we mean to manufacture Formaldehyde but very shortly other allied products from Formaldehyde would be also manufactured including Synthetic resins; manufacture of Soda Ash is also contemplated.

4. The plant is under construction and the production is expected to start by the beginning of year 1929.

5. Our plant is equipped to manufacture 120 tons of Formaldehyde per annum when worked to capacity.

7. Our Works is at Kirloskarvadi, District Satara and we consider as far as industrial situation is concerned in respect of (*a*) raw material, (*b*) sources of power and fuel, (*c*) labour and other consideration and (*d*) market we are fairly well situated.

9. (*a*) Our present product is used in the Mill Industry, in leather and paper industries and as a general disinfectant. Similarly it is a raw material for synthetic resins.

(*b*) In the Mill Industries it is used in dyeing process and in after-treatment of the direct cotton-dyes.

(*c*) It is not used in the manufacture of explosive products.

10. Since the temperature of this country is well above the normal we shall have to suffer slight losses due to evaporation and condensation. The loss through evaporation of Methyl Alcohol, or raw material is expected to be 5 per cent.

11. Our process for the manufacture of Formaldehyde is Catalytic process involving partial oxidation of Methyl Alcohol and subsequent fractional distillations.

12. Our principal raw material is Methyl Alcohol.

13. The annual requirement in Methyl Alcohol for our purposes will be about 15,500 gallons per year when the present plant will be working at full capacity. The plant consists of only one unit at present.

15. Our main source of supply of raw material is Indian.

16. Our raw material comes from Mysore State and is purchased from Mysore Iron Works, Bhadravati. The market price of the same naked f.o.r. Bhadravati is Rs. 1-8 per gallon.

18. (*a*) *Nil.*

(*b*) We think so.

19. We consider that our industry is assured of its raw material, which is domestic, so long as Mysore Iron Works is there and we believe that it will last for a reasonably long period.

21. Since we do not import any of our raw material, the manufacture of our product will not cease.

22. Our raw material is not a monopoly of a particular country.

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* Printed separately along with the representations received from other firms, etc.

23. The process of manufacture requires some expert supervision; however it does not involve the employment of labour imported from abroad. Indian labour and Indian chemists are sufficient.

27. When the Works begin, the total number Indian workmen is expected to be 25.

29. Indian labour force is more than sufficient: (*b*) and is drawn from the vicinity of the factory.

30. The Indian labour improves with training and time and (*b*) it compares well in efficiency with European work men in similar works.

32. The power used in the Factory is of two kinds: (1) steam is used for the process heating and for its generation a boiler is used. Fuel consists of coal (2) Mechanical power is generated from an internal combustion engine for which crude oil is fuel.

34. (*a*) The price per ton of coal at Works is Rs. 21 and of crude oil is Rs. 85 per ton.

37. We estimate the amount of coal required, to be 30 tons per month.

38. We think that the demand will increase in the near future reasons being the rise of new industries such as the manufacture of Synthetic resins and the use of Formaldehyde for agricultural purposes.

39. Our principal markets shall be Bombay, Ahmedabad, Madras and other textile manufacturing centres.

43. German competition mainly is the keenest competition for us in the case of Formaldehyde.

44. The conditions of the manufacture in India differ fundamentally than those in the competing country Germany. The difference lies in the following points (1) Financial greatness of the Companies, (2) long experience in Chemical technology and engineering, (3) manufacture of Formaldehyde from Methyl Alcohol which they themselves manufacture. (4) Other general industrial advantages and mass production methods.

45. The process of manufacture here is the same as is practised in the competing countries.

46. The price of the imported chemical c.i.f. Bombay is about £48 per ton when taken in lots of more than one ton.

47. The above price is quoted by an importing firm Havero Trading Co., Ltd., Bombay, (*b*) and we consider the information quite reliable.

48. In other foreign countries Trusts or Combines operate in chemicals.

(*b*) One of these Combines is I. G. Farben industries A. G. Frank Furt O./M. Germany. Their capital=1,000,000,000, Gold marks. The combine consists of the following companies mainly:—

(1) Badische Aniline & Soda Fabrik Ludwigshafen,

(2) Friedrich Bayer Farbwerke, Leverküsen,

(3) Meister Lucius & Brünning Höchst a/main,

(4) A. G. für Aniline Fabrikation Berlin.

(5) Some others.

Their manufacture consists of heavy chemicals, coaltar, dyestuffs and practically all kinds of synthetic chemicals such as synthetic Methanol Ammonia, and Nitrogen products.

49. At present we do not believe from the calculations we have estimated that the price of the foreign stuff sold in India is not unremunerative. But as soon as they find that there is competitor in the local market there is every reason for us to believe that there will be a fall in price to wipe out of the existence the local Indian Industry and this fear alone practically makes us approach you at present with a request to take our case into consideration if at any future time it is found that the foreign stuff is being sold in India by dumping or otherwise at a price lower than what it is at present. And while making recommendations regarding the protection to the Indian Chemical Industry it is our request that the Board will make provisions to

take our case into consideration immediately dumping or competition commences.

51. The foreign competition is expected to be keenest in Bombay and other coastal towns.

52. In the year 1921 the price of Formaldehyde was £130 per ton whereas at present c.i.f. Indian Port price is £48 per ton. The cause of this decrease in price is mainly due to the fact that its raw material Methyl Alcohol is at present manufactured synthetically from coal and water. This state of affairs is bound to be permanent.

54. We cannot reply at present this point since we are collecting the information.

55. (*a*) We think that Indian manufacturer is at disadvantage since he has to pay a higher cost for plant and machinery.

(*d*) Collection and transport of raw materials is costlier.

(*e*) Cost of raw material and consumable stores is generally higher.

(*g*) Stocks of spare parts are to be maintained since they could not be had in India immediately.

(*i*) Raising of capital is a difficult task.

Many of these disadvantages are likely to be permanent so long as adequate protection for Industries is not guaranteed and the capital is bound to be shy.

57. No. As far as we know there is no other Company which manufactures Formaldehyde.

59. (*a*) We consider that our Works are the smallest economical unit of production to insure economy. With that view in object the whole plant has been imported from European Manufacturer after careful considerations.

60. Manufacture of our product does require the use of elaborate if not all too expensive machinery.

61. About 75 per cent. of the total outlay has been incurred on plant machinery and other equipment.

62. Plant consists of an oxidising unit with a compressor, an engine, an oxidising chamber, a carburator and scrubber; and there are two fractionating Stills for Formaldehyde and Methyl Alcohol, along with a number of tanks and reservoirs.

63. Since the main plant and the machinery is imported, after due consideration and inquiries, from one of the foreign manufacturers, we have every reason to believe that the plant and equipment is thoroughly modern on the whole.

65. Almost all of the tanks are manufactured in India.

66. (*a*) We have leased for the present building and land and for our purposes, we have spent about Rs. 2,000 in temporary erections and changes (*d*) and (*e*) Rs. 15,000 have been spent on plant machinery and other miscellaneous equipment.

75. We contemplate, when the present scheme will have succeeded, to extend our present plant for the manufacture of Synthetic resins an industry which would necessitate an outlay of capital amounting to about Rs. 15,00,000

Cost of Production.

Since the manufacture has not started actually the exact figures cannot be given at present, and hence the succeeding questions have been left unanswered.

83. The working capital, which the Works will require according to the output equivalent to its full capacity will be rupees six to seven thousand

84. This capital will be private.

94. (*a*) We claim that our Industry possesses natural advantage such as an abundant supply of Indian raw material, sufficient supply of labour and home market.

(*b*) We claim that with the help of protection, if given, the Industry is sure to develop, which is desirable in the interest of the country's textile and other cited industries.

(*c*) We believe that the Industry when established will eventually be able to face world competition without protection.

95. The Industry is one in which the large scale production can be achieved and increasing output would mean increasing economy of productions.

(*b*) And it is probable that the whole needs of the country would be supplied by the home production.

96. We consider that our Industry is of national importance inasmuch as it serves nation's ultimate interest.

97. We believe with the rise of an electrical age there shall be a vast demand for Synthetic resins which are good electrical insulators and possess mechanical properties. Formaldehyde is one of the chief raw materials for it.

98. We recommend and suggest the increase in the existing Tariff duties to safeguard our Industry against underselling, when necessary, to a reasonable limit.

99. The existing customs duty, which is mainly a revenue duty, is 15 per cent.

100. We cannot at present suggest anything regarding this.

Messrs D. Waldie & Co., Ltd., Konnagar.

(1) *Letter dated the 10th January, 1929.*

We beg to enclose a further 3 copies of replies to your questionnaire as required.

We find that in the first three copies our request for protection for Soda Silicate was omitted by oversight, and we have now included this.

Introductory.

1. Established in 1853 as a Private Company and converted into a Private Limited Company in 1916 and again Public Limited Company in July 1922. It is a Registered Limited Company.

2. 4470 shares of Rs. 10 each out of 120,000 shares subscribed, held by Indians. 4 Directors at present and all Europeans. There are no Indian Directors.

3. Acid Sulphuric.
Acid Hydrochloric. } Commercial, Pure and Analytical, Reagent, Chemically Pure.
Acid Nitric.

Red Lead.
Bituminous Paint.
Alumina Sulphate Coml.
Alumina Sulphate Pure.
Alum.
Sulphate of Iron.
Mag Sulph.
Lime Sulphur Solution.
Distilled Water.
Rectified Spirit Pure for homœpathic and allopathic purposes.
Absolute Alcohol.
Zinc Chloride Solution.

Liq. Ammonia.
Soda Sulph.
Soda Crystals.
Arsenic Solution.
Cancelling Ink.
Marking Ink.
Light Naphtha.
Carbolic Powder.
Drugs and Small Chemicals.

4. Immediately after it was established.

5. Sulphuric Acid 2,400 tons of Chamber Acid per annum (to be used as raw material for other products).

	Tons per annum.
Conc. Sulphuric Acid 1,840	200
Chemically Pure Acid	12
Sulphate of Alumina	1,200
Alum	360
Red Lead	1,000
Hydrochloric Acid	120
Nitric Acid	120
Lime Sulphur Solution (for Tea Gardens)	400
TOTAL	3,412
Epsom Salts (discontinued)	200
Alumina Ferric	1,000

Acid Sulphuric 1,550	800	tons (sold as such).
Acid Sulphuric 1,840	400	,,
Acid Hydrochloric Coml.	400	,,
Acid Nitric	200	,,
C. P. Acids	40	,,
Alumina Ferric (Water clearing)	3,000	,,
Alumina Sulphate (Paper Making)	306	,,
Bituminol (Bituminous Paint)	175,000	gallons
Red Lead	3,700	tons
Average per annum (including smaller products), say	2,000	,,

7. Konnagar, Dist. Hooghly.
Yes.

8. (*a*) Some products are better, others are equal such as Red Lead, Accumulator Acid, etc.

(*b*) Very seldom and generally sold at a lower price than the imported price.

(*c*) Because the product is manufactured in India.

(*d*) Generally speaking purchasers are prejudiced against Indian products as this attitude enables them to beat prices down.

9. (*a*) Paints, Paper, Water Works, Electrical undertakings, Homœpathic medicines, Allopathic medicines, Aerated Water manufacture, Indigo, Galvanizing, Cotton Mills, Jute Mills, Tea Estates, Sugar Factories, Oil Refineries, Agriculture, Railways H. M.'s Ordnance Factories, Analytical Laboratories.

(*b*) Battery charging, Paper sizing, water purifying, diluting original Homœpathic tinctures, the manufacture of Aerated Water, Treating Indigo, Cleaning Galvanized Iron Sheets, Sizing Cotton and Jute, Dressing Tea

Bushes, Dressing Sugarcane and as an ingredient of paints, red lead being the best pigment for painting structural iron and steel, clarifying liquors in Sugar factories, for boiling oil, manuring for agriculture, manufacture of ammunition, chemical analysis.

(*c*) Yes, Nitric Acid and Sulphuric Acid.

10. Some of the products are manufactured in the cold weather and can be manufactured during the summer with difficulty and as a consequence the manufacturing cost will be heavy.

11. Ordinary Standard Processes. (See answer to question 62).

Raw Materials.

12. (1) Sulphur, Soda, Nitrate, Salt, Potash Chloride.

(2) Pig Lead.

(3) Bauxite, Magnesite, Turpentale, Asphalt, Sulphate of Ammonia.

(4) Potash Nitrate.

13.

	Tons.
Sulphur	800
Pig Lead	900
Bauxite	400
Refined Bauxite	300

14. 0·25 ton Sulphur will produce 1 ton Sulphuric Acid 1,550.
0·425 ton Sulphur will produce 1 ton Sulphuric Acid 1,840.
19·3 cwt. Pig Lead will produce 1 ton Red Lead.
0·4 ton Bauxite, 0·7 ton Chamber Acid } will produce 1 ton Fer-Alumina.
0·25 ton Refined Bauxite, 0·67 ton Chamber Acid, 0·385 ton Magnesite } will produce 1 ton Alumina Sulphate White 15/16 per cent. Al_2O_3.
0·785 ton Chamber Acid will produce 1 ton Mag. Sulph.
·5 ton Sulphur will produce 1 ton Lime Sulphur Solution.

15. India and Continent of Europe—
Pig Lead—Burma.
Sulphur—Sicily.
Bauxite—India.

16. (A) Sulphur, Soda Nitrate, Potash Chloride.
(B) Bauxite, Pig Lead, Magnesite, Sulphate of Ammonia.
(A) (*a*) Sulphur Hamburg and Sicily.
(*b*) 35·30 c.i.f. Calcutta.
(*c*) Catania.
(*d*) freight 22 shillings, insurance 5 per cent.
(*e*) landing charges Rs. 2-14 per ton.
(*f*) transport charges to the factory Rs. 3-8 per ton, and
(*g*) Customs duty *nil*.

(B) (*a*) Pig Lead, Rs. 300 per ton. Bauxite, Rs. 16-8 per ton. Pot. Nitrate, Rs. 315 per ton.

17. Not likely to be found in India.

18. (*a*) Special railway freight on Bauxite only.
(*b*) No.

19. Yes.

20. Copper Ore is now being worked in India at Mosabani by the Indian Copper Corporation and we hope to produce Copper Sulphate from this if sufficient opportunity offers.

This is a chemical which would well bear a measure of protection as the chief users the Tea Industry use only a small amount.

Estimated cost of manufacture—

	Rs.
Raw Materials	285
Coal	5
Wages	10
Overheads	50
	350
Packages	15
Transport to Customer	5
	370

Cost of Imported product—

	Rs.
On 13th November 1928 300 cwts. Copper Sulph. were registered in the import list costing	5,745=380 per ton.

21. Sulphuric Acid is dependent on imported Sulphur, but Sulphide Ores of Copper are now available in India from which it should be possible to work out a process for the manufacture of Sulphuric Acid.

22. The Sulphur market of the world is controlled by the American Sulphur Mines, but their price is limited, since if the sale price of Sulphur rises too high the Sulphuric Acid industry throughout the world would revert to the use of pyrites.

Labour.

23. No (Presume 'labour' means subordinate).

24. None.

25. (*c*) Lead burning, Fitting and Sheet Metal working.

27. (*a*) Say 270 to 285.

	Per mensem. Rs
(*b*) Coolies	16
Semi-skilled	24
Lead Process Workers	...
Process Mistries	35
Lead Burners	45
Vicemen	32

28. Total wages bill for Indian Labour at Works for past 5 years Rs. 5,68,723-7-0.

29. (*a*) Yes.

(*b*) from within 200 miles radius.

30. (*a*) Many do and become "Mistries".

(*b*) Approx. 30 per cent. efficient to 70 per cent.

31. Nothing special as the industry cannot afford it.

Power (including Fuel).

32. (*a*) Steam and electrical (own plant) from coal railed 120 miles.

(*b*) Coal.

33. 1 Ton Red Lead requires 1 ton 14 cwts. coal.
1 Ton Boiled Acid requires 1 ton 8½ cwts. coal.
1 Ton Hydrochloric Acid requires 8½ cwts. coal.
1 Ton Nitric Acid requires 11 cwts. coal.
1 Ton Alum Sulph. requires 12 cwts. coal.

34. (*a*) 1-12 a ton.
(*b*) Rs. 7-8 a ton.
35. (*a*) Bellis and Morcomb Generating set, cost about 1½ As. K. W./hr.
(*b*) Fairly well.
(*c*) Red Lead 70 K. W. hrs. per ton of red lead.

Market.

36. Total Indian Production—5 years—
Sulphuric Acid (Chamber Acid) 75,000 tons or yearly 15,000 tons.
Sulphuric Acid (Concentrated) 1,500/2,000 tons or yearly 300/400 tons.
Hydrochloric Acid 1,500/2,000 tons or yearly 300/400 tons.
Nitric Acid 1,500/2,000 tons or yearly 300/400 tons.
Chemically Pure Acids 100/150 tons or yearly 20/30 tons.
Alum 3,000 tons or yearly 600 tons.
Alumina Ferric (water clearing) 7,000 tons or yearly 1,400 tons.
Alumina Sulphate Pure (Paper sizing) 300 tons or yearly 60 tons.
Bituminous Paint 175,000 Gals. tons or yearly 160 tons.
Red Lead 3,700 tons or yearly 750 tons.

37. Total Indian Demand for above products—

	Yearly tons.
Sulphuric Acid (Chamber Acid)	15,000
Sulphuric Acid (Concentrated)	400/500
Hydrochloric Acid	300/400
Nitric Acid	300/400
Chemically Pure Acids	40/60
Alum	2,000
Alumina Ferric	2,000
Alumina Sulphate Pure	2,500
Bituminous Paint	500
Red Lead	2,400

38. The demand for Red Lead is increasing yearly. Presumably because this, the admittedly best paint for structural iron and steel in many cases is below the cost of inferior paints bearing patent or proprietory names, and the use of structural steel is increasing yearly.

39. Calcutta, Bombay, Dacca, Rangoon and Karachi.

40. No.

41. Red Lead might be exported East if we can cheapen the production. Sulphate of Copper might be worked up to a biggish trace using Indian Copper Ore as the raw material since Rubber Plantations are now purchasing Sulphate of Copper.

42. 1900—

	Rs. Per ton.
Gun and Shell Factory—Acid Sulph.	170
Rifle Factory—Acid Sulph.	170
Ammunition Factory—Acid Sulph.	170
Nitric Acid, Pure	840
Oriental Gas Co.—Acid Sulph.	120
1928—	
Acid Sulph.	140
Acid Nitric Coml.	560
Oriental Gas Co.—Acid Suplh.	60

Foreign Competition.

43. *Red Lead*—Italy.
Germany.
Japan.
England.
Belgium.
Mag. Sulph.—Germany.
Al. Sulph.—England.
Germany.

44. Wider and more stable markets justify more elaborate (and consequently expensive) plant which reduces production costs. Such plant here would be under present market conditions a potential source of "stand by" losses.

45. Plant has been built up from small beginnings and is still on the small scale. Profits are not such as to attract outside capital at present.

46. (*i*).

——	a C.i.f. Price	b Freight.	c Insurance and trade charges.	d Customs duty.	e Landing charges.
	Per. cwt. Rs. A	s.		cwt. Rs. A. P.	per ton. Rs. A.
Red Lead . .	19 2	45	...	2 13 0	2 12
Alumina Ferric . .	3 8	45	...	0 7 9	2 12
,, Sulphate .	4 2	45	...	0 9 9	2 12
Alum	7 0	45	...	0 14 4	2 12
Sulphate of Copper .	22 0	45	...	2 13 0	2 12

(*ii*).

——	1924.	1925.	1926.	1927.	1928.
	Rs. A.	Rs. A.	Rs. A.	Rs. A.	Rs.
Red Lead . . .	670 0	685 0	682 0	685 0	460
Sulphate Acid (1,740)	140 0	140 0	110 0	110 0	103
Sulphate of Alumina .	160 0	165 0	165 0	165 0	80
Alumina Ferric . .	130 0	98 8	98 8	87 8	75
Mag. Sulphate .	120 0	120 0	110 0	95 0	90
Nitric Acid . . .	630 0	630 0	560 0	560 0	560
Acid Sulphate 1,505 .	70 14	65 12	60 0	60 0	60

47. Customs Returns.

48. (*a*) I. C. I.

Italian R/L Consorzio.

Associated Lead Manufacturers.

(*c*) Profits are cut to such a low point that reasonable overhead charges cannot be paid.

49. From the undernoted estimate of cost of production we are confident that the Italian manufacturers are making no profit and at the most are merely obtaining a small contribution towards their overheads. Their object is apparently to drive the Indian product off the market.

Price quoted by Italians in December 1928, Rs. 384 per ton c.i.f. Calcutta—

	Rs.	A.	P.
Freight Italy to India	30	0	0
Packages (based on our costs)	35	0	0
Cost of Pig Lead (18·5 cwts. per ton) @300	277	8	0
Cost of manufacture (estimated 40 per cent. below our cost)	30	0	0
Overheads (estimated on large production)	7	0	0
Cartage to ship and shipping charges (estimated)	5	0	0
	384	0	0

The German Chemical Combine are also apparently dumping chemicals as the following prices show. These are taken from a Hamburg market report and a considerably lower price is quoted for export than for consumption in Germany.

	Prices in Germany. £ s. d.	Prices for export. £ s. d.
Alum	8 7 0	7 0 0
Red Lead	34 5 0	28 2 6
Litharge	34 5 0	28 7 6
Green Vitriol (Sulphate of Iron)	2 7 6	2 0 0
Soda Hypo	9 0 0	6 15 0

50. No, we have discontinued making Magnesium Sulphate as the German chemical is a bye product of the Potash Industry and sells in Calcutta at Rs. 75 per ton including packages.

51. At all the principal Ports of entry.

52. (*a*) Yes a very substantial fall.

	Price in 1920. Rs.	Price in 1928. Rs.
Red Lead	630	460
Sulphuric Acid—		
(1740)	170	105
(1550)	120	60
Sulphate of Alumina	160	80
Mag. Sulphate (Epsom Salts)	160	90

(*b*) To world conditions.

(*c*) As far as we can foresee these conditions are permanent.

53. Principal markets are the ports.

55. (*a*) Plant and Machinery—Cost 60 per cent. above foreign cost.

(*b*) (*c*) No disadvantage. Labour less efficient but cheaper.

(*d*) Raw materials with the exception of pig lead have to come great distances.

(*e*) Raw Materials—Cost higher by amount of freight. Consumable stores about 60 per cent. up.

(*f*) No.

(*g*) Spares stocks due to time taken to get spare parts and comparative inexpertness of skilled men; more spares have to be carried.

56. (*d*) and (*e*) permanent. Temporary disadvantages are likely to operate until the Industry can be made attractive to outside capital by increase of size and profitableness.

Internal Competition.

57. (*a*) Yes. Mineral Acids and Galenicals are the subject of acute competition.

(*b*) Bengal Chemical and Pharmaceutical Works Ld., Dr. Bose's Laboratory, Ld., Bengal Acid Manufacturers, Calcutta Chemical Co., Ld.

58. Yes, but without effect.

Equipment.

59. (*a*) Yes. In the larger lines. Red Lead, Fer-Alumina.

(*b*) Red Lead 50 tons month. Fer-Alumina 50 tons month, Sulphuric Acid 400 tons month. Alum 30 tons per month.

60. Elaborate machinery not essential but production costs can be enormously reduced thereby.

	Rs. A. P.	Rs. A. P.
61. 12 per cent.—		
Acid Chambers	1,43,048 2 0	
Less depreciation	18,700 13 0	
		1,24,347 5 0
16 per cent.—		
Apparatus	1,96,681 8 8	
Less depreciation	37,194 1 11	
		1,59,487 6 9
12 per cent.—		
Machinery	1,42,772 9 5	
Less depreciation	26,535 2 2	
		1,16,237 7 3

62. *Acid Plant* consists of the chamber process, without Towers. Towers were erected but sufficient capital was not forthcoming to use them.

Concentration of Sulphuric Acid is carried out by the Silica Cascade system.

Nitric and Hydrochloric Acid. Standard distillation systems.

Sulphate of Alumina. Simple plant consisting of lead dissolving dishes, wooden settling vats and lead evaporating dishes.

Red Lead Plant. This plant was built from experimental beginnings and is of the old fashioned hand fired furnace type. See answer to question 64.

Practically the whole of our plant is made by ourselves.

63. In certain lines more modern plant is essential if sufficient profits are to be made to attract further capital to the industry.

64. Separation on a system devised by one of our Directors has enabled us to produce red lead of a fineness which now competes with the imported product. This plant was constructed on the factory.

The Red Lead colouring furnaces usually take 32 to 42 hours to colour and require constant firing and rabbling or raking. One of our Directors has devised a patented process to colour red lead in 30 minutes.

This process colours in a closed reaction chamber at a high pressure and is designed to be continuous.

The large scale plant is now in course of erection and although success on the laboratory scale has been attained nothing can be said as to how successfully the large scale plant will work. The expenditure on this so far has been about Rs. 30,000.

65. As mentioned most of our plant is made on the Chemical Factory, but the high pressure plant involving heavy steel castings was all made in England.

Capital Account.

66. Block value of Property under following heads:—

	Rs.	A.	P.	Rs.	A.	P.
(*a*) Leases and Concessions.						
(*b*) Lands				4,20,656	0	0
(*c*) Buildings	2,40,813	6	7			
Less depreciation	44,267	12	1			
				1,96,545	10	6
(*d*) Plant and Machinery	4,82,502	4	1			
Less depreciation	82,430	1	1			
				4,00,072	3	0
(*e*) Other Miscellaneous assets	69,677	12	9			
Less depreciation	17,595	5	3			
				52,082	7	6

67. Total amount of depreciation written off:—

	Rs.	A.	P.
Building	44,267	12	1
Acid Chamber	18,700	13	0
Apparatus	37,194	1	11
Machinery	26,535	2	2
Other Assets	17,595	5	3

There is no Depreciation Fund.

68. No sum has been set aside for depreciation on increase in the replacement cost of Plant and Machinery due to general rise in price level other than the usual depreciation.

69. As most of our plant is made in our Works from lead sheet, timber and constructional iron, we think a new works would cost approximately the same to erect, if erected in similar style and type.

	Rs.
70. (*a*) Authorised	30,00,000
(*b*) Subscribed	12,00,000
(*c*) Paid up	12,00,000

All ordinary shares of Rs. 10 each

71. None.

72. None.

73. Debenture Loans—

	Rs.
8 per cent. (issued in 1923)	3,00,000
Less paid	3,00,000
Balance	2,40,000

Redeemable at 15 per cent. Rs. 15,000 at the end of each year.

	Rs.
6 per cent. (issued in 1926)	2,00,000
7½ per cent. (issued in 1928)	1,00,000

Redeemable at 20 per cent. Rs. 20,000 in October each year.
There is no Debenture Sinking Fund.

	Rs.
75. Process for production of White Sulphate of Alumina (free from Iron) for paper making 100 tons per month—Plant required will cost approximately	40,000
Process for production of Copper Sulphate 10 tons monthly	5,000
Replacement of part of Sulphuric Acid Plant	25,000
	70,000

FORM I.

Statement showing the aggregate expenditure incurred at the Works on the total output of your factory for each of the last three years. (See question 76.)

	Year. 1925. Rs.	1926. Rs.	1927. Rs.
1. Raw Materials	4,42,663	6,36,863	4,72,126
Other purchases (Merchandise)	8,31,313	6,69,256	5,19,589
2. Works labour	1,48,598	1,28,951	1,16,043
3. Power and fuel	58,802	58,767	43,306
4. Ordinary current repairs and maintenance of buildings, plant and machinery	30,100	14,235	16,155
5. General services, supervision and local office charges	1,51,468	1,32,754	1,19,447
6. Miscellaneous, *e.g.*, rent, municipal taxes, insurance, etc.	26,155	19,648	15,631
7. Any other single item not enumerated above which amounts to 5 per cent. or more of the total expenditure	*66,261	*85,876	*1,15,093
TOTAL	17,55,360	17,46,350	14,17,390
*Interest	40,026	47,846	73,646
Depreciation	26,027	34,684	37,040
Other items	208	3,346	4,407
TOTAL	66,261	55,876	1,15,093

(b) Overhead charges.

81. Overhead charges are allocated on a percentage basis proportional to the sales.

Thus total overheads are Rs. 3,32,000-0-0, includes all charges except manufacturing wages, and sales are Rs. 13,49,000-0-0 therefore overheads amount to 24·6 per cent. of the sales.

When calculating costs for a tender, however, it is generally necessary to ignore the actual percentage incidence or overheads on any particular product and to quote a price which will get the business, even if little or no profit is shown on that particular item simply regarding the gross profit made on the transaction as so much contribution towards overhead charges.

If the total sales for the year show a gross profit in excess of the amount necessary to pay overheads, then all gross profit over that figure becomes net profit.

(i) *Depreciation.*

82. (*a*) Rates of depreciation allowed by the Income-tax Authorities are—

	Per cent.
Building	5
Machinery	5
Apparatus	5
Acid Chambers	3
Furniture	5

(*b*) No, they are much below reality on machinery, apparatus and chambers.

(*c*) These should be—

	Per cent.
Machinery	7½
Apparatus	15
Acid Chambers	7½

(ii) *Working Capital.*

83. About 5 lacs of rupees at full capacity.

84. The Company borrows from the Bank on an overdraft guaranteed by the Managing Agents.

85. 4½ lacs is borrowed and interest payable is 1 per cent. over Bank rate with a minimum of 7 per cent.

86. Cost of 1 month's output at full capacity would be about Rs. 70,000 including packages. Packages are a heavy item. In the case of Sulphuric Acid the packages are worth more than the acid.

87. Finished Goods stocks average about 3 weeks to 1 month's sales, say cost value Rs. 45,000 to Rs. 60,000. A period of 2¼ months to 3 months normally elapses between production and payment.

88. 3 weeks' stocks Coal, value Rs. 2,000.

3 months' stocks Sulphur, value Rs. 8,000/12,000.

3 weeks' stock Pig Lead, value Rs. 15,000.

(iii) *Agents' Commission and Head Office expenses.*

89. The Company has a Calcutta Office under the control of the Managing Agents.

90. (*i*) The annual amount of expenses of Calcutta Office Rs. 55,000. A profit of about Rs. 20,000 is made on merchandise leaving a net charge to the Company of Rs. 35,000.

(*ii*) Managing Agents' commission 10 per cent. on yearly profits of the Company after deducting interest on Debenture or other loans and before

placing anything to depreciation reserve or other special accounts. Managing Agents' allowance is Rs. 2,000 per month.

91. Fixed allowance of Rs. 2,000 per month and 10 per cent. of net profits.

92. (*i*) Rs. 17-8 per ton for Calcutta Office expenses.

(*ii*) Rs. 12 per ton for Managing Agents.

93. 12½ per cent. after paying depreciation, commissions, reserve funds, bad debts and for research and improvements in plant.

Claim for protection.

94. (A) The industry possesses abundance of the raw materials necessary for the two most important products, *e.g.*:—

Bauxite for Alum and Alumina Sulphates.

Pig Lead (from Burma) for Red Lead.

and in addition—

Saltpetre for Nitric Acid.

Magnesite for Epsom Salts.

Copper Ore for Sulphate of Copper.

The home market in the case of the two first named products and of Epsom Salts is big enough to allow economical production, and in the case of red lead India with cheap pig, might also become an exporting country.

This remark applies also to Sulphate of Copper, there being a demand on the rubber plantations.

(B) In our opinion without protection the Heavy Chemical Industry will never attract sufficient capital to enable it to operate on lines sufficiently up to date to warrant giving it the name of an "Industry".

(C) We think that with 5 to 7 years of adequate protection the Industry should have time to set its house in order, and by installing new and up to date plant, be in a position to supply the whole home market and possibly export to near-by countries.

The reasons for this statement are fully contained in the replies to the questionnaire. In amplification we would say that the Chemical Industry here has never really recovered from the post war slump and the mistakes which were made at that time.

95. (*a*) This factor undoubtedly applies.

(*b*) Yes, this is so.

96. In time of war the heavy chemical industry assumes a national importance, being a key industry, both as regards the manufacture of munitions and of other necessities.

98. An understanding should be arrived at between the various competing factories to allow of a fair price being maintained.

99. (*a*) 15 per cent. *ad valorem*.

100. Regarding Red Lead, the price quoted by foreign producers has dropped as shown in answer to question 49, without a corresponding drop in the price of pig lead. In 1928 the price was cut from Rs. 520, in January to Rs. 460, in December.

We consider a duty of 33⅓ would enable us to compete and at the same time show a sufficient margin of profit to set aside a reserve fund for research and improving the plant.

This rate of duty we also suggest for the heavy Sulphates (of Alumina, Magnesium, Copper, etc.), and for the Silicates, to include Soda Silicate. This should enable this chemical to be manufactured in India, the import into Calcuttta is about 600 tons per annum. Given protection we are prepared to commence its manufacture.

(2) *Letter No. 1963/S.-102, dated the 6th March, 1929.*

With reference to Mr. Hayward's evidence before the Tariff Board we beg to enclose herewith notes and figures as requested by the Board.

Enclosure No. 1.

Note on the feasibility of the establishment of one Central Chemical Works in India.

As pointed out by the President of the Tariff Board, large scale production of Sulphuric Acid will enable a minimum cost be attained, but this saving has to be carefully balanced against other expenditure on freights and packages and handling charges to consumers.

Taking as a first consideration, therefore, the Transport of Sulphuric Acid from Port to Port for the supply of those quantities of acids as are used as such, at these various consuming centres, we arrive at the striking figures shown on page A accompanying.

On 1 ton of Sulphuric Acid 1740 S. G. selling at Rs. 87-8 per ton we have total charges of Rs. 500, for Hydrochloric Acid selling at Rs. 210 per ton naked the charges amount to Rs. 694 per ton and for Nitric Acid selling at Rs. 560 they amount to Rs. 578.

By rail these charges are even more prohibitive.

The steamer freight on dry chemicals is given in table B, these charges are sufficient to counterbalance any saving in production cost due to large scale production of Sulphuric Acid.

This taking Alum, 1 ton of this requires ½ ton Chamber Acid on which the saving due to large scale production might be at the most Rs. 10-8, this would bring the landed price in Bombay of Bengal Alum down to Rs. 150, but the sale price to user in that port, of imported foreign Alum is Rs. 135.

Similarly for Sulphate of Alumina, of which one ton requires 0·7 ton Chamber Acid, the saving by the use of large scale production Sulphuric would be approximately Rs. 14 per ton, bringing the sale price in Bombay of Bengal Sulphate of Alumina down to Rs. 121 per ton, while the selling price to actual user of the foreign product is approximately Rs. 85 per ton.

Again taking Copper Sulphate, this requires 7½ cwts. of Sulphuric Acid on which the saving would be approximately Rs. 15 per ton giving a landed cost in Bombay of Rs. 409 (without profit), selling price being Rs. 440, Rs. 31 per ton profit would have to go to the Bombay importer as merchandise profit leaving no profit to manufacturer.

Enclosure No. 2.

Large Scale production for Bengal.

As already pointed out in our reply to the Tariff Board questionnaire and stressed by Mr. Hayward at his oral examination, the ores of the Indian Copper Corporation should eventually yield a supply of Brown Oil of Vitriol (B. O. V.) sufficient for the needs of Bengal and such ports of India which can be economically reached by rail.

The coalfields would for some years be able to absorb their whole output for the manufacture of Ammonium Sulphate, thus Tatanagar takes we believe about 800 tons of Sulphuric Acid per month, and being only about 20 miles distant could readily avail itself of the B. O. V. producable from Sulphide Ores, this being the possible first step in the manufacture of this important fertiliser from raw materials entirely derived from Indian sources.

We believe the entire possible output of Pyrites B. O. V. for some years to come could be absorbed in the manner indicated, in our opinion the Sulphuric Acid used in the coalfields, being about 1,600 tons per month.

The initial difficulties of utilising I. C. C. Pyrites would, however, have first to be overcome, as from our examination of this ore the problem would not appear to us to be easy of solution.

Enclosure No. 3.

Summary, showing charges per ton of Acids, Calcutta to Bombay.

	Sulphuric Acid. Rs. A. P.	Hydrochloric Acid. Rs. A. P.	Nitric. Acid. Rs. A. P.
Freight per ton . . .	79 5 0	96 0 0	79 5 0
Packages, handling to ship, etc.	409 8 0	579 0 0	485 0 0
Handling and clearing from ship to customer . . .	12 0 0	19 0 0	14 0 0
TOTAL .	500 13 0	694 0 0	578 5 0

Steamer freight from Calcutta to Bombay.

	Rs. A. P.	Rs. A. P.
Cost of 1 ton Acid Sulphuric, 1,740 . . .	87 8 0	
Cost of 68 × 2 gallon jars at Rs. 5	340 0 0	
Cost of 34 double cases at Re. 1-12 . . .	59 8 0	
Freight at Rs. 36 per ton, on the above (weight of 1 case about 1¾ maunds)	79 5 0	
Transport to ship	10 0 0	
		576 5 0
1 ton Acid Hydrochloric Coml.	210 0 0	
96 × 2 gallons jars at Rs. 5	480 0 0	
48 cases at Re. 1-12	84 0 0	
Freight, Rs. 36 per ton (weight of 1 case 1½ maunds)	96 0 0	
Transport	15 0 0	
		885 0 0
1 ton Acid Nitric Coml.	560 0 0	
80 × 2 gallon jars at Rs. 5	400 0 0	
40 cases at Re. 1-12	70 0 0	
Freight at Rs. 36 per ton (weight of 1 case about 1¾ maunds)	79 5 0	
Transport	15 0 0	
		1,124 5 0

Enclosure No. 4.

Steamer freight and landing charges on Dry Chemicals to Bombay.

	Rs. A. P.	Rs. A. P.
To cost of 1 ton Alum	115 0 0	
To cost of 20 × 1 cwt. cases	15 0 0	
Freight	18 0 0	
Transport charges from Factory to ship . .	5 0 0	
Clearing charges from Jetty to buyer's place .	7 0 0	
		160 0 0

	Rs.	A.	P.	Rs.	A.	P.
To cost of 1 ton Mag. Sulph.	75	0	0			
To cost of 20 × 1 cwt. cases	15	0	0			
Freight	18	0	0			
Transport charges from Factory to ship	5	0	0			
Clearing charges from Jetty to buyer's place	7	0	0			
				120	0	0
To cost of 1 ton Iron Sulphate	45	0	0			
To cost of 20 × 1 cwt. cases	15	0	0			
Freight	18	0	0			
Transport charges from Factory to ship	5	0	0			
Clearing charges from Jetty to buyer's place	7	0	0			
				90	0	0
To cost of 1 ton Alumina Sulphate	90	0	0			
To cost of 20 × 1 cwt. cases	15	0	0			
Freight	18	0	0			
Transport charges from Factory to ship	5	0	0			
Clearing charges from Jetty to buyer's place	7	0	0			
				135	0	0
To cost of 1 ton of Copper Sulphate	440	0	0			
To cost of 20 × 1 cwt. cases	15	0	0			
Freight	18	0	0			
Transport charges from Factory to ship	5	0	0			
Clearing charges from Jetty to buyer's place	7	0	0			
				485	0	0

Enclosure No. 5.

Railway freight on actual weight at owner's risk from Howrah to Bombay via *Naini.*

	Per ton. Rs.	A.	P.	Rs.	A.	P.
Alum	130	0	0			
Freight at Re. 1-12-9 per maund	48	8	3			
				178	8	3
Mag. Sulph.	90	0	0			
Freight at Rs. 3-11-2 per maund	99	13	6			
				189	13	6
Iron Sulphate	60	0	0			
Freight at Rs. 2-4-9 per maund	62	0	3			
				122	0	3
Alumina Sulphate	90	0	0			
Freight at Rs. 2-4-9 per maund	62	0	3			
				152	0	3
Copper Sulph.	440	0	0			
Freight at Rs. 3-12-2 per maund	101	8	6			
				541	8	6

Railway freight to Bombay on actual weight at owner's risk viâ *Naini.*

	Per ton. Rs. A. P.	Rs. A. P.
1 ton Acid Sulph., 1,740	87 8 0	
68×2 gallon jars at Rs. 5 each	340 0 0	
34 double cases at Rs. 1-12	59 8 0	
Freight approx. Rs. 4-13-4 per maund, weight of 1 case about 1¾ maunds	287 8 2	
Transport	10 0 0	
		784 8 2
1 ton Acid Hydrochloric Coml.	210 0 0	
96×2 gallon jars at Rs. 5	480 0 0	
48 cases at Re. 1-12	84 0 0	
Freight approx. Rs. 7-1-8 per maund, weight of 1 case approx. 1½ maunds	511 8 0	
Transport	15 0 0	
		1,300 8 0
1 ton Acid Nitric Coml.	560 0 0	
80×2 gallon jars at Rs. 5	400 0 0	
40 cases double at Rs. 1-12	70 0 0	
Freight approx. Rs. 7-1-8 per maund, weight of 1 case approx. 1¾ maunds	497 5 0	
Transport	15 0 0	
		1,542 5 0

Enclosure No. 6.

C.i.f. Prices of various Chemicals imported by us in the last 3 years.

	1926. £ s. d.	1927. £ s. d.	1928. £ s. d.
Ammon. Chloride Small Xtl.	22 7 6	22 10 0	.....
Arsenic Powder	21 10 0	24 10 0	23 15 0
Acid Oxalic	29 10 0	35 0 0	.....
Soda Nitrate	12 15 0	14 7 6	11 17 0
Potash Muriate	8 3 7	.....	8 2 6
Copper Sulphate	24 5 0	.....	27 0 0
Barium Chloride	10 15 0	9 19 9	12 12 6
Yellow Prussiate of Potash	.....	64 0 0	62 0 0
Barium Carbonate	7 5 6	9 0 0	9 0 0
Lead Acetate	48 0 0	.....	.....
Potash Permanganate	.....	40 15 0	.....
Superphosphate single	3 15 0	.....	.....
Soda Phosphate	16 10 0	.....	.....

Enclosure No. 7.

Cost of Indian Salt from Salt Range, Rajputana, compared to imported.

	Rs.	A.	P.	
Samber Salt inclusive of bags . .	2	4	0	per maund with duty.
Freight	1	6	10	per maund =Rs. 38-8-6 ton.
	3	10	10	
Less duty	1	4	0	
	2	6	10	per maund without duty.
	=65	8	6	per ton delivered Calcutta.
Delivery to Works and unloading .	2	8	0	
TOTAL .	68	0	6	per ton.
Liverpool Salt	36	8	0	per ton without duty including bags delivered into Factory.

Particulars of Copper Sulphate price. (Question No. 20A.)

Copper Sulphate—Estimated cost of manufacture.

	Rs.	A.	P.
Raw Materials (5 cwts. Copper Scrap) at Rs. 52 per cwt. . .	260	0	0
7·5 cwts., Acid Sulphuric, at Rs. 65 per ton	24	6	0
Coal	5	0	0
Wages	10	0	0
Overhead	50	0	0
Packages	15	0	0
Transport to Calcutta	5	0	0
	369	6	0

Enclosure No. 8.

Costs of importation of machinery. (Question No. 55A.)

The undernoted particulars are taken from actual imports by the Company to serve as examples.

	L/Ch. £	s.	d.	L/Ch. £	s.	d.	C/Ch. Rs.	A.	P.
One Steam Jacketted Mix Measuring Tanks	229	10	0	20	9	0	85	11	0
Grid Coils	129	0	3	16	18	7	92	4	0
Steam Jacketted Pumps . . .	172	0	0	3	16	4	7	11	0
Cine. Kodak and Merco. Valves . .	109	13	3	2	1	0	235	0	0
Red Lead Plant	601	16	0	42	19	8	86	2	9
	1,241	19	6	86	4	7	506	12	9
							25	5	0
							40	0	0
	=Rs. 16,559-0-0			=Rs. 1,150-0-0			572	1	9
				572	1	9			
				1,722	1	9			
				=10 per cent.					

	£	s.	d.	£	s.	d.	Rs.	A.	P.
Spraying Machine	616	9	8	190	4	9	562	0	0
Motor	37	10	0						
	653	19	8	=Rs. 2,537	0	0			
	=Rs. 8,719	0	0	562	0	0			
				Rs. 3,099	0	0			
				=35 per cent.					

Enclosure No. 9.

Chamber Acid.

	Rs.	Rs.
1. Raw Materials	32,295	...
2. Works labour	1,308	...
3. Power and fuel	2,325	35,928
4. Ordinary current repairs and maintenance of buildings, plant and machinery		826
5. General services, supervision and local office charges .		6,108
6. Miscellaneous, *e.g.*, rent, Municipal taxes, insurance, etc.		790
7. Any other single item not enumerated above which amounts to 5 per cent. or more of the total expenditure		5,748
TOTAL .		49,400

Total production 1,040 tons. Plant closed down for repairs. Cost Rs. 47·5 a ton.

Sulphuric Acid, 1,740.

	Rs.	Rs.
1. Raw Materials	11,258	
2. Works labour	1,008	
3. Power and fuel	1,048	
		13,314
4. Ordinary current repairs and maintenance of buildings, plant and machinery		306
5. General services, supervision and local office charges .		2,268
6. Miscellaneous, *e.g.*, rent, Municipal taxes, insurance, etc.		293
7. Any other single item not enumerated above which amounts to 5 per cent. or more of the total expenditure		2,130
TOTAL .		18,306

Total production 289 tons. Cost Rs. 63·35 a ton.

Accumulator Acid.

	Rs.	Rs.
1. Raw Materials	4,197	
2. Works labour	1,008	
3. Power and fuel	1,666	
		6,871
4. Ordinary current repairs and maintenance of buildings, plant and machinery		158
5. General services, supervision and local office charges		1,168
6. Miscellaneous, *e.g.*, rent, Municipal taxes, insurance, etc.		151
7. Any other single item not enumerated above which amounts to 5 per cent. or more of the total expenditure		1,099
TOTAL		9,447

Total production 96 tons. Cost Rs. 98·4 a ton.

Hydrochloric Acid (Coml).

	Rs.	Rs.
1. Raw Materials	6,607	
2. Works labour	648	
3. Power and fuel	494	7,749
4. Ordinary current repairs and maintenance of buildings, plant and machinery		178
5. General services, supervision and local office charges		1,317
6. Miscellaneous, *e.g.*, rent, Municipal taxes, insurance, etc.		170
7. Any other single item not enumerated above which amounts to 5 per cent. or more of the total expenditure		1,240
TOTAL		10,654
Credit for materials recovered (if any)		742
NETT TOTAL		9,912

Total production 83½ tons. Cost Rs. 118·7 a ton.

Hydrochloric Acid (C. P.).

	Rs.	Rs.
1. Raw Materials	1,945	
2. Works labour	1,944	
3. Power and fuel	253	
3A. Packages	3,753	
		7,895
4. Ordinary current repairs and maintenance of buildings, plant and machinery		182
5. General services, supervision and local office charges		1,342
6. Miscellaneous, *e.g.*, rent, Municipal taxes, insurance, etc.		174
7. Any other single item not enumerated above which amounts to 5 per cent. or more of the total expenditure		1,263
TOTAL		10,856

Total production 11 tons 8 cwt. Cost Rs. 952·2 a ton.

Nitric Acid.

	Rs.	Rs.
1. Raw Materials	10,924	
2. Works labour	1,440	
3. Power and fuel	241	
		12,605
4. Ordinary current repairs and maintenance of buildings, plant and machinery		290
5. General services, supervision and local office charges		2,143
6. Miscellaneous, *e.g.*, rent, Municipal taxes, insurance, etc.		277
7. Any other single item not enumerated above which amounts to 5 per cent. or more of the total expenditure		2,007
TOTAL		17,322

Total production 37½ tons. Rs. 462·06 a ton.

Fer-Alumina.

	Rs.	Rs.
1. Raw Materials	11,909	
2. Works labour	3,240	
3. Power and fuel	2,025	
		17,174
4. Ordinary current repairs and maintenance of buildings, plant and machinery		395
5. General services, supervision and local office charges		2,920
6. Miscellaneous, *e.g.*, rent, Municipal taxes, insurance, etc.		378
7. Any other single item not enumerated above which amounts to 5 per cent. or more of the total expenditure		2,748
TOTAL		23,615

Total production 362 tons 11 cwt. Cost Rs. 65·13 a ton.

Alumina Sulphate (White).

	Rs.	Rs.
1. Raw Materials	14,004	
2. Works labour	1,296	
3. Power and fuel	138	
		15,438
4. Ordinary current repairs and maintenance of buildings, plant and machinery		355
5. General services, supervision and local office charges		2,624
6. Miscellaneous, *e.g.*, rent, Municipal taxes, insurance, etc.		340
7. Any other single item not enumerated above which amounts to 5 per cent. or more of the total expenditure		2,470
TOTAL		21,227

Total production 245 tons 8 cwt. Cost Rs. 86·5 a ton

Alum.

	Rs.	Rs.
1. Raw Materials	5,365	
2. Works labour	1,620	
3. Power and fuel	122	
3A. Packages	849	
		7,956
4. Ordinary current repairs and maintenance of buildings, plant and machinery		193
5. General services, supervision and local office charges		1,352
6. Miscellaneous, *e.g.*, rent, Municipal taxes, insurance, etc.		175
7. Any other single item not enumerated above which amounts to 5 per cent. or more of the total expenditure		1,273
TOTAL		10,949

Total production 61 tons 15 cwt. 84 lbs. Cost Rs. 177·3 a ton.

Mag. Sulph. (Estimated).

	Rs.	Rs.
1. Raw Materials	5,315	
2. Works labour	648	
3. Power and fuel	531	
3A. Packages	1,513	
		8,007
4. Ordinary current repairs and maintenance of buildings, plant and machinery		184
5. General services, supervision and local office charges		1,361
6. Miscellaneous, *e.g.*, rent, Municipal taxes, insurance, etc.		176
7. Any other single item not enumerated above which amounts to 5 per cent. or more of the total expenditure		1,281
TOTAL		11,009

Total production 110 tons. Rs. 100·08 a ton.

Red Lead.

	Rs.	Rs.
1. Raw Materials	1,57,380	
2. Works labour	16,885	
3. Power and fuel	21,088	
3A. Packages	20,312	
		2,15,665
4. Ordinary current repairs and maintenance of buildings, plant and machinery		4,960
5. General services, supervision and local office charges		36,663
6. Miscellaneous, *e.g.*, rent, Municipal taxes, insurance, etc.		4,745
7. Any other single item not enumerated above which amounts to 5 per cent. or more of the total expenditure		34,506
TOTAL		2,96,539

Total production 625 tons. Cost Rs. 474·46 a ton.

Soda Thiosulphate.

	Rs.	Rs.
1. Raw Materials	22,170	
2. Works labour	2,160	
3. Power and fuel	252	
		24,582
4. Ordinary current repairs and maintenance of buildings, plant and machinery		565
5. General services, supervision and local office charges		4,189
6. Miscellaneous, *e.g.*, rent, Municipal taxes, insurance, etc.		539
7. Any other single item not enumerated above which amounts to 5 per cent. or more of the total expenditure		3,933
TOTAL		33,808

Total production 230 tons. Estimated cost Rs. 146·99 a ton.

Soda Thiosulphate (Hypo.).

	Rs.	Rs.
1. Raw Materials	22,170	
2. Works labour	2,160	
3. Power and fuel	252	
3A. Packages	3,066	
		27,648
4. Ordinary current repairs and maintenance of buildings, plant and machinery		636
5. General services, supervision and local office charges		4,700
6. Miscellaneous, *e.g.*, rent, Municipal taxes, insurance, etc.		608
7. Any other single item not enumerated above which amounts to 5 per cent. or more of the total expenditure		4,424
TOTAL		37,916

Total production 230 tons. Estimated cost Rs. 164·8 a ton.

Enclosure No. 10.

FORM I.

Statement showing the aggregate expenditure incurred at the Works on the total output of your factory for each of the last three years. (See Question 76.)

	Years. 1926. Rs.	1927. Rs.	1928. Rs.
1. Raw Materials	6,36,863	4,72,126	2,52,670
Other purchases (packages, mill stores and merchandise)	6,69,256	5,19,589	4,03,913
2. Works labour	1,28,951	1,16,043	86,660
3. Power and fuel	58,767	43,306	43,025
4. Ordinary current repairs and maintenance of buildings, plant and machinery	14,235	16,155	17,701
5. General services, supervision and local office charges	1,32,754	1,19,447	1,31,564
6. Miscellaneous, *e.g.*, rent, Municipal taxes, insurance, etc.	19,648	15,631	16,691
7. Any other single item not enumerated above which amounts to 5 per cent. or more of the total expenditure	*85,876	*1,15,093	*1,18,714
	17,46,350	14,17,390	10,70,938
	Rs.	Rs.	Rs.
*Interest	47,846	73,646	77,378
Depreciation	34,684	37,040	37,378
Other items	3,346	4,407	3,958
TOTAL	55,876	1,15,093	1,18,714

(3) *Letter, dated 8th March, 1929.*

With reference to your letter No. 200 of the 5th instant, we beg to return herewith the estimate of acid sulphuric requirements of Bengal, as requested by the President of the Board.

Estimate of total Sulphuric Acid requirements of Bengal.

	Bengal requirements per annum.		Chamber acid required.
Alumina sulphate and Alumina ferric, imports	1,812		
D. W. Co., Ltd., product	607		
Calcutta Corporation	600		
Other producers (Say)	200		
	3,219	tons ·7 ton per ton	2,254 tons.
Alum, imports	286		
D. W. Co., Ltd., product	61		
Other producers	100		
	447	tons ·5 ton per ton	223 ,,
Copper sulphate, imports	200	tons ·4 ton per ton	80 ,,
Gas Company, acid sulphuric	500	,,	500 ,,
Hydrochloric acid	200	,,	270 ,,
Nitric acid	100	,,	176 ,,
Acid sulphuric 1,840	950	,,	595 ,,
Acid sulphuric 1,740	1,000	,,	1,350 ,,
	Total ton of Chamber acid		5,448 ,,

(4) *Estimated cost of Sulphuric Acid, handed to in by D. Waldie & Co., Ltd., on the 11th March, 1929.*

	Rs.
Sulphur 90 tons × Rs. 106-4 per ton	9,562·5
Soda Nitrate 1·8 tons × Rs. 188 per ton	338·4
Coal 28·8 tons × Rs. 7-12 per ton	223·2
Works Labour	318·0
European Establishment	600·0
	*11,042·1 (1)

	Rs.	
Capital Rs. 4,00,000.		
Interest at 6 per cent. per annum	24,000	
Depreciation at 7½ per cent.	30,000	
	54,000	
		Rs.
Rs. 4,500 per month		4,500·0
Repairs 3½ per cent. on (1)*		386·5
Office Charges 3½ per cent. on (1)*		386·5
Rates, rent, taxes, etc., 2·2 per cent. on (1)*		243·0
TOTAL		16,558·1

Calculation based on 400 tons Chamber Acid monthly (257·00 tons 100 per cent. Acid) and presuming towers are in use.

Yield 94 per cent. Cost per ton 100 per cent. Acid, Rs. 64·4.

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(5) *Letter No. 2421/S.-102, dated the 13th May, 1929, from D. Waldie and Company, Limited.*

Re ALUMINA SULPHATE.

We enclose herewith letter in original, dated the 3rd May, 1929, from the India Paper Pulp Co., Ltd., regarding further reduction of cost of imported Alumina Sulphate and should be obliged if the Board will kindly take this into consideration, when dealing with the question of this, our most important Sulphate.

We believe the figure given you was considerably higher, but would emphasise the necessity of differentiating between figures given for purposes of quotation only and those obtaining in actual business, to which latter category this belongs. You will observe that the imported pure white Sulphate of Alumina is costing Rs. 82 per ton and we are selling at Rs. 80 to the Titaghur Paper Mills, our works cost being Rs. 72·6. When Mr. Hayward gave his evidence you were under the impression that this commodity cost considerably more than this to import.

Enclosure.

Copy of the letter No. 3/213, dated the 3rd May, 1929, from the India Paper Pulp Company, Limited, to Messrs. D. Waldie & Co., Ltd., Calcutta.

SULPHATE OF ALUMINA.

We find that the agreement made between us a year ago regarding Sulphate of Alumina as set out in our letter No. 3/168 of 20th March, 1928,

and your letter No. 7531 of 29th March, 1928, expired on the 31st March, 1929.

While we were quite prepared to continue this arrangement in the absence of any fluctuations in the price of the imported chemical we have recently received very attractive samples and prices from England. Our Mill Manager advises us that the quality of the sample is practically identical with the quality you are now supplying, and the prices quoted would permit of its being landed and delivered at our Mill for approximately Rs. 82 per ton as against Rs. 88 per ton which we are at present paying you. We recollect, however, that when we interviewed your representative a year ago you informed us that you were extending your plant, and it occurs to us that you may possibly have been able to reduce your manufacturing costs and that you are now in a position to meet us to some extent in sympathy with the fall in the price of imported alum which from the evidence in front of us appears to be about 12*s.* 6*d.* per ton. We shall accordingly be obliged if you will consider the matter and let us know your views in due course.

The Bengal Chemical and Pharmaceutical Works, Limited.

(1) *Letter dated the 14th January, 1929.*

We beg to enclose herewith replies (six copies) to the questionnaire of the Board relating to chemical enquiry forwarded with your letter No. 795, dated 13th November 1928.

Replies by Bengal Chemical and Pharmaceutical Works, Limited, of 15, College Square, Calcutta, dated the 14th January, 1929, to questionnaire in enquiry by the Tariff Board into the question of grant of protection to the manufacturers of heavy chemicals.

INTRODUCTORY.

1. In 1901. It is a public joint-stock company.

2. Practically whole. All 7 directors are Indians. Superior management entirely by Indians since it was started.

3. Sulphuric, Nitric, and Hydrochloric Acids; Sulphates of Iron, Sodium, Potassium, Aluminium; Alum; Potash Nitrate, Liqr. Ammonia; Creosote and Disinfectants; Pharmaceutical preparations; Surgical Dressings; Vaccines; Toilet preparations and Scientific Instruments.

4. From 1901.

		Tons.
5.	Sulphuric and other Acids	6,000
	Sulphates and Alum	2,000
	Liqr. Ammonia	150
	Creosote and Distinfectants	900
6.	Average output per annum during last 5 years—	
		Tons.
	Sulphuric and other acids	2,500
	Sulphates and Alum	1,200
	Liqr. Ammonia	75
	Creosote and Disinfectants	600

7. At 90, Manicktola Main Road, Calcutta, and on Barrackpur Trunk Road, Panihati.

(*a*—*d*) Yes.

8. (*a*—*b*) Yes.

(*d*) No prejudice.

9. (*a*—*b*) Galvanizing metal working, dyeing, bleaching, tanning, manufacture of ærated waters, etc.

(*c*) Potash Nitrate and Nitric Acid occasionally used by Government Ammunition Factories.

10. No.

11. The Sulphuric Acid Plant at our Panihati Works is of the Carmichael system. The other plants are efficient considering their respective output.

RAW MATERIALS.

12.

For Sulphuric and other Acids	Sulphur, Potash Nitrate, Sodium Nitrate, and common salt.
For Sulphates . . .	Bauxite, Magnesite, Iron scraps.
For Ammonia . . .	Ammonium Sulphate, Lime.
Creosote and Disinfectants .	Coal Tar.

13.

	Tons.
Sulphur	1,400
Potash and Soda Nitrate	1,250
Common Salt	800
Bauxite	1,350
Magnesite	225
Ammonium Sulphate	100
Coal Tar	2,700

14. For 1 ton—

		Tons.
Sulphuric Acid, 100 per cent.	Sulphur . . .	0·38
	Potass or Soda Nitrate .	0·035
Nitric Acid, 70 per cent. .	Sod. Nitrate . . .	1·15
	Sulphuric Acid . . .	1·1
Hydrochloric Acid, 33 per cent.	Common Salt . . .	0·8
	Sulphuric Acid . . .	1
Aluminium Sulphate . .	Bauxite	0·35
	Sulphuric Acid . . .	0·48
Alum	Bauxite	0·3
	Potass Sulphate . . .	0·24
	Sulphuric Acid . . .	0·4
Magnesium Sulphate . .	Magnesite	0·5
	Sulphuric Acid . . .	0·55
Liq. Ammonia . . .	Ammonium Sulphate . .	1·5
	Lime	1

15.

Sulphur	Sicily.
Potash Nitrate . . .	Bihar.
Soda Nitrate	Chilli.
Bauxite	Central Provinces.
Magnesite	Salem (Madras Presidency).
Common Salt	Madras.
Ammonium Sulphate . .	The collieries in Raneegunge, etc., and Tata Iron & Steel Co.

16. Sulphur is imported from Italy and Sodium Nitrate from Chilli. No duty is payable on Sulphur. Duty on Sodium Nitrate is 15 per cent. *ad valorem*.

18. (*a*) A slight concession in railway freight on Bauxite and Magnesite.

(*b*) Yes. The freight rate of Bauxite from the Central Provinces and that of Magnesite from the Madras Presidency are very high; so long as the freight rates are not substantially reduced, products which require the above raw materials cannot hope to compete with corresponding foreign products.

(*c*) The freight rates should be lowered.

19. (*a*—*b*) Yes.

20. It may be possible in future to replace imported Sulphur by Indian Pyrites or even Gypsum.

21. Yes; *e.g.*, if Sulphur supplies are not available, practically the whole range of heavy chemical manufacture will automatically cease. But such a situation is not likely to happen in near future.

22. (*a*) Only Sodium Nitrate is the monopoly of Chile; but Potassium Nitrate which is available in India can be substituted for it.

(*b*) No.

Labour.

23. Requires much expert supervision but does not involve the employment of skilled labour imported from abroad.

24. None.

25. (*a*) All along Indian labour was employed.

27. (*a*) All workmen are Indian.

28. As all the labour is Indian labour, the question does not arise.

29. (*a*) Yes.

(*b*) All from vicinity of factory.

30. (*a*) Yes.

31. About one-fourth of the labourers are housed near the factory. There is a hospital with a whole-time medical officer.

Power (including Fuel).

32. (*a*) Steam and Oil Engines; Electricity generated by Oil Engine.

(*b*) Coal; available in sufficient quantities.

34. (*a*) Coal, Rs. 4-4 per ton.

(*b*) Coal, Rs. 10-8 per ton. Fuel Oil, Rs. 76-4 per ton.

35. Electricity is generated by ourselves. Cost about one anna per unit.

Market.

38. Yes. Because new industries are springing up.

39. Whole of India but mainly Bengal.

40. Our works being in Calcutta, the question cannot arise.

41. Yes. To Ceylon, Africa, Java and other places.

42. (*a*) Yes.

(*c*) At or below the current prices then prevailing in India.

Foreign Competition.

43. England and Germany.

44. The markets for Indian products being still small, smaller plants have to be used.

45. Yes, to some extent.

Foreign manufacturers are at an advantage.

		Per ton. £	s.	d.
46.	Aluminium Sulphate	7	0	0
	Alum	8	18	0
	Magnesium Sulphate	4	0	0

The above are average prices (c.i.f.) current in 1928.

47. (*a*) Quotations from foreign exporters.

(*b*) Yes.

48. (*a*) The Imperial Chemical Industries, Limited, in England, and the I. G. Farbenindustrie in Germany.

(*c*) We have been obliged to lower our prices (for sulphates) to such an extent that profit has practically disappeared. Production of certain items has also been curtailed.

50. (*a*) No.

51. In all places, particularly at the large ports.

52. (*a*) Yes.

(*b*) Mainly attempts on the part of foreign manufacturers to recapture lost markets by working at a nominal profit, and the utilization of war-time ammunition factories.

(*c*) These causes seem to be permanent.

55. (*a*) Our cost is more on account of greater transport charges.

(*d*) The inland freight on minerals like bauxite is very high.

(*g*) Yes, for parts of imported machinery.

56. (*a*) and (*g*) are permanent, at least until machineries are made locally. (*d*) We expect that the freights would be reduced.

INTERNAL COMPETITION.

57. (*a*) There is considerable competition.

(*b*) Messrs. D. Waldie & Co. and Bose's Laboratory, Ld.

58. An attempt is now being made.

EQUIPMENT.

59. (*a*) Yes.

60. Yes.

61. About 30 per cent.

63. Yes, considering the output. Gradually, larger and more modern plants are being installed.

64. Yes. A new and up-to-date Sulphuric Acid Plant (Carmichael system) is being installed in addition to our existing plant.

65. Castings, boiling pans, etc., are made locally.

CAPITAL ACCOUNT.

66. (*a*) *Nil.*

(*b*) Rs. 4,10,260.

(*c*) Rs. 8,39,830.

(*d*) Rs. 12,55,600.

(*e*) Rs. 21,17,203.

67. Actual cost without depreciation.

Depreciation hitherto allowed: Rs. 8,19,520.

68. The depreciation allowed is fairly correct.

69. About the same as in Answer 66. The operating cost would be the same as now.

70. (*a*—*c*) Rs. 19,00,000. Divided into 10,000 Ordinary Shares of Rs. 100 each and Rs. 90,000, 7½ per cent. cumulative preference shares of Rs. 10 each.

71. 7½ per cent. Yes. No dividends are in arrears.

73. Rs. 1,00,000. Issued in 1919. Rate of interest: 7½ per cent. per annum. Redeemable on 14th April 1929.

74. Rs. 8,22,183. Partly from surplus profits and partly from premium on shares.

76. COST OF PRODUCTION.

(a) *Works Costs.*

Form I.

	1925-26.	1926-27.	1927-28.
	Rs.	Rs.	Rs.
1. Raw Materials . . .	2,15,034	2,46,003	2,65,900
2. Works Labour	43,719	45,539	43,882
3. Power and Fuel	5,500	5,850	6,075
4. Ordinary current repairs and maintenance . . .	5,550	6,700	8,690
5. General services, supervision, local office charges . .	10,016	10,588	11,166
6. Miscellaneous, rent, etc. . .	7,000	7,200	7,500
7. Depreciation	22,100	28,300	29,250
	3,08,919	3,50,180	3,72,463

77. The plants never worked to full capacity. There has not been any considerable difference in cost owing to varying outputs.

78. No.

79. Yes.

80. No.

(b) *Overhead Charges.*

81. The overhead charges are reckoned proportionately to the works costs, the proportion varying for different products.

(*i*) Depreciation.

	Per cent.
82. (*a*) Buildings	5
General Machinery	5
Chemical Machinery	7½

(*b*) No.

(*c*) The wear and tear of certain chemical plants (such as furnaces, reaction pans, etc.) is very great. In our opinion the average depreciation should be 10 per cent.

(*ii*) Working Capital.

83. Rs. 5,00,000.

84. Some additional capital will have to be borrowed for working to full capacity.

	Rs.
86. Present working capital is about	2,50,000
Works cost for one month	27,670

87. Rs. 50,000.

88. No.

(*iii*) *Agents' Commission and Head Office Expenses.*

89. The Company has a head office. There are no managing agents.

90. (*i*) About Rs. 11,000.

(*ii*) *Nil.*

93. 12½ per cent.

CLAIM FOR PROTECTION.

94. (*a*) Yes.

(*b*) Without protection, the industry is not likely to develop rapidly.

(*c*) Yes.

95. (*a*—*b*) Yes.

96. Yes.

98. A protective import duty on such chemicals as are made in India and a similar export duty on corresponding raw materials sent out of India.

99. (*a*) Sulphur is imported duty-free.

100. A protective duty of 30 per cent. on imported mineral acids and sulphates.

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(2) *Letter dated the 7th March, 1929.*

As asked by the President of the Board, I have the pleasure to enclose herewith the following papers for further information of the Board :—

(1) Statement in Form II given in page 10 of the questionnaire regarding some important chemicals.

(2) Cost of superphosphates.

(3) Statement showing drop in prices of sulphates during last three years.

I was also asked by the President to furnish information regarding rock phosphates from Egypt. These Egyptian mineral phosphates are imported by some manure dealers here (*e.g.*, Messrs. Ewing & Co., Calcutta) at an approximate cost of Rs. 50 per ton for the powdered stuff containing 30—32 per cent. phosphoric acid. We had no opportunity to manufacture superphosphate out of this rock phosphate and hence cannot throw further light on the subject just at present.

N.B.—We regret that through oversight in answer to question 16 we mentioned that 15 per cent. *ad valorem* import duty is payable in respect of sodium nitrate. As a matter of fact no duty is payable on import of sodium nitrate.

Enclosure No. 1.

Cost of bone superphosphate (manufactured by us a year and a half ago).

For 1 ton product :

	Rs.	A.	P.
Raw materials	104	0	0
Other expenses	10	0	0
TOTAL .	114	0	0

Enclosure No. 2.

Statement showing drop in prices of imported sulphates (in casks) during last three years.

	1926.	1927.	1928.
	Rs.	Rs.	Rs.
Alum	150	140	135
Magnesium sulphate . .	110	80	80
Aluminium sulphate . .	100	95	85

Enclosure No. 3.

FORM II.

Works cost per ton of finished product (average of last three years).

	Products.						
	Sulphuric Acid (absolute).	Nitric Acid 70 per cent.	Hydrochloric Acid 33 per cent.	Liquor Ammonia 30 per cent.	Magnesium Sulphate (pure).	Alum commercial.	Aluminium Sulphate commercial.
1. Raw Materials	45·27	329·15	109·60	318·50	67·00	62·15	45·57
2. Works Labour	10·00	32·00	20·00	110·00	6·50	13·00	6·50
3. Power and Fuel	20·00	30·00	20·00	90·00	10·00	20·00	10·00
4. Ordinary current repairs and maintenance of Building, Plants, Machinery.	10·00	90·00	30·00	90·00	8·00	14·00	8·00
5. General services, Supervision, local office charge.	4·00	4·00	4·00	4·00	4·00	4·00	4·00
6. Miscellaneous, *e.g.*, Rent, Municipal taxes.	2·00	2·00	2·00	2·00	2·00	2·00	2·00
7. Cost of packing cases or casks.	...	...	...	...	10·00	10·00	...
TOTAL	91·27	487·30	185·60	514·50	109·50	125·15	76·07

Messrs. Parry and Company, Madras.

(1) *Letter dated the 7th December, 1928, from the Tariff Board.*

When the Board examined you in Ootacamund in October last you intimated that all your costs, etc., submitted by you should be treated as confidential on the ground that you did not require any protection. Since then a proposal has been made before the Board to the effect that if the Board recommends the grant of protection to the heavy chemical industry, it should take partly the form of a bounty on the production of Sulphuric Acid. As was explained to you at the time of your examination, it is the policy of the legislature to insist that no bounty should be granted to a company unless it complies with certain conditions laid down by the legislature, for example:—

(1) That the company should be formed on a rupee basis and registered in India.

(2) That its Board of Directors should consist of such number of Indians as the legislature may consider reasonable.

Unless these conditions and others of a similar nature prescribed by the legislature are fulfilled, no claim to a bounty can be established.

2. I am to add that as a rule the Board does not recommend any bounty if the party concerned does not submit itself to be examined in public and allow all the evidence including that relating to costs to be made public.

3. I am therefore to enquire whether you will be prepared to appear before the Board for a public examination and agree to the costs of production submitted by you to the Board being made public.

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(2) *Letter dated the 10th December, 1928.*

We are in receipt of your letter No. 890, dated 7th instant, the contents of which are noted.

We are examining the possibility of floating a small Rupee Company to take over the Chemical interests of the East India Distilleries and Sugar Factories Limited at Ranipet. It will however take some time to arrive at any decision which will be in the hands of the Board of Directors of the latter Company. Until such time as this Rupee Company is floated, if it ever is floated, there does not appear to be any object, in view of the contents of your letter, in submitting ourselves for a public examination before the Board. We will however take up the matter with you again immediately the future of the Chemical Industries in which we are interested has been decided.

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(3) *Letter No. 931, dated the 15th/17th December, 1928, from the Tariff Board, to Messrs. Parry and Company, Madras.*

With reference to your letter, dated 10th December, 1928, and in continuation of this office No. 890, dated 7th December, 1928, I am directed to state that it is entirely for you to consider whether you should comply with the Board's suggestion that you should appear for public examination and allow the proceedings to be published. The enquiry is now well advanced and you will agree that the proceedings of the Board cannot be delayed until the Rupee Company is floated. The Board, in writing to you, had in view the possibility of your firm being excluded, in the event of the proposal for the payment of a bounty now under consideration being accepted, for the reasons given in my letter No. 890, dated 7th December, 1928. The Board understands from your letter under reply that you are prepared to take any risk which may be involved in your inability to submit yourself for a further examination.

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(4) *Letter dated the 24th December, 1928, from Messrs. Parry and Company, Limited, Madras, to the Secretary, Tariff Board.*

We have to thank you for your No. 931, dated 15/17th instant. In your No. 890, dated 7th instant you laid down two conditions with which we should have to comply before we would be eligible for any bounty which the Tariff Board might recommend.

If and when we are in a position to fulfil those conditions we will apply for a bounty and be prepared to appear for public examination. In the meantime we think you will agree that it will be wasting your and our time if we offer to give evidence.

(5) *Letter dated the 19th March, 1929, from Messrs. Parry and Company, Madras.*

In reply to your Demi-official No. 227, dated the 13th instant, I enclose the following statements which we have had prepared in connection with suggested extensions at Ranipet and hope that they will be useful to the Board. We shall be obliged if they may be treated as *confidential.**

No. 1.—Estimated cost of Moroccan phosphate uncrushed delivered in godown Ranipet.

No. 2.—Estimated cost of crushing Moroccan phosphate.

No. 3.—Estimated cost of acid calculated on a production of 5,000 tons per annum.

No. 4.—Estimated cost of superphosphate from the above materials, 5,000 tons of acid would produce about 15,000 tons of superphosphate.

To produce 5,000 tons of superphosphate only the cost should be increased by Rs. 1-12 per ton.

No. 5.—Present cost of manufacturing superphosphate at Ranipet on a small scale.

No. 6.—Current cost of imported superphosphate.

No. 7.—Estimated cost of superphosphate plant.

You will note that none of the above figures include depreciation or interest.

Enclosure No. I.

	£	s.	d.
1. *Cost of Moroccan phosphate*—			
75/76 quality at 4½*d.* per unit, 76 units at 4½ =	1	8	6
Estimated freight . . . . . =	0	15	0
	2	3	6

	Rs.	A.	P
£2-8-6 at 1/5 7/8 . . . . . =	29	3	1
C.i.f. to Ranipet . . . . . =	7	12	0
	36	15	1
say .	37	0	0
Wastage at 2½ per cent.	1	0	0
Cart hire	0	8	0
Cost of raw phosphate in godown Ranipet . .	38	8	0

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* This stipulation was withdrawn subsequently during oral evidence.

Enclosure No. II.

2. *Estimated cost of crushed phosphate*—

	Rs.	A.	P.
Raw phosphate as per (1)	38	8	0
Crushing wastage	1	0	0
Machinery running	1	0	0
Machinery renewal	0	8	0
Building upkeep	0	2	0
Rent and insurance	0	4	0
Office establishment	0	8	0
Labour	1	12	0
Fuel (power)	0	8	0
Postage and sundries	0	4	0
Supervision	1	0	0
	45	6	0
Crushed phosphate per ton	45	8	0

Enclosure No. III.

3. *Cost of acid, 5,000 tons*—

	Rs.	A.	P.
Labour	0	12	0
Office establishment	1	12	0
Sulphur	39	4	10
Fuel	5	11	1
Nitric acid	7	12	4
Sundries	0	6	0
Insurance	0	4	3
B. and M. running	0	1	10
Upkeep and maintenance	1	0	0
Bonus	0	4	0
Supervision	2	8	0
	59	12	4

Say Rs. 60 per ton.

For 3,000 tons say Rs. 65 per ton.

Enclosure No. IV.

4. *Cost of superphosphate, 18 per cent.*—

	Rs.	A.	P.
12 cwts. phosphate at Rs. 38-8	23	4	0
7 cwts. acid at Rs. 60	21	0	0
Raw materials	44	4	0
Labour	1	0	0
Office	0	12	0
Rent and insurance	0	3	0
Sundries	0	5	0
Supervision	1	0	0
Renewals	1	0	0
Naked cost	48	8	0
Double gunnies	8	12	0
Cart hire	0	6	0
Cost at Ranipet	57	10	0
=Cost f.o.r. Madras	60	7	0

Enclosure No. V.

5. *Present cost of 14/15 per cent. superphosphate at Ranipet*—

	Rs.	A.	P.
Cost of phosphate	33	8	6
Cost of acid	28	5	9
Labour	1	3	3
Office	0	11	11
Rent and insurance	0	3	6
Postage and telegrams	0	1	0
Building U. and M.	0	0	3
Machinery running	0	0	2
Sundries	0	4	3
Supervision	1	2	7
	65	9	1
Packing and cart hire	8	7	2
Cost for Ranipet	74	0	3

Enclosure No. VI.

	£	s.	d.
6. *Cost of Home Super, 18 per cent.*—			
Cost c.i.f. Madras	4	0	0

	Rs.	A.	P.
At 1/5⅞	53	11	3
Landing charges	5	0	0
Wastage	1	4	9
Cost f.o.r. Madras	60	0	0

Enclosure No. VII.

7. *Estimated cost of super plant*—

10,000 ton plant complete is quoted at £6,250 f.o.b. London, exclusive of buildings.

We have the following estimate for a 4,000 ton plant with no mechanical refinements: —

	Rs.
Godowns (1)	20,000
Godowns (2)	6,500
Dens	8,500
Engine	7,000
Grinding plant	26,187
Contingencies	5,000
	73,187

This plant would not make a first quality super and it is essential that any plant should have mechanical dens.

(6) *Letter dated the 25th April, 1929, from Mr. D. O. Wright of Messrs. Parry and Company, Limited, Madras.*

I enclose a list of questions Nos. 1 to 11 put to me by the Board to which I promised replies and the reply is given under each question.

2. We have had to refer to Ranipet and the reply will follow.

Cost of Fuel for crushing Phosphate.

1. This is based on our cost of crushing bones—using oil fuel. Figure for 1928 was As. 8-9 per ton, which includes a certain amount of fuel—coal—for kibbling.

A large proportion of Moroccan phosphate will not require grinding, hence our figure of 8 annas.

Acid Costs.

3. (*a*) *Sulphur.*—Rs. 111 per ton
(*b*) *Nitrate of Soda.*—Rs. 153 per ton } (including wastage).

Yield of Acid and Consumption of Nitrate of Soda.

4. Statement showing the quantity of Acid produced for the last 5 years:—

Years.	Kind of Acid.	Quantity produced during each year.	Yield on 100 parts of Sulphur.	Percentage of Nitrate of Soda to Sulphur burnt.
		Tons.	Per cent.	Per cent.
1924 . . .	Chamber Acid	712,804	290	6·2
1925 . . .	Do. .	847,352	287·9	6·08
1926 . . .	Do. .	1,077,756	290·9	5·5
1927 . . .	Do. .	1,048,251	290	6·33
1928 . . .	Do. .	1,340,701	290	5·83

5. (*a*) At port of import.

We have no exact figures as we do not make sales *ex*-ship and are usually able to land the cargo in sufficiently good order to be carried to factory. 2½ per cent. would be an outside figure.

(*b*) At Works before despatch.

As we do not treat home super separate, we cannot give definite figures. It all depends on time the consignment is in stock. Within a couple of months we would need to rebag at least 50 per cent. and over three months at least 75 per cent. These figures are confirmed by Shaw Wallace & Co.

6. With an up-to-date modern plant, Superphosphate can be sent out within a few days of manufacture. There is no likely deterioration on storage, save in the mechanical condition of the super. Material at the bottom of a big pile would be consolidated, but we should anticipate no reversion—sieving might be necessary.

7. (*a*) and (*c*) May and June for districts where the N.-E. Monsoon is the cultivating season and November and December where the S.-W. Monsoon is the chief cultivating season.

(*b*) February, March, April, August, September, October.

8. We have never found any reversion.

9. 12 cwts. is taken as an average works cost from our own experience.

In 1928 we used 11·6 cwts. of Algerian phosphate per ton of Super and as we anticipate making a much drier Super, 12 cwts. will be an outside maximum figure.

We have also to take into account that we have had no experience of Moroccan phosphate on a large scale and hence we take a safe figure.

The following is the amended cost:—

	Rs.	A.	P.
12 cwts. Phosphate at Rs. 45-8-0	27	5	0
7 cwts. Acid at Rs. 60	21	0	0
Raw materials	48	5	0
Labour	1	0	0
Office	0	12	0
Rent and Insurance	0	3	0
Sundries	0	5	0
Supervision	1	0	0
Renewals	1	0	0
Naked cost	52	9	0
Double gunnies	8	12	0
Cart hire	0	6	0
	61	11	0
Cost f.o.r. Madras	64	8	0

10. *Detailed Cost of Super Plant.*

One Sturtevant complete Superphosphate plant comprising:—

One Steel enclosed Raw Phosphate Elevator, inclined, approximately 31 ft. c/cs.: all complete with feed hopper and delivery chute. Price £235 nett.

One No. 1 Sturtevant Patent Moto-Vibro Screen. Price £168 nett.

One Tailings Worm Conveyor from Moto-Vibro Screen, 17 ft. long. Price £38 nett.

One Fines Worm Conveyor from Moto-Vibro Screen, 22 ft. long. Price £47 rett.

One No. 1 Sturtevant "Open Door" Ring Roll Mill, as listed in Brochure No. 1562, page 11, under code word "Ringo". Price £735 nett.

One 10 ft. diameter Sturtevant Patent Air Separator. Price £485 nett.

One Steel Enclosed Circulating Elevator. Price £328 nett.

One Worm Conveyor from Circulating Elevator to Air Separator. Price £52 nett.

One Dust Collecting Plant comprising:—

One Sturtevant Patent Automatic Filter. Price £116 nett.

One Sturtevant Steel Plate Fan. Price £31 nett.

The necessary Dust Collecting Pipes. Price £49 nett.

One Fines Worm Conveyor, 8″ worm, 22 ft. long. Price £50 nett.

One Fines Worm Conveyor, 8″ worm, 14 ft. long. Price £32 nett.

One Fines Worm Conveyor, 10″ worm, 17 ft. long. Price £50 nett.

One Fines Elevator, 10″ Buckets, steel enclosed, 46 ft. c/cs. Price £286 nett.

One Pair of worm conveyors (Feed Return), 10″ forms, each 10 ft. long. Spur gear from one to the other. Price £65 nett.

One Sturtevant Semi-Automatic Phosphate Weigher. Price £138 nett.

One Sturtevant Semi-Automatic Acid Weigher. Price £192 nett.

One Sturtevant Superphosphate Mixer with inlet and outlet hoppers. Price £405 nett.

One 25-ton Sturtevant Patent Mechanical Den and Excavator, all complete with superstructure for carring the chasis which supports the side doors and cutter: all necessary driving. Price £1,560 nett.

One Tray Conveyor alongside the Den approximately 36 ft. c/cs. Price £188 nett.

One set of Fitting for Superphosphate Elevator including steel boot, top and bottom gearing, chain and buckets, but timber casing not included: centres of Elevator approximately 27 ft. Price £240 nett.

One Fume Exhauster. Price £80 nett.

With regard to motors for driving the plant we have much pleasure in quoting you for the following:—

Super Plant—

One 10-H.P. Motor for driving the three Worm Conveyors and Fines Elevator. Price £60 nett.

One 10-H. P. Motor for super Elevator and Conveyor. Price £60 nett.

One 15-H.P. Motor for driving Mixer Fume Fan and Traversing Gear of Den. Price £90 nett.

One 8-H.P. Motor for cutter of Den. Price £54-10 nett.

Grinding Plant—

One 60-H.P. Motor for Sturtevant Ring Roll Mill, Circulating Elevator, Air Separator, Filter and Fan, Moto-Vibro Screen Feed Elevator, five worm conveyors. Price £200 nett.

These motors would be supplied with rails and pulleys, with suitable starting panels, and the whole of the electrical equipment would be specially constructed and rated for use in India, the temperature rise on the motors would after six hour run not exceed 60° F. and they would be specially insulated and impregnated to withstand a hot and humid climate, and especially monsoon conditions.

In addition cost of prime-mover to be allowed for.

Cost of Nitric Acid in Acid Cost.

11. The cost of Nitric Acid Rs. 7-12-4 given in our cost is our actual figure for last year.

If it is compared with cost of Nitrate of Soda as in other manufacturers' costs, the additional cost of the Sulphuric Acid which must be used in conjunction with the Nitrate of Soda must be taken into account.

Our consumption of Nitrate of Soda is probably high, but our plant is now 10 years old and is requiring many renewals, especially burners, and extra tower space is also advisable.

Tata Iron and Steel Company, Limited.

(1) *Letter dated the 3rd December, 1928.*

As requested by the Tariff Board, we beg to send herewith the following statements:—

(1) Notes on enrichment of slag.

(2) Comparison of cost of Sulphate of Ammonia (Wilputte Ovens) for 1927-28 with that of 1925-26, giving reasons for increase.

(3) Comparison of Sulphuric Acid costs for 1927-28 with 1924-25 and 1925-26.

(4) Statement showing the quantity and price of Sulphur purchased and the cost charged in the cost sheets, including railway freight, etc.

Enclosure No. 1.

Notes on enrichment of basic slag.

Experiments were made under the supervision of Dr. McWilliam in 1917-18 on the addition of Indian Phosphate rock to our basic slags in order to increase the percentage of soluble phosphoric acid in the slag.

As a preliminary experiment finely ground phosphate rock (apatite) and lime were ignited at temperatures up to 1,000°C. No serious improvement in solubility resulted.

Later various mixtures of phosphate rock, basic slag, and Sylhet limestone were finely ground and fused. The amount of phosphoric acid was increased by this process but out of melts yielding 14 to 17 per cent. total P_2O_5, the the soluble P_2O_5 varied from 1·26 to 5·84 per cent. only. In these mixes the amount of phosphate rock was equal to or in excess of the slag.

Our present Duplex slags are richer in P_2O_5 than the slags used for these experiments, and contain about 8 per cent. P_2O_5. The best phosphate rock obtainable locally in bulk is about 25 per cent. P_2O_5 grade. To obtain an enriched slag of 16 per cent. P_2O_5 content we should have to add an amount of Phosphate Rock equal in weight to that of the slag itself and this could not be absorbed without reheating the mixture.

Fine grinding alone appears to make the phosphate rock a satisfactory fertiliser. The phosphate rock might perhaps be added cold to the finely ground slag, but the price realised for 2 tons of fertiliser of 16 per cent. grade would perhaps be no higher than that for 1 ton of 25 per cent. grade, so that the extra cost of grinding, etc., would not be covered.

The use of Fluorspar in the steel furnaces adversely affects the citric solubility of the slag phosphate but whether this practice at Jamshedpur renders the slag worthless, if very finely ground, is not proved.

Enclosure No. 2.

SULPHATE OF AMMONIA.

(Wilputte Ovens.)

Comparison of costs for 1927-28 with 1925-26.

	1927-28.	1925-26.	Remarks.
	Rupees per ton.		
Producing labour . . .	3·77	2·94	Increase due to readjustment of certain wages formerly charged to Coke Ovens coke but now correctly charged to bye-products.
Labour in Repairs and Maintenance.	1·28	1·20	Increase due to increased renewals, etc.
Materials for Repairs and Maintenance.	6·58	2·43	Increase due to renewals of copper pipes for Saturators, heat resisting coils, etc.
Tools, Lubricants, etc. . .	1·13	1·03	
Shipping supplies . . .	6·15	14·06	
Sulphuric acid	45·10	41·37	Increase due to higher cost of acid.
Lime	0·38	0·20	
Steam	5·00	4·91	
Water	1·02	1·30	
Electric Light and Power . .	0·22	0·23	
Yard Switching . . .	0·19	0·26	
General Works Expenses . .	1·57	1·31	
Shop Expenses . . .	0·33	0·34	
Contingent Fund . . .	1·34	1·14	
Total cost per ton . Rs.	74·06	72·72	
Total production .Tons.	7,365	6,758	
Consumption of acid . .	9,024	8,280	
Rate charged ter ton . Rs.	36 12 11	33 42 3	

Enclosure No. 3.

Sulphuric Acid.

Comparison of Costs for

—	1924-25.		1925-26.		1927-28.		Remarks.
Production	10,605 tons.		14,736 tons.		14,635 tons		
	Rs.	Rs.	Rs.	Rs.	Rs.	Rs.	
Sulphur cost per ton of Sul. Acid	24·61		23·47		24·42		
Nitrate of Soda	3·26		1·92		2·81		
Total materials per ton	...	27·87		25·39		27·23	
Producing Labour :—							
Superintendent, Foremen, etc.	·14		·67		·66		
Unloading	·27		·37		·21		
Burners, Chambers, etc.	1·93		1·19		1·02		
Other producing labour	·80		·85		·76		
Labour in Repairs and Maintenance	1·20		·98		1·17		
Total labour	...	4·34		4·06		3·82	
Materials in Repairs and Maintenance	1·54		1·40		2·52		Increase due to repairs to one of the Towers.
Tools, Lubricants and miscellaneous supplies	1·38		1·21		1·06		
Water	·23		·22		·19		
Electric Light and Power	·20		·27		·24		

—	1924-25.		1925-26.		1927-28.		Remarks.
	Rs.	Rs.	Rs.	Rs.	Rs.	Rs.	
Yard Switching	·08		·14		·21		
Laboratory	·25		·19		·21		
Shop Expense	·08		·10		·21		
General Works Expense	·47		·36		·61		
Contingent Fund for Employees	·43		·40		·37		
		4·66		4·29		5·62	
Total cost above materials		9·00		8·35		9·44	
Total Sulphuric Acid Cost per ton		36·87		33·74		36·67	
	Consumption.	Price per ton.	Consumption.	Price per ton.	Consumption.	Price per ton.	
	Tons.	Rs. A. P.	Tons.	Rs. A. P.	Tons.	Rs. A. P.	
Sulphur used for the acid produced	2,587 18	100 13 4	3,535 0	97 13 9	3,633	98 6 0	
Nitrate of Soda ,, ,,	147 4	255 6 4	138 3	204 1 1	205	200 8 2	
Sulphur used per ton of acid ,,	547 lbs.	...	537 lbs.	...	556 lbs.	...	
Nitrate ,, ,, ,,	·31 ,,	...	21 ,,	...	31 ,,	...	

Extensions :—
No. 1.—One chamber started operation on 14th February 1923.
Second chamber started on 15th June 1923.
No. 2.—Plant started operation on 19th September 1924.

Enclosure No. 4.

Statement showing Sicilian Sulphur purchased by the Tata Iron and Steel Company through Messrs. Henry Garner & Co., London.

Date of Order.	Quantity purchased. Tons.	Price. per ton c.i.f.
18th October 1926 . . .	2,000	29·00
23rd August 1927 . . .	1,800	32·70
25th October 1927 . . .	1,800	32·00

Sulphur is charged in our Cost Sheets at the rate of Rs. 104 per ton made up as under:—

	Per ton. Rs. A. P.
Cost of sulphur c.i.f. $32.00 or	88 0 0
C. S. Co.'s handling charges	3 5 10
Railway freight	10 13 9
Re-bagging charges at Calcutta	1 12 5
Total cost landed at Jamshedpur .	104 0 0

(2) *Letter dated the 4th January, 1929, from The Tata Iron and Steel Company, Limited.*

With reference to your letter No. 892, dated the 7th December 1928, we return the evidence given before the Board on Monday, the 26th November, duly corrected.

We attach a note regarding the cost of manufacturing sulphuric acid, for the information of the Board.

Enclosure.

Note re Heavy Chemicals.

The cost of operating a new sulphuric acid plant in Jamshedpur will not be materially less than the present plants. The capacity of the new plant required is approximately the same as of the existing plants combined and we estimate that the improvements in a new plant such as hopper, feed, etc., would reduce labour by about Re. 1 per ton and other charges by about Re. 1 per ton. The cost of raw materials used in the manufacture of sulphuric acid would not be less. The cost above material which averages about Rs. 9 per ton over the last 3 years would be reduced to about Rs. 7.

We have four cylindrical chambers in the original No. 1 Acid Plant and subsequently added 2 rectangular chambers. We have four rectangular chambers in No. 2 Plant making a total of 10 chambers altogether. These chambers are in 2 units and not 4 as stated to the Tariff Board. The acid we make is of 110°Tw. or 64 to 65 per cent. acid.

Regarding the renewals of the lead chambers, these have to be renewed constantly.

The period of service between renewals is fairly constant and the maintenance charges after the first 4 or 5 years of operation do rise owing to these renewals. Providing, however, the chambers and plant are kept in good condition as at Jamshedpur, the plant does not lose in efficiency of operation. Like all other plants, however, the older it is, the more obsolete it becomes.

On page 20 of the evidence given before the Tariff Board, Rs. 45-10 is the cost of sulphuric acid per ton of sulphate of ammonia and not the cost of sulphur.

The items charged to the cost sheet for repairs and maintenance are actual and are not allocation. In the bye-product plant also periodical replacements are necessary which have the effect of increasing the cost of producing sulphate of ammonia during the period when these replacements and renewals are made.

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(3) *Telegram No. M.-72, dated the 22nd April, 1929, from the Tata Iron and Steel Company, Limited, Jamshedpur.*

Your letter 264. We estimate on average between 500 and 600 tons zinc dross, 180 to 220 tons skimming and about 100 tons ash will be available annually for next five years. Following price delivered Bombay: Dross rupees 313; Skimmings Rs. 60. Ashes Rs. 110 will give us same return as we get from other areas. Approximate zinc contents dross 93, ash 65 and skimmings 50 per cent.

The Indian Iron and Steel Company, Limited.

(1) *Letter No. 598, dated the 18th March, 1929.*

As promised by Mr. Fairhurst when giving oral evidence before your Board on the 8th instant we now enclose herewith particulars of our costs of manufacture of sulphuric acid at Hirapur works from imported sulphur.

We have taken the month of January as the output is about normal at 460 tons and you will note the actual cost of manufacture is Rs. 50-8-9 per ton.

We trust this information will be of use to you.

Enclosure.

Sulphuric Acid Costs.

Month of January, 1929. **Production 460 tons. Previous month 450 tons.**

Raw materials	Yield of	Prop. acid.	Quantity.	Price per ton.	Amount.	Total cost per ton.
		Cwts.	T Cwts.	Rs. A. P.	Rs. A. P.	Rs. A. P.
Sulphur . .	303·03	6·60	151 16	100 12 3	15,295 3 7	33 4 0
Nitric acid .	...	...	....	...	...	...
Nitrate of soda	5,609·76	·36	8 4·1	174 9 9	1,433 15 8	3 1 11
TOTAL	...	...	...	...	16,729 3 3	36 5 11

Operating charges—

	Amount. Rs. A. P.	Rs. A. P.	Rs. A. P.
Contract labour . .	260 0 0		
Departmental salaries .	425 12 6		
Departmental labour .	153 15 0		
Consumable Stores (*see* over) . . .	19 4 9	859 0 3	1 13 1¹

	Rs. A. P.	Rs. A. P.	Rs. A. P.
Repairs and renewals—			
Labour	442 2 8		
Stores	402 15 6		
Jobs completed R. S. P. 6	24 6 9		
Jobs completed E. E. 7 .	107 3 6		
General charges . .	.....		
Lime used 14 . .	.....		
Mortar used 15 . .	.....		
		976 12 5	2 2 0
Works general charges—			
Power, P. 7 . . .	171 4 3		
Water supply 11 . .	166 8 5		
Town European 8 .	368 10 1		
Town Indian 8 . .	134 6 9		
Ice and soda plant 8 .	23 7 3		
Stores department 12 .	43 8 4		
Waste heat 3 .	1,000 0 0		
Laboratory 13 . .	123 7 1	2,231 4 2	4 13 7
Overrising expenditure F. 16 . .		614 0 3	1 5 4
Reserve Acid Plant Resheeting Fund at Rs. 4 per ton . . .		1,840 0 0	4 0 0
Total cost .		23,250 4 9	50 8 9
Less sulphuric acid sales . .		1,256 2 4	2 11 9
		21,994 2 5	47 13 0

(2) *Letter No. 598-1327, dated the 23rd March, 1929.*

Further to our letter No. 1/598 of 18th March, 1929, we have to advise you that the strength of the sulphuric acid manufactured by this Company is 1·70 S. G. Acid contains 63·0 per cent. SO_3 and 77·17 per cent. H_2SO_4.

Tinplate Company of India, Limited.

Letter dated the 7th March, 1929, to Sir P. P. Ginwala, Kt., Jamshedpur.

Here is the information about sulphuric acid I promised to you and Dr. Matthai yesterday.

We have a contract with the Jheria Sulphuric Acid Company for 250 tons of acid per month at a price of Rs. 82-0-0 f.o.r. Tatanagar. There is a siding charge of Rs. 10 a wagon which brings the cost to us up to Rs. 83 per ton. The acid is nominally of 142° Tw., but by the time it reaches us it is down to about 134° Tw. at 28° C. equivalent to 1·67 sp. g. and about 76 per cent. acid.

We used to buy acid from The Tata Iron and Steel Company at a cost of Rs. 65 per ton f.o.r. Tatanagar, but our last purchase from them was made in April, 1928.

Copy of Circular letter No. 189-T., dated the 14th October, 1928, from the Secretary, Tariff Board, to all the Local Governments and Administrations.

I am directed to refer you to Commerce Department Resolution No. 199-T. (8) of 16th July, 1928, and to say that the Board is now engaged in enquiring into the application of certain manufacturers of heavy chemicals for protection.

2 The Board has been advised that the following are the principal raw materials required for the manufacture of those chemicals specifically mentioned in paragraph 1 of the above quoted resolution and of other allied products such as superphosphates, magnesium chloride, sodium carbonate, etc., into which also it may be necessary for the Board to enquire:—

Sulphur.	Bauxite.
Iron pyrites or other metallic sulphides.	Chromite.
	Manganese.
Magnesite.	Potassium chloride.*
Common salt.	Gypsum.
Potassium nitrate.	Limestone.
Sodium nitrate.	Phosphates.

* *N.B.*—In one of the representations received by the Board "potash sulphate" is included amongst the necessary raw materials. It is understood, however, that potassium chloride is the original raw material for potassium compounds.

3. I am directed to enquire—

(*a*) whether any of these raw materials are found in your Province/Administration, and if so, to request that a note may be prepared for the use of the production or removal of these materials, and in which they occur,

(*b*) whether there are any local regulations or concessions in respect of the production or removal of these materials, and

(*c*) whether any works for the manufacture of acids and heavy chemicals have been established in your province.

4. I am to add that the Board will be glad to receive any other information in this connection which the Government of/Administration considers might be of assistance to the Board in its present enquiry, and will welcome any expression of opinion which the Government of/Administration desires to make upon the subject matter of the present reference.

The Government of Central Provinces, Nagpur.

Letter dated the 29th November, 1928.

Subject:—RAW MATERIALS REQUIRED FOR THE MANUFACTURE OF CHEMICALS.

With reference to your Circular letter No. 189-T., dated the 14th October, 1928, on the above subject, I am directed by the Governor in Council to reply as follows to the three points raised in paragraph 3 thereof:—

(*a*) The only raw materials found in this province are manganese, limestone, bauxite and salt. All available information regarding these materials is contained in Dr. Fermor's article on mineral resources of the Central Provinces printed at the beginning of the Mining Manual of the Central Provinces and Berar (Fourth Edition), 1928, a copy of which is being forwarded

to you separately by book post. The output of manganese, bauxite and limestone during 1927 was 743,233 tons, 407,144 tons and 915 tons respectively. The figures for the previous years are given on page (IV) of the article referred to above. No information is available showing the estimated quantities in which these minerals occur.

As regards salt, I am to say that the only place in this province where salt deposits are known to exist is the Lonar Lake in the Buldana District of Berar. The output during 1925 and 1926 was:—

	1925.	1926.
	Tons.	Tons.
Papdi (impure carbonate of soda) . .	20	75
Khappal or Dalla (dry deposit of carbonate of soda)	15	25

The figures for 1927 are not available as the lease held by the Pioneer Alkali Works, Limited, Bombay, for the working of salt deposits of the Lonar Lake was cancelled by this Government in that year and the right to work the deposits is now auctioned annually for a lump sum royalty irrespective of the quantity raised.

(*b*) The extraction and removal of the minerals in question are regulated by the Government of India's mining rules, the supplementary instructions framed by the local Government, and the terms and conditions included in the standard forms of mining lease and prospecting license. The rules, the regulations and the forms in question are all contained in the Mining Manual referred to above.

(*c*) No works for the manufacture of acids and heavy chemicals have been established in this province.

The Chief Commissioner, N.-W. F. Province, Peshawar.

Letter dated the 8th December, 1928.

Subject:—Manufacture of Heavy Chemicals.

With reference to your letter No. Cir. 189-T., dated the 14th October, 1928, I have the honour to attach herewith a memorandum giving answers to the various questions asked by you.

Memorandum.

(*a*) *Whether any of the raw materials mentioned in the letter are found in the North-West Frontier Province.*

The following raw materials are found in the North-West Frontier Province:—

(*a*) (1) *Common Salt.*—Extensive salt deposits are found in the mountainous range of the Kohat District, extending from Bahadurkhel to Dupar hills (below Khushalgarh). Salt is now worked out from this range in open quarries at three places, *i.e.*, at Jatta, Bahadurkhel and Kharak, under the supervision of the Government of India, Salt Department. At the present rate of output these deposits are practically inexhaustible. At Bahadurkhel only the salt beds can be traced for a distance of about 8 miles with an exposed thickness of 1,000 feet. Approximate quantities of salt obtained from these quarries per year are shown as follows:—

(*i*) *Jatta.*—450,000 maunds, this is the biggest depôt for salt in the Province.

(*ii*) *Bahadurkhel.*—100,000 maunds.

(*iii*) *Kharak.*—30,000 to 50,000 maunds.

At all these places the contractors and traders dig out the salt from open quarries with their own arrangements for labour, carriage, etc., and pay to the Government a tax of Re. 1-4 per maund of salt taken out. This salt is grey in colour with transparent patches and is inferior in quality to that obtained from the Mayo Mines at Khewra and the salt quarries at Kalabagh in the Punjab.

(2) *Limestone.*—There is hardly any geological formation without limestone in one form or the other, although most of these deposits are too impure to be of any use. Limestone is obtained all over the Province from the various adjoining hills and is only of local importance. Such localities are very numerous, and as the limestone is burnt to quicklime for local use only, it is unnecessary to mention their names here. It may, however, be mentioned that large deposits of pure limestone are present at the following places in this Province:—

Pezu, Janikhel, Hem Domel and Khajuri (Bannu District), Chirat hills, Nowshera Tahsil (Peshawar District), Bahadurkhel (Kohat District), etc.

(3) *Sulphur.*—It exists at Serai Mullah, Panoba, Aspina and Gumbat in the Kohat District, but it has never been worked for any commercial use or export.

(4) *Potassium Chloride.*—Beside the salt deposits near Bahadurkhel (Kohat District) potassium chloride is also present in large quantities, more or less in a pure state or mixed with salt. It has never been obtained commercially from this source.

(5) *Potassium Nitrate.*—Although potassium nitrate is present in many localities in this Province in the form of nitre or saltpetre mixed with earth it is nowhere refined into potassium nitrate on an industrial scale. Small crude refineries are, however, working at some places in the Province but the production is too small to be of any commercial interest. Whatever little nitre is refined it is consumed locally for power making, fire works.

(6) *Gypsum.*—The mountainous range of the Kohat District contains gypsum in great abundance. There it can be obtained by open quarrying in any quantity, but so far it has not been worked. Even the salt range possesses gypsum in large amount associated with rock salt, but in this form it is not of good quality being of grey brown colour on account of the impurities mixed with it.

(7) Other substances mentioned in the letter of the Tariff Board under reference are not known to exist in this Province.

(*b*) *Whether there are any local regulation or concessions in respect of the production or removal of these materials.*

(*b*) A copy of the North-West Frontier Province mining manual and this Administration Notification No. 1187-C.-I., dated 23rd November 1926, containing regulations and concessions in respect of the production or removal of these materials is enclosed herewith.

(*c*) *Whether any works for the manufacture of acids and heavy chemicals have been established in North-West Frontier Province.*

(*c*) There are no works for the manufacture of acids and heavy chemicals in the North-West Frontier Province.

The Government of Madras.

(1) *Letter dated the 15th December 1928.*

Reference: Your letter No. Circular 189-T., dated 14th October 1928, enquiry-protection-heavy chemicals.

With reference to your letter read above, I am to forward copy of a report received from the Director of Industries, Madras, answering the various points raised in your letter and to state that the Board of Revenue has been consulted and that, on receipt of its reply, a further communication will be sent, if any material additions to the information now submitted by the Director of Industries are found necessary.

With reference to paragraph 4 of your letter, I am to state that the Government of Madras strongly deprecate measures which will increase the cost of any industrial process in India and still more measures which will increase the cost of chemical manures to the ryot or impede their manufacture in India.

NOTE.

(*a*) *Sulphur and Pyrites.*—This is stated to occur near Wolundurpet (Kiranur 11° 41′ 30″ : 79° 21′) in South Arcot District and the tract is said to extend for half a mile. The occurrence of a deposit on the bed of a tidal swamp near Suri Sanyaram in Godavari District has also been recorded. A sample which perhaps came from this locality analysed contained 28·32 per cent. of free sulphur and 0·28 per cent. of combined sulphur. Recently a deposit of decomposed iron sulphide was located on the western flank of the Periamalai in the Tenniar forest reserve of the Polur taluq in North Arcot District. It has an average thickness of 3½ ft. and an Assistant Superintendent of the Geological Survey Department estimated that it would be possible to get in a pit 20′ × 3·25′ × 50′ about 300 tons of ore with 76 tons of sulphur, assuming it was only 20 per cent. of the total weight. When analysed, the sulphur content was found to be low, *i.e.*, from 17·28 to 19·35, and much of the sulphur appeared to have been carried away owing to decomposition at the surface. Below a certain depth, say 50 ft. the unaltered ore-body could perhaps be found which would probably yield double the amount of this sulphur. Traces of sulphur were also noticed on the flanks of Karnatigarh north of Peryamalai and a careful search might, it has been suggested, bring to light other deposits. A party has shown interest in prospecting the area and borings are now being put down with a view to determining the value and extent of the deposits.

Magnesite.—The most noteworthy deposits are those of the chalk hills situated between the town of Salem and the foot of the Shevaroy hills. The magnesite occurs over an area of about 4½ square miles, and the reserves of magnesite in these deposits are reported to be practically unlimited. A deposit of magnesite was also found to occur on the Kenjamalai iron area and in 1926-27, 729 tons were mined from the area. The total output in the Salem District during each of the last 5 years is given below:

	Tons.
1923	19,336
1924	24,427
1925	29,620
1926	28,676
1927	16,966

As about 75 per cent. of the exports of Salem calcined magnesite went to America, the increase in the United States of America import duty on calcined magnesite in December last from 14 to 21 dollars per ton is adversely affecting the magnesite industry of Salem District. Other occurrences in the Presidency are near Daroji in Bellary district, near Seringala and Fraserpet in Coorg, near Maddavaram and Betamcherla in Kurnool district and in a few places in Trichinopoly district.

Common Salt.—There are a number of factories scattered along the coast. The average production during the years 1919-23 was 480,693 statute tons.

Bauxite.—This occurs in the laterite which caps the northern hills in Vizagapatam district. A somewhat siliceous laterite bauxite was, it is

reported, found on Girliguma hill in the district. Laterite occurs in various other localities in the Presidency and it is probable that bauxite also may in some cases be found in association with it. No attempts appear to have been made to mine bauxite in the Presidency.

Chromite.—This appears to exist in association with the magnesite of the chalk hills near Salem and an attempt was even made in the last century to prepare bichromate of potash but was abandoned subsequently. The irregular manner in which the chromite occurs in the area is stated to render it impossible to form an estimate of the quantity available. A small outcrop of chromite, forming a vein 4 inches thick in magnesite was also found at the north-west base of Kanjemalai Hill in the Salem district.

Manganese.—Though Manganese occurs in several districts in the Presidency, *e.g.*, Bellary, Chingleput, Coimbatore, Ganjam, Kurnool, Madura, Nellore, Nilgiris and Vizagapatam, the deposits in Bellary, including those of the Sandur State, and Vizagapatam districts are alone important. The total quantity of ore available in the Sandur Hills was roughly estimated at about 10 million tons of which the quantity contained in thirteen deposits on the Kanmat, Haruvu Plateau, was estimated at a little over 1,300,000 tons. The output of the ore in the Vizagapatam district reached a maximum in 1907, when it amounted to 136,169 tons, but it declined subsequently and during the last few years, it has never gone up above 32,000 tons in a year. It may also be pointed out that though the production in 1919 was only 2,778 tons, it has not decreased below 21,000 tons from 1923 onwards. The output in the Bellary district during the last five years has ranged from 2,588 tons to 9,459 tons. The latest year for which figures of production are available in respect of the Sandur deposits in 1925 in which year 52,596 tons were produced but in previous years, the production was considerably smaller.

Gypsum.—This is stated to occur in the neighbourhood of Madras in the Chingleput district, near Santaravur in Nellore district and in Trichinopoly district in the form of fibrous plates and concretions in association with Phosphatic nodules.

Limestone.—Although limestone appears to occur in several districts of the Presidency, a large proportion of the output is derived from the Cuddapah district. The production of limestone and Kankar in the Presidency during the years 1919-23 averaged 17,701 tons while in 1925, it amounted to 13,996 tons.

Phosphates.—The only deposits of phosphates are in the Trichinopoly district and the phosphates are in the shape of nodules. Although Dr. Warth estimated that the deposits contained about 8 million tons of nodules, this seems to be an over-estimate. Analysis of the nodules showed them to contain from 56 to 59 per cent. of phosphate of lime with about 16 per cent. of carbonate. The spare distribution of the nodules and their high calcium carbonate content are unfavourable to the commercial success of any attempt to manufacture superphosphate and further it is reported that the Trichinopoly phosphates compare unfavourably with imported ones in the matter of phosphoric acid content. The attempts to use the phosphates in the form of flour have yielded so far only indifferent results.

(*b*) The grant of concessions for working these minerals is governed by the Mining Rules. Information as far as available as to the concessions granted is given below.

Sulphur and Pyrites.—The only application that has been received is that from one Mr. H. A. Colwynne. He was recently granted a prospecting license in respect of a plot of 2 square miles in North Arcot district and a further application for another two square miles is under consideration.

Magnesite.—The only concession granted is that to the Magnesite Syndicate, Suramangalam, Salem district, although certain portions of the area appear to be owned under a Jaghir tenure. One Mon. Gaudart who was granted a mining lease for iron ore has been working magnesite also. The grant of a special lease is stated to be under consideration.

Cromite.—One prospecting license and two mining leases were granted recently for, among other minerals, chromite.

Manganese.—As several concessions appear to have been granted, some of which a decade or two ago, the Board of Revenue may be consulted for details.

Gypsum.—The only application the department is aware of is the one received from Mr. Charles Middleton.

Limestone.—The department has no information.

Phosphates.—Messrs. Staines and Co., who had a lease do not appear to have renewed it. Messrs. Parry and Company and C. Middleton have applied for leases over the Trichinopoly deposits.

(*c*) The East India Distilleries and Sugar Factories Ltd., Managing Agents, Messrs. Parry & Co., manufacture at their Ranipet factory, hydrochloric acid, nitric acid, sulphuric acid, sodium sulphate and certain other chemicals. Sulphuric acid is also manufactured by the Indian Ordnance Cordite Factory at Aruvankadu. I consider that on principle the imposition of import duties on materials of industry is open to objection and that, wherever possible, they should be removed.

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(2) *Letter No. 3607—II/28—4, dated the 7th February, 1929.*

In continuation of this Department letter No. 3607—II/28, dated 15th December, 1928, I am directed to forward copy of a report received from the Board of Revenue on the subject together with the papers mentioned therein.

Letter from the Secretary, Board of Revenue, Land Revenue and Settlement, Mis. No. 355, dated 1st February, 1929.

Read the following:—

I.

Memorandum from Government, Development Department, No. 3607—II/28-2, dated the 6th December, 1928.

II.

Replies from the Collectors and the Collector of Salt Revenue.

RESOLUTION:—

The Director of Industries has in reply to question (*a*) noted on the productive capacity of the Presidency or the estimated quantity of the various minerals that may be available and in reply to question (*b*) he has furnished information on the number of leases and licenses issued. The Board considers that in question (*b*) the Tariff Board calls for information on the special rules, regulations or concessions in respect of the production or removal of the minerals in question and would therefore bring the replies furnished by the Director of Industries to question (*b*) under question (*a*) so that they may serve the purpose of explaining or corroborating the general notes prepared by the Geological Department and adapted by the Director of Industries.

Question (*a*).—The Board agrees with the Director of Industries in considering that full and up-to-date information on this point can be had only from the Geological Department.

As regards the details about the number of licences and leases issued, etc., the Board has consulted the Collectors of all districts and the Collector

of Salt Revenue in the matter and would add the following to the notes furnished by the Director of Industries:—

Common Salt.—It is manufactured for human consumption in 59 salt factories situated along the east coast in the Madras Presidency. The average total production of these factories based on the figures for the last three years is 12,429,000 maunds or 456,948 tons of salt per annum. Under section 7 (*b*) of the Indian Salt Act, 1882 (XII of 1882), the Governor-General in Council has remitted the duty leviable on salt manufactured in the Presidency when such salt is used within the Presidency for any industrial purpose other than the preparation of refined salt or as an ingredient or preservative in any article of food or drink subject to certain rules (copy enclosed*). The Collector of Salt Revenue is of the opinion that the use of salt in the preparation of chemicals would constitute "use in an industrial process" and that salt could be issued duty-free to the manufacturers of chemicals under these rules so long as the manufacture was done in the Madras Presidency. The Board agrees with him.

Iron Pyrites.—It is reported to be available in Kaniyambadi reserved forest in Vellore taluk besides Periamalai reserved forest in Polur taluk of North Arcot District. Details of the area, the depth of the deposit and quality and quantity of the chemical are not available.

Mr. H. A. Colwynne has been granted a prospecting licence over an area of 424 acres in Kaniyambadi reserve.

Magnesite.—The special lease for the mineral in favour of Mon. Gaudart referred to by the Director of Industries was granted in Board's Proceedings No. 2424 Mis., dated 30th August 1927.

Chromite.—Is not known to occur in commercial quantities in the Presidency. The Collector of Anantapur has reported that in 1924 to 1926, Messrs. Abdul Hye of Bellary and Rao Bahadur Lakshmi-Narayana of the Central Provinces applied for licences to prospect for chrome-ore and chromite respectively but subsequently withdrew their applications as the preliminary investigation showed that the enterprise would not be successful.

Manganese.—The note prepared by the Director of Industries varies slightly in details from the report of the Geological Department. The note need not however be altered. The following details may be added:—

The only application in Anantapur for a prospecting licence for manganese was withdrawn as the stuff available was found to be of poor quality. The Collectors of Ganjam and the Nilgiris report that the mineral has not been prospected for in those districts. The Collector of Bellary reports that there are 11 mines in the district of which only 3 worked during 1927. The total quantity produced during 1926—28 is given below together with its value:—

Year.	Quantity produced.	Value.		
	Tons.	Rs.	A.	P.
1926	8,853	37,241	8	0
1927	5,991	39,171	0	0
1928	3,438½	15,520	0	0

Gypsum.—The quantity of gypsum mined in Trichinopoly during the past 10 years is reported to be about 123 tons. This occurs in the Perambalur and Lalgudi taluks of the district.

Phosphates.—According to the Director of Geological Survey Phosphatic nodules are to be found in considerable quantities in bed of shale in the cretaceous rocks near Valudayur in Pondicherry and the quantity available there was estimated to be 8 million tons. The other details furnished by the Director of Industries relate to the mineral available in Pondicherry.

* Not printed.

The lease granted to Messrs. Staines and Company in 1919, was not registered by the lessee who also failed to fulfil the conditions of the lease. A suit was instituted and a sum of Rs. 1,250 realised in satisfaction of the dues to Government by virtue of a compromise ordered by Government. Messrs. Parry and Company, applied for a lease on 5th May, 1928. They were asked to submit the application in proper form duly stamped. They have not done so. The application of Mr. Middleton is under the consideration of the Board. Only 2,082 tons of nodules were removed during the last 10 years.

No further information is available regarding the other minerals referred to by the Tariff Board.

Question (*b*).—All the minerals referred to by the Tariff Board except common salt and limestone fall under the category of minerals which have a high commercial value and are governed by the Government of India Rules. Removal of limestone is governed by the rules issued by the Local Government. Both the rules have been printed side by side in the Mining Manual. A printed copy of the required portion is enclosed for being forwarded to the Tariff Board.

Question (*c*).—The Board has no further remarks to add.

Paragraph 4 of the Tariff Board's letter.—The Collector of Madras reports that so far as the city is concerned the only regulations that appear to affect the minerals in question are those relating to export and import by land and sea. He adds that the freight charges on the transport of acids are rather heavy and it does not pay to manufacture except in centres where there is a large demand and that it will probably be desirable to give concessions in this respect to *bonâ fide* firms undertaking to manufacture chemicals with a view to stimulate demand but that the manufacture of the chemicals enumerated is so restricted and limited that any protection to them may not have an appreciable effect.

The Government of Bombay.

Letter dated the 8th January, 1929.

Subject:—INDUSTRIES.—TARIFF BOARD, INQUIRY BY, ABOUT THE SOURCES OF CERTAIN MINERALS FOR MANUFACTURE OF CHEMICALS IN BOMBAY PRESIDENCY.

In reply to your letter No. Cir. 189-T., dated the 14th October 1928, on the subject of the enquiry by the Tariff Board into the applications of certain manufacturers of heavy chemicals in India for protection, I am directed by the Government of Bombay (Transferred Departments) to observe as follows with reference to the points raised in paragraph 3 of your letter.

2. *Paragraph 3* (a).—A note on the raw materials, required in the manufacture of heavy chemicals, found in the Bombay Presidency is appended and gives the required information as far as available. It will be noted that there are only 2 minerals found in sufficient quantities to make them workable on a commercial scale.

Paragraph 3 (b).—The Government of Bombay have framed, under the Mines Act, rules and regulations for the working of minerals in this Presidency. These rules are contained in the Bombay Mines Manual to which a reference is invited.

Paragraph 3 (c).—The Dharamsi Morarji Chemical Company, Limited, and the Eastern Chemical Company, Limited, both of Bombay, manufacture acids and heavy chemicals; the Pioneer Magnesia Company, Bombay (works at Kharaghoda), manufacture magnesium chloride and the Shri Shakti Alkali Works in Dhrangadhra State manufacture alkalies.

3. With regard to the question of the desirability of affording protection to local chemical companies, I am to invite attention to the letter to the

Government of India from the Government of Bombay, No. 6407-II-B., dated the 23rd November 1927 (a copy of which it is understood, has already been forwarded to the Tariff Board by the Government of India), in which the views of the Bombay Government on the subject have been stated in full. It seems desirable to grant protection to the local chemical companies in order to reduce, by encouraging local manufacture, the present heavy imports of chemicals. In 1927-28, the total value of the imports from abroad of the undermentioned chemicals among others was Rs. 22,94,496 :—

Nitric Acid.	Copper Sulphate.
Sulphuric Acid.	Magnesium Chloride.
Other Acids.	Magnesium Sulphate.
Alum.	Sodium Sulphide.
Aluminous Sulphates.	Zinc Chloride.
Ferrous Sulphate.	

The Dharamsi Morarji Chemical Company, Limited, however, have the plant and equipment to manufacture *all* the above chemicals and the Pioneer Magnesia Company are in a position to supply the *total* requirements of *India* in magnesium chloride, if only these two companies are given adequate protection, financial support and transport facilities. It is probable that for a time the consumer will have to pay more for the chemicals than he would have to pay if no protection were granted, but on the other hand, if the local companies are compelled to close down on account of competition from the large foreign combines, the prices of imported chemicals are likely to be even higher than under protection. Furthermore, the importance of the chemical industry to the country, especially in time of war, is obvious.

Note on the Raw Materials found in the Bombay Presidency required in the manufacture of Heavy Chemicals.

Bombay Presidency is not rich in deposits of minerals. This can be seen from the fact that out of the nine minerals that are required in the manufacture of heavy chemicals only 2, *viz.*, Bauxite and Manganese are worked on a commercial basis.

Sulphur is found in Sind, Gazri Bunder. This was discovered in 1843, and it is stated that the deposits are extensive. The crude material is stated to contain 30 per cent. to 40 per cent. sulphur, but this source has never been developed or organized on a commercial scale. At Lakhi sulphur by crude method was manufactured from the scumps formed on the water of the hot springs, but it was found that it could not be manufactured on a commercial scale.

The figures as regards the estimated quantities, etc., are not available. See page 472/A Bibliography of Indian Geology and Physical Geography, Part II, and Indian Industries and Labour, Bulletin No. 28 (1922), by Mr. C. S. Fox.

Iron Pyrites.—There are no deposits of iron pyrites in the Bombay Presidency. See Indian Industries and Labour, Bulletin No. 28 (1922), by Mr. C. S. Fox.

Magnesite.—Considerable quantities of magnesite were observed in connection with the steatite deposits occurring near Devi Mori and Kokapur in the Idar State. It is not known whether these deposits have been worked by that State. See Indian Industries and Labour, Bulletin No. 3 (1921), by Mr. J. C. Brown.

Potassium Nitrate (Saltpetre).—No deposits of this mineral are available in this Presidency. See page 449 of a Bibliography of Indian Geology and Physical Geography.

Bauxite.—Deposits of Bauxite occur at Belgaum, Kolhapur, Satara, Poona, Bhor State, Ahmednagar, Kolaba, Thana, Ratnagiri, Surat, Baroda, Rajpipla, Kathiawar and Cutch.

The deposits in the Belgaum and Kaira Districts are worked by Mr. A. N. Peston-James, No. 34, Fort, Belgaum, and the Shivrajpur Syndicate, Managing Agents, Messrs. Killick, Nixon and Company, collected samples of limestone which would be of use in the manufacture of chemicals, from the whole of the Bombay Presidency. These samples were analysed by Mr. Turner of the Victoria Jubilee Technical Institute. A list showing the localities where limestones are found was then prepared by the Department. The list is attached hereto.

It may be observed here that none of these deposits are worked on a commercial scale, but small quarries to meet local requirements are opened by the local merchants.

Common Salt.—Salt is manufactured at the following places in Sind:—

(1) Maurypur (near Karachi; brine salt).

(2) Saran (in Diplo Taluka, Thar-Parkar District; deposit salt).

(3) Darwari (near Dilyar, Khipro Taluka, Thar-Parkar; deposit salt).

During the year 1926-27, 493,849 maunds of salt were manufactured or excavated at these places.

In the Bombay Presidency proper, it is produced at the following places:—Kharaghoda, Kuda (Baragra Salt); Dharsna, Muroli, Bassein, Rai, Trombay, Bhandup, Dadar, Belapur, Shewa, Uran, Karanja, Pen, Vengurla, Sanikatta (Sea Salt). The total production during the year 1926-27 was 11,389,689 maunds.

Information regarding Sodium Nitrate, Potassium Chloride and Phosphates is not available.

List of Places where lime-stone is found in the Bombay Presidency.

Engineering Divisions, etc.	District.	Taluka.	Place.	Remarks.
Indus Right Bank Division (Western Nara District.)	Karachi .	Manjhand Mahal.	Bagotoro .	The country from which the samples are taken is run by a low range of hills of limestone.
Southern Division.	Bijapur .	Bagalkot .	Bagalkot .	
Do. .	Ratnagiri .	Rajapur .	Along a nala at Chunakolwan, one mile from Muchkundi River.	Area about 8 acres. There are huge boulders which are broken by blasting operations.
Do. .	Satara .	Khanapur	Near Chanwad, ½ mile N.E. of Tasgaon-Pingli Road at Mile 21-3.	Karad is the nearest Railway Station, 28 miles from the bed. The bed is 4·5 acres with an average depth of 4 ft.
Central Division	Sholapur .	Malsiras .	Both sides of Poona-Pandharpur Road at mile No. 103-3.	Not found in a continuous area, but is spread over ½ sq. mile. It is found 2 ft. below the surface and the bed is 2 ft. thick.
Do. .	,, .	Boundary of Sholapur District and Phaltan State.	South sides Poona Pandharpur Road at mile No. 99.	Area about ¼ sq. mile. It is found at 2 ft. from the surface and the bed is from 4 to 6 ft. thick.

Engineering Divisions, etc.	District.	Taluka.	Place.	Remarks.
Central Division	Sholapur .	Modni m b (Miraj Senion State.)	Bhend Nala .	The nala runs *via* Aran village crossing the Poona Sholapur Road at Mile No. 11.
Indus Left Bank Division.	Hyderabad (Sind).	Hyderabad	Hyderabad Gonja Taker Hills, Colimar quarries.	
Do. .	Hyderabad	,, .	Hyderabad Jail quarry.	
Do. .	,, .	,, .	Hyderabad Railway Station Kali quarry.	
Southern Division.	Kanara .	Kumta .	Yan-Near Devimane.	There is no cart tract to the bed. The nearest port is Kunta (16 miles off, 6 miles being difficult mountain track and 10 miles good high road).
Deccan Irrigation Division (Lake Whiting District).	Poona .	Purundhar	Division . .	It is 6 to 8 ft. below the surface, but layers are not continuous.
Do. do.	,, .	,, .	Rajewadi .	The quantity available is not exactly known but it is les than Diva deposits.
Do. do.	,, .	,, .	Kumbharwallam	1 or 2 million c.ft. at the most and there is a cover of 5 to 10 ft. of muram over it.
Do. do.	,, .	Bhimthadi	Yawat . .	The deposits are not pure and there is a good depth of earth.
Do. do.	Satara .	Wai .	Yella . .	Fairly rich in lime. Has not been worked to any extent. There may be 5 to 6 million c.ft.
Northern Division, (Gujarat Irrigation District).	Panchmahals.	Dohad .	Himealia .	
Do. do.	,,	,, .	Chunakhan .	
Central Division	Ahmednagar.	Sangamner	Sangamner .	
Indus Right Bank Division (Karachi Building District).	...	...	Jungshahi .	
Do. .	...	...	Hubb Kharadi .	
Do. .	...	...	Hubb River .	
Do	...	...	Mangho Peer near Karachi.	

Engineering Divisions, etc.	District.	Taluka.	Place.	Remarks.
Kathiawar (samples sent by the Agency Engineer).	Jamnagar State.	Panchkosi	Khan Kotda .	Nearest Railway Station Vanthali Jamnagar Railway.
Do	,, .	Lalpur .	Gala Panchasar	Do. do.
Do. .	,, .	Bhanwad .	Ranipur .	Bolwa or Wares Jalia, B. G. J P. Railway.
Do.	,, .	,, .	Wala Dungro .	Virpur, G. R. Railway.
Do. .	,, .	,, .	Bhanwad .	Balwa Gondal Porebunder Railway.
Do. .	Porebunder State.	...	Dhabba . .	
Do. .	,, .	...	Dosabhai Revli	
Do. .	, .	...	Narawali .	
Do. .	, .	...	Bakar . .	
Do. .	,, .	...	Quarry No. 162	
Do. .	,, .	Bhanwad .	Ranvali . .	
Do. .	,, .	...	Govalni Quarry	
Do. .	Junagadh State.	...	Junagadh .	Nearest Railway Station Junagadh.
Do. .	,, .	...	Dungarpur .	Nearest Railway Station Dungarpur.
Do. .	,, .	...	Deosa . .	Nearest Railway Station Saradiya.
Do. .	,, .	...	Bherai . .	Nearest Railway Station Bherai Bunder.
Indus Right Bank Division (Shkarpur Canals District).	...	...	Rohri Quarry No. 13, Near District Bungalow.	
Do. .	...	...	Sukkur, near the Mohammedan Burial ground.	

Government of the Punjab.

Letter No. 3787-F./G., dated 30th January, 1929.

With reference to your letter No. Cir.-189-T., dated the 14th October, 1928, I am directed by the Governor in Council to forward a copy of a note recorded by the Director of Industries, Punjab, containing information on the points raised in paragraph 3 of your letter. A copy of Financial Commissioners' Standing Order 42, 1st reprint referred to in the note is also enclosed.*

2. The Governor in Council has no comments to make.

Note by the Director of Industries.

Item A.—The occurrence of Sulphur in springs near Dera Ghazi Khan, in Mianwali and Jhelum Districts and that of Iron Fyrites, Chromite, Magnesite, Manganese, Bauxite, etc., in the Salt Range, Kulu Valley and in the hillocks near Gurgaon and Jhang has been described by La Touche in the bibliography of Indian Geology and Physical Geography but none of these minerals has so far been worked on a commercial scale. It is only common salt, gypsum and limestone which are available in large quantities and are being mined very extensively. The following table gives the names of localities where existing and the quantities of lastnamed minerals extracted during the year 1926:—

Quantities.	*Localities.*
Limestone, 6,56,892 tons . .	Jhelum District—Dandot Khewra Mianwali District. Rawalpindi District.—Taxila, Murree Hills. Shahpur District. Hoshiarpur District.—Birampur.
Gypsum—	
(included in limestone) . .	Jhelum District.
(during 1927, 4,112 tons of Gypsum were extracted) . .	Mianwali District—(not being worked on an appreciable scale).
Salt, 1,22,801 tons	Khewra, Kalabagh and Warcha in Jhelum, Mianwali, Shahpur Districts, respectively.

Item B.—Rules framed by the Government of India in the late Commerce and Industries Department Resolution No. 7552-7581-121, dated 15th September, 1913, as subsequently amended are applicable to the extraction of major minerals such as iron, sulphur, manganese, etc., whereas limestone and gypsum are being quarried in accordance with the rules contained in Financial Commissioner's Standing Order No. 42, 1st reprint, common salt on the other hand is being mined and sold by the Government of India, Salt Department. Private individuals or firms are not granted any concessions for the extraction of common salt.

I am not aware of any special regulations requiring a license or a concession in respect of the production of minerals referred to in paragraph 2 of the letter from the Secretary, Tariff Board.

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* Not printed.

Item C.—I give below the names of manufacturers of acids and heavy chemicals in the Punjab:—

1. Shabhu Nath and Sons of Islamabad, Amritsar.
2. The Frontier Chemical Works, Rawalpindi.
3. Messrs. D. Waldie and Company, Lahore.

(This firm manufactures magnesium sulphate, alum, soda and sodium bicarbonate. They also make sulphuric acid, hydrochloric acid, nitric acid of commercial importance. Monthly output is detailed below:—

	Tons.
Magnesium sulphate	5 to 6
Alum	8 to 10
Sodium bicarbonate	1 to 25).

4. The Punjab Chemical Works, Lahore.

(The firm manufactures disinfectants and pharmaceutical preparations in addition to acids.)

Government of the United Provinces.

(1) *Letter, dated 18th February, 1929.*

Subject:—INQUIRY FROM THE TARIFF BOARD ABOUT SOURCES OF RAW MATERIAL FOR HEAVY CHEMICALS, ETC.

In reply to Mr. Walker's letter No. Cir.-189-T., dated October 14th, 1928, on the above subject, I am directed to forward to you herewith a copy of a letter from the Director of Industries, United Provinces, forwarding a report by Dr. Gilbert J. Fowler, D.Sc., F.I.C., Principal of the Harcourt Butler Technological Institute, Cawnpore. I am to add that the Government accept no responsibility for the views expressed in these enclosures, which are forwarded for the information of fact which they contain.

Enclosure.

Copy of letter No. 120, dated 21st January, 1929, from the Director of Industries, United Provinces, to the Deputy Secretary to Government, U. P., Industries Department, Allahabad.

With reference to Government endorsement No. 2163/XVIII-478, dated 2nd November, 1928, I have the honour to enclose two copies of the reply from the Principal of the Technological Institute. As my reply to Government has already been considerably delayed, I am not waiting till the return of Dr. Fowler. In case he has anything to add or amend, Government will be informed.

Not being a chemist I am not in a position to comment on the technical portion of the principal's reply. The present Assistant Director who compiled the industrial survey sums up the question in a note of which I append two copies. I agree with him. The export of bones from the U. P. to the chief ports to which that note refers, is, from the point of view of the Tariff Board's inquiry, relevant only in so far as the world-price of bones affects their export *from India.*

As regards the general question of protection, this, as in the case of the iron and steel industry, is so complicated that I do not find it possible to give a reply off-hand. In principle and speaking broadly, I agree that the heavy chemical industry needs and deserves protection. The Board of Industries too expressed nearly the same view. But it is impossible to define

straightway the form this protection should take. As other subsidiary industries are involved, perhaps a solution will be found in a judicious combination of a protective tariff and bounties to the main and the subsidiary industries.

Copy of letter No. 4422/14, dated 11th January, 1929, from the Principal, H. B. Technological Institute, United Provinces, Cawnpore, to the Director of Industries, United Provinces.

With reference to your endorsement No. 155/T.-12, dated 22nd November, 1928, I have the honour to report as follows :—

1. *Sulphur.*—Some of the springs in the Kumaon Hills deposit small quantities of sulphur which is negligible. All the sulphur used for manufacturing purposes in U. P. is imported.

2. *Iron pyrites or other metallic sulphides.*—Iron pyrites is found to be present in Siwaliks in the Dehra Dun district. Galena is found 3 miles west-south-west of Charcharie in Mirzapur but the place is at present inaccessible.

Numerous deposits of galena are also found in the Almora district near Ralum, Banskum, Baidli, Baghir, Karahi, Sorgurag, but the mines are unworked.

The lead mine at Nagpur in Garhwal district is a fair one but the place is inaccessible. Yellow arsenic (known as Hartal) is found in the northern parts of Almora district at Munsiyari, and also close to Almora town as well. A small quantity of arsenic is brought down every year by Bhotais for sale at Jouljibi and Bageshwar Fairs. It is not possible to state the quantities of these minerals available, but the amount of galena seems to be fairly large.

3. *Magnesite.*—It is not found in the United Provinces in any quantity.

4. *Common Salt.*—It is obtained as a bye-product in saltpetre refinery. After payment of duty the salt is sold at a profit of one anna to four annas per maund by the owners of refineries. The quantities of this salt so disposed of cannot be exactly stated but it will not much exceed 25,000 maunds per annum.

5. *Potassium Nitrate.*—Considerable quantities of this material are manufactured in this province. The industry thrived much during the war period but it has received a set-back owing to after-war competition. The districts of Farrukhabad, Muttra, Allahabad and Etah are the four main Saltpetre Refining centres.

Nitrous earth is scraped from old inhabited sites and the Zamindar of the villages charges royalty at varying rates from Rs. 20 to Rs. 200 per year. Crude saltpetre is extracted by Lunias by extracting with water. Lunias can obtain a license for the manufacture of crude saltpetre on payment of Re. 1 annually.

The crude saltpetre is refined in factories called refineries. The refiners have to obtain a license from Government on payment of Rs. 50 annually.

The refined saltpetre is about 95 per cent. pure potassium nitrate. The total amount of refined saltpetre that can be manufactured in United Provinces is about 100,000 maunds. The industry is passing through a dull time owing to foreign competition and the export has gone down. The Calcutta price for saltpetre of Farrukhabad quality is at present Rs. 8-8-0 per maund which is rather low.

6. *Sodium nitrate.*—
7. *Bauxite.*—
8. *Chromite.*—
9. *Manganese.*—

} These are not found in any quantity in this province.

10. *Potassium Chloride.*—The only source of potassium chloride or potassium sulphate seems to be wood ash from which potassium carbonate

can be easily extracted and converted into potassium sulphate with sulphuric acid or potassium chloride with hydrochloric acid. The small amount of potassium chloride that is present in crude saltpetre would be rather difficult to extract commercially, wood ash as a source of potash compounds is rather an uncertain factor at present and no one has worked it out on a large scale. Almost all the factories use coal as fuel. Some work was done in the H. B. Technological Institute on the extraction of potassium carbonate from wood ash supplied by an oil mill at Bindki road and it was found that about 4—5 per cent. of potassium carbonate of about 85 per cent. purity could be extracted easily. But the quantity and supply of wood ash are not likely to be sufficient and systematic at present.

11. *Gypsum.*—Enormous quantities are said to be present near about Rajpur and Siwaliks in the Dehra Dun district. The compound present is said to be $CaSO_4$, $2H_2O$ in a sufficiently pure state.

On the borders of Hamirpur district near Chhatarpur State gypsum is found in large quantities. Gypsum is also found on the banks of Alakhenanda near Fanai and Nagrasu in the Garhwal district. Gypsum is found in eastern Chhakhata, near the Nehal bridge on the road between Kaladhungi and Naini Tal in the Naini Tal district.

12. *Limestone.*—Garhwal.—There are three distinct ranges of limestone hills in Garhwal. The chief quarry is at Rani Bagh. The rate of royalty varies from Rs. 2-4-0 to Rs. 15-0-0 a ton, but the average is Rs. 5 a ton. Over 600 tons were raised in 1920.

Dehra Dun.—The district abounds in limestone. Leases for collection and excavation of limestone are given away by auction. The price of a pile 10′× 10′×1′ (150 maunds) near the kiln varies from Rs. 18 to Rs. 28. About 10½ lacs of maunds are worked annually.

Naini Tal.—Limestone is abundant. Chuna Khan Lime in the Ramnagar Forest Division is said to be one of the best quality in India. Altogether more than 1½ lac maunds of lime were exported from Naini Tal district in 1920-21.

Banda.—There are three limestone quarries; limestone is of good quality, estimated quantity available—50 lacs of maunds.

Mirzapur.—Limestone is available in Barha State but there are no transport facilities.

Almora.—Limestone is found scattered all over the district. The transport charges are heavy. There are lime quarries at Devaldhar, Karahi, and Mahakal. Lime is sold at Rs. 1-8-0 per maund.

Besides the above the province contains deposits of Kankar (an impure limestone mixed with clay) and marl which is fairly pure calcium carbonate and the quantities have been estimated to be 1,000,000,000 cubic ft. and 74,000,000 cubic ft.

Phosphates.—The only phosphatic rocks that are known are in the Mussoorie limestone. The purity varies from 66 to 76 per cent.

Another source of phosphate in this province is bone. The quantity of bones nominally available is about 282,000 maunds annually. Most of this is at present exported to Calcutta and Bombay.

Acids and Heavy Chemicals.—There are five factories where sulphuric acid is manufactured in the United Provinces :—

2 in Cawnpore.

2 in Benares.

1 in Ghaziabad (Meerut).

The Cawnpore Chemical Works, Cawnpore, also manufacture the following heavy chemicals :—

Hydrochloric acid.

Nitric acid.

Ferrous sulphate.
Magnesium sulphate.
Alum.
Alumino ferric.

Sodium Carbonate.—This is by far the largest item amongst the imported heavy chemicals.

The province contains enormous deposits of sodium carbonate mixed with lesser quantities of sodium sulphate and sodium chlorides. The quantity of sodium carbonate nominally available is enormous and is sufficient to meet the whole of India's demand for many years to come. The deposits, however, are scattered and there are difficulties of purification. But the cheapness of the raw material may counteract all the other factors if the problem is seriously considered. The detailed information on this subject may be found in the two following papers published by the H. B. Technological Institute :—

Protection for Indian Chemical Manufactures.

(1) The extent and nature of the *reh* deposits of the United Provinces, by E. R. Watson and K. C. Mukerjee (Journal of Indian Industries and Labour, February 1922).

(2) The commercial utilisation of the *reh* deposits of the United Provinces, by E. R. Watson and K. C. Mukerjee (Journal of the Indian Industries and Labour, May 1922).

It is exceedingly difficult to give a correct expression of opinion on this matter, if a protective tariff is placed on chemicals it at once raises the prices of all chemicals to Indian industrialists. The number of persons employed by industrial concerns is considerably above those engaged in chemical manufacture in India. To prevent dumping the import duty would have to be very high.

The protection of Indian Chemical Manufacture with a subsidy on a sliding scale might meet the position. Before this was done it would be necessary to have exact costs of production in India. This subsidy might be paid from the revenue got by a small increase of the import duty on chemicals. This would give the Indian manufacturers a double benefit from the slight increase of import duty and subsidy. The increased import duty must essentially be only a small one, otherwise it will increase manufacturing costs to industrialists using chemicals.

Extract from Note, dated 15th January, 1929, by the Assistant Director of Industries, United Provinces.

The report which is mostly based upon the information collected in the survey reports, shows that with the exception of potassium nitrate, potassium chloride, limestone and phosphates in the form of bone, there are very few materials in this province from which heavy chemicals can be manufactured. The bone-mill at Nagarwara is closed and bones can hardly be said to be available in sufficient quantities. The Principal himself reports that they are mostly exported to Calcutta and Bombay and the quantity available is only nominal. Similarly though potassium chloride is available in the form of wood ash everywhere, its supply, as the Principal says, is not likely to be sufficient or systematic at present. Potassium nitrate can certainly be developed and limestone is extracted in various districts. In my opinion only the latter two should be reported to be available in these provinces. Besides these sodium carbonate is obtainable in the form of *reh*. Work has already been done on the manufacture of sodium carbonate by the late Dr. Watson and emphasis can be laid upon it.

(2) *Letter No. 510/XVIII-478, dated the 2nd April, 1929.*

Subject:—INQUIRY FROM THE TARIFF BOARD ABOUT SOURCES OF RAW MATERIAL FOR HEAVY CHEMICAL, ETC.

I am directed to refer to my letter No. 298/XVIII-478, dated the 18th February, 1929, on the above subject, and to say that the report which was forwarded therewith was prepared by Mr. J. A. H. Duke, officiating Principal of the Harcourt Butler Technological Institute, Cawnpore, and not by Dr. Fowler as erroneously stated in my letter. I am now to enclose, for the information of the Board, a copy of a note by Dr. Fowler commenting on that report. The Government accept no responsibility for the views expressed in the note.

Note No. 4798/14, dated the 1st February, 1929, by Dr. Fowler, Principal, Technological Institute, Cawnpore, to the Director of Industries, Cawnpore.

I have carefully gone through Mr. Duke's reply No. 4422/14, dated the 11th January, 1929, and have discussed it with him and Mr. K. C. Mukerjee. I have little to add to what they have said, but for your information I would state my opinion on various items in the report. Duties should only be imposed on articles the manufacture of which is likely to be stimulated thereby and should be of such an amount that the consumer will not be seriously inconvenienced. So far as the items mentioned in Mr. Duke's letter are concerned it would for example be a mistake to put any protective duty upon sulphur since unless this was very high or unless a large subsidy was paid, the conditions are such that no firm is likely to exploit the mining of those deposits of sulphide ores which exist. In the meanwhile sulphuric acid is a very necessary chemical, *e.g.*, for the manufacture of fertilisers, and sulphur should therefore be obtainable as cheaply as possible.

There is something to be said for protective measures for the production of *potassium nitrate*. The present process of manufacture in these provinces is capable of improvement, but I understand that no anxiety has been manifested by any of those engaged in the industry to undertake such improvement. I have also indicated, while I was in Nasik, simple means whereby the supply of nitrate could be increased with benefit to the sanitation of the district, but nothing was done.

There are possible methods for obtaining *sulphuric acid* from gypsum, but they will have to be worked on a large scale and it is doubtful whether capital could be found for a new and somewhat uncertain process, which would have some difficulty in competing with imported sulphur and as I have said it is undesirable to raise the price of sulphuric acid.

Phosphates.—It is worth while considering whether export duty should be imposed on bones since phosphates are needed for the maintenance of fertility in Indian soil. There is no doubt a good deal of prejudice against the use of bonemeal, but like other such difficulties it is rapidly diminishing when the good results of the use of such manures are observed. In any event bones can be used for the manufacture of glue and of superphosphate, substances which are already made in the country.

Sodium carbonate.—I understand that the production of sodium carbonate from Reh has been attempted on a large scale in these provinces, but owing to various unfortunate circumstances the venture did not prosper. Any further attempt would require very careful consideration of all the circumstances and particularly whether there was any possibility of competing with the potential supplies from Imperial Chemicals, Limited. In this case protection by tariff will hardly meet the situation and would inflict hardship on very many industries dependent on carbonate of soda.

(3) *Letter No. 885/XVIII-478, dated the 5th June, 1929, from the Government of United Provinces.*

INQUIRY FROM THE TARIFF BOARD ABOUT SOURCES OF RAW MATERIAL FOR HEAVY CHEMICALS.

In continuation of my letter No. 510/XVIII-478, dated 2nd April, 1929, on the above subject, I am directed to give below, for the information of the Board, the figures of annual production of three out of the five sulphuric acid manufacturing factories in this province, mentioned on page four of the report by Mr. J. A. H. Duke, a copy of which was forwarded to the Board with my letter No. 298/XVIII-478, dated 18th February, 1929. The acid factory at Benares has been closed since 1923; while the other factory at Cawnpore—the Chakeri Sulphuric Acid Works—is being amalgamated with the Cawnpore Chemical Works, Limited, Cawnpore.

Factory.	*Production.*
1. The Cawnpore Chemical Works, Limited, Cawnpore.	3,000 tons, 6,720,000 lbs. per annum.
2. Krishna and Company, Chemical Works, Benares.	215,040 lbs. in the year ending December 31st, 1928.
3. Ajodhya Prasad and Company, Ghaziabad.	268,037 lbs. last year.

Government of Assam.

Letter No. 1213, dated 20th February, 1929.

Subject:—APPLICATION OF CERTAIN MANUFACTURES OF HEAVY CHEMICAL FOR PROTECTION.

I am directed to refer to your letter No. Cir.-189-T., dated the 14th October, 1928, on the above subject, and to say that only limestone, of which about twelve lakhs of maunds are annually exported from the Khasi and Jaintia Hills, is found in large quantities in Assam. No exact information can be given as to the other substances mentioned in your letter as no survey of the chemical resources of Assam had ever been made. An extract from the report of the Economic Botanist, Assam, is enclosed which gives such information as is available.

2. Copies of (*a*) the rules regulating the grant of concessions for limestone and other minor minerals in this province and (*b*) the form of lime quarry permit are enclosed. There are no rules regarding the other substances.

3. No works for the manufacture of acids of heavy chemicals have been established in this province.

4. The Governor in Council has no opinion to offer on the subject under reference.

Enclosure No. 1.

Extract from letter No. Gl.-15/957, dated the 30th November, 1928, from the Economic Botanist, Assam, Jorhat, to the Director of Agriculture, Assam.

Sulphur.—Very probably it does not exist in the free state in the province. As pyritous shales it is associated with the coal measures of Upper Assam, but has not yet been utilised on a manufacturing scale.

Iron pyrites.—Iron exists in Assam in various forms. In the Khasi Hills, it exists as a titaniferous iron ore. Iron smelting was practised in the pro-

vince once but the industry has died out at present. Iron in the form of limonite occurs in great abundance in the Tipam Rocks of the Naga Hills. The company who has the concession of the Makum coalfield have also the monopoly of the iron of this region, but have hitherto made no attempt to work it out. It is quite likely that iron pyrites will also be found in these regions which, however, requires proper investigation. Nothing is known about the existence of the other metallic sulphides.

Magnesite.—Nothing is known about the occurence of magnesite in Assam.

Common salt.—Salt springs are found in conjunction with petroleum in the Upper Assam coal area, at Borhat, Jaipur and other places. They also exist in Cachar, both in the southern ranges and in the Barail. Several salt springs are worked in Manipur. The estimated quantities of outturn and the regulations in respect of the production of this stuff are not known.

Potassium nitrate, sodium nitrate and potassium chloride.—It is very doubtful that these alkali salts are available in Assam.

Bauxite.—Although nothing is known about this mineral, yet it is likely that it may be found in certain places of the province, especially in the rocks which close in the valley on the east which have not as yet been explored.

Chromite and manganese.—Their presence is not known.

Gypsum.—It may be found associated with the limestone area of the province, although its presence has not been detected.

Phosphate.—Nothing is known about it.

Limestone.—Vast stores of limestone exist on the southern face of the Khasi and Jaintia Hills and these are being worked there for centuries. It is found from the exit of the Someswari River in the Garo Hills to that of the Hari river in Jaintia. Altogether there are 34 limestone tracts which are separately treated as quarries in the Khasi and Jaintia Hills, one in Sylhet and one in the Garo Hills. The Government is the sole proprietor of all the quarries in the Jaintia and Garo Hills and one in Sylhet, as well as of four in the Khasi Hills; the remainder are the joint property of the Khasi rulers and the British Government, the latter administering the estates and reaping half the profits.

The exports of lime from sylhet to Bengal for the years 1890-93 are given below:—

	Maunds.
1890-91	1,804,197
1891-92	1,826,675
1892-93	1,314,161
Total output 1903	2,394,225

Limestone is also found in small quantities in the Doigrung, a tributary of the Dhansiri, and also in the rocks east of Sadiya, where it occurs in the shape of boulders and pebbles in the river beds.

Enclosure No. 2.

Rules regulating the grant of concessions for limestone and other minor minerals.

1. Persons desiring to exploit limestone or other minor minerals will be required to take out either a prospecting license or a quarry lease.

2. (1) In the case of a prospecting license the terms will be as follows:—

(i) *Period of license.*—One year or such shorter term as the applicant may desire.

(ii) *Security deposit.*—Rupees 100 per square mile or part thereof.

(iii) *License fee.*—A fee of Re. 1 an acre subject to a minimum of Rs. 100 will ordinarily be charged for each license and Deputy Commissioners are empowered to grant licenses on this basis. In cases, however, where the Deputy Commissioner considers this rate unsuitable, he should submit through the Commissioner his proposal for the fixation of the license fee for the orders of the Local Government.

(iv) *Royalty* will be charged on any limestone removed under cover of a prospecting license at Rs. 2 per 100 quarry maunds (112 lbs.) of limestone.

(2) In regard to the grant of prospecting licenses, the Deputy Commissioner has the power of granting areas on his own authority to one applicant up to a limit of 3 square miles, including the area already held by the applicant under such licenses throughout the province. For areas above that limit the Deputy Commissioner should represent to the Local Government, through the Commissioner, what larger area should be allowed and issue the prospecting license in accordance with the orders passed.

(3) As in the case of major minerals, a prospecting license for minor minerals implies a right to a lease over the area covered by the license.

3. (1) Quarry leases for limestone may be issued in the form of (*a*) annual permits or (*b*) long term leases.

(2) Annual permits will be issued by the Deputy Commisioner in the form appended to these rules (Form No. 11).

(3) Long term leases may be granted for quarries to be worked in accordance with a system of scientific mining on the following conditions:—

(i) *Period of lease.*—Twenty years or such shorter term as the applicant may desire, renewable on expiry for a further similar period on such terms as may be decided upon by the Local Government.

(ii) *Royalty.*—(*a*) Rs. 2 per 100 quarry maunds (112 lbs.) of limestone.

(*b*) Re. 1 per 100 quarry maunds of small broken limestone.

(*c*) 2½ per cent. on the value at the pit's mouth of other minor minerals commutable at the option of Local Government into a fixed rate by weight of the mineral, revisable every 5 years, the rate for the first 5 years of the lease to be settled on the working of the first year and to be decided after an examination of the accounts kept by the lessee.

(iii) *Dead rent.*—The rate in the case of limestone and other minor minerals will be decided by the Local Government on the merits of each case on the recommendation of the local officers, due regard being made to the previous year's receipts, to the nature of the minerals, the value of deposit and degree of development of the industry in the area concerned.

In all cases the Deputy Commissioner should submit proposals for the fixation of a suitable rate.

(iv) Except in the case of limestone leases, a surface rent at the rate assessable under the Assam Land and Revenue Regulation or, if no such rent is assessable, such rates as may be fixed by Government.

4. The Deputy Commissioner shall maintain the following registers of concessions granted for minor minerals:—

(*a*) Register of prospecting license (minor minerals) granted.

(*b*) Register of quarry leases (minor minerals) granted.

Enclosure No. 3.

FORM No. 11.

Lime quarry permit (to be issued by Deputy Commissioner, Khasi and Jaintia Hills, in respect of British-owned areas).

To

_____

_____

son of of village

Thana District

Whereas you have applied for a permit to work the Lime quarry situated at , this Annual Permit is granted to you in respect of Block measuring feet in length on the following conditions :—

1. That you pay royalty at the rate of Rs. 20 per 1,000 maunds of limestone quarried by you to the Forest Officer at

2. That this permit does not give you exclusive right to work at the quarry, but your operations must be confined within the limits of the Block as pointed out and marked by any person duly authorized by the Deputy Commissioner on that behalf.

3. That you will not interfere with the work of any other permit holder, nor will you meddle with stone already quarried or stacked at the locality which may be allotted to you.

4. That this permit is granted to you for working the Block yourself and you will not sub-let it to any one.

5. That this permit will remain in force only for the period of one year from 1st November to 31st October, 19 .

6. That, on the expiry of the term hereof, you will have no right to work at the quarry or remove any stone therefrom without a fresh permit being taken from this office which may be given subject to your having satisfactorily worked during the present term.

7. That you will stack your stone at the ghats or banks of the streams that may be pointed out to you by the for measurement and issue of certificate of origin before the same is exported by you.

8. Should any of the foregoing conditions be contravened by you, or by any person employed by you on your behalf, this permit will be cancelled, and any stone excavated by you will be forfeited to Government.

Deputy Commissioner.

Deputy Commissioner's Office,

The *19*

Witnesses— Accepted, these terms are binding on

1. of

2. ,,

3. ,,

Permit-holder.

Agent to the Governor-General and Chief Commissioner in Baluchistan.

Letter No. 960-R., dated the 23rd February, 1929.

Subject:—APPLICATION OF CERTAIN MANUFACTURERS OF HEAVY CHEMICALS FOR PROTECTION.

I am directed to acknowledge the receipt of your letter No. Cir. 189/T., dated the 14th October, 1928, on the subject indicated above, and to say that almost all the raw materials, mentioned in your letter under reply, exist in varying quantities in Baluchistan but they are not extracted commercially to any appreciable extent except in the case of:—

(1) Sodium Carbonate.

(2) Common Salt.

(3) Chromite.

No regulations interfering with the removal or production *in situ* of the raw materials in question, except those mentioned above, have been issued by this Administration.

Khar is manufactured in the Sibi Tahsil of the Sibi District and the right to manufacture is sold annually by auction which, on an average, produces about Rs. 300 of revenue.

There are no restrictions in the manufacture of common salt when used for domestic purposes. When, however, it is produced for the market, it is liable to duty.

The exploration, prospecting and mining of chromite is subject to the usual mining rules.

2. I am to add that no works for the manufacture of acid and heavy chemicals are in existence in Baluchistan.

3. In this connection, I am to forward a copy of a detailed note prepared by Mr. J. W. N. Cumming, Retired Extra Assistant Commissioner in Baluchistan, as it may prove interesting to the Board.

Enclosure.

A reply, so far as Baluchistan is concerned, to the Government of India, Commerce Department, Resolution No. 199-T. (8) of 16th July, 1928, and Circular letter No. Cir. 189-T., dated the 14th October, 1928, from the Secretary, Tariff Board, Ootacamund, as to the existence in India of the principal raw materials required for the manufacture of certain chemicals, by Mr. J. W. N. Cumming, Retired Extra Assistant Commissioner in Baluchistan.

Bauxite, the ore commonly used for the extraction of the metal Aluminium, derives its name from a mineral found at Baux, near Arles, in the south of France, where it is said to contain *Silica* from 13 to 17 per cent.; *Alumina* from 60 to 65 per cent.; *peroxide of iron* from 4 to 8 per cent. and water from 15 to 17 per cent. (Bloxam). No ore containing anything like this high percentage of *Alumina* has yet been discovered in Baluchistan, nor has the inferior ore known as *laterite*, another source of *alumina*, been discovered so far in Baluchistan.

Baluchistan, however, abounds in Red Clays, which I brought to notice in January, 1917, as being a likely source for the extraction of *alumina*, *vide* my "Suggestions for the Industrial Development of Baluchistan" (printed by the Superintendent, Government Printing, India, Calcutta, 1918). This Red Clay is very conspicuous, at Hanna, only 7 miles from Quetta, and Dr. Fox of the Geological Survey, who had occasion to visit Baluchistan on duty, about April, 1926 or 1927, expressed the opinion in the course of a

conversation he had with me on the subject, that it was a form of "Red Bauxite".

During the Great War, when neutral as well as belligerent countries were compelled to search within their own borders for those raw materials which formerly they were content to import from elsewhere, every likely source of *alumina* was examined.

Sweden and Norway were particularly hard hit in this respect. There is no Bauxite in either of these countries; but a process, discovered and successfully worked by Dr. Buchner of Heidelberg, for winning this metal from Kaolin and Kaolin rich clays, was tried with success in Sweden.

The clay was extracted with *Sulphuric Acid* and, after removal of the iron, the *alumina* was precipitated from the solution with ammonia, four tons of clay with an *alumina* content of 30 per cent. yielding as much as one ton of the oxide. This process was considered to have a considerable future before it and plans were then laid for its introduction into Sweden on a large scale. In Norway, they succeeded in extracting *alumina* from a different source, *viz.*, from a white rock (a *plagioclase felspar*) known as Labrador Stone, commonly mistaken for marble with an *alumina* content also of 30 per cent., dilute *Nitric Acid* being used in place of *ammonia* which could not be procured cheaply there—("Nature", dated 23rd October, 1919). Now our Red Clay, which is softer than Labrador Stone, has been shown by regular analysis to contain as much as 27·40 per cent. of this useful metal. This should be capable of extraction by either of the processes referred to, or by electrolytic means, which may prove cheaper in the long run.

The Quetta Electric Supply Co., which it is understood will begin functioning some time this year, will doubtless be able to supply all the electrical energy that may be needed for such a purpose. But, should their rate per unit prove too expensive to make the venture a profitable one, a cheaper source of electrical energy is obtainable, nearer Hanna, if only the Government of India would give its consent to the very practical scheme prepared a few years back by the late Lt.-Colonel L. Close, R.E., Secretary to the Agent to the Governor General in Baluchistan in the P. W. D., shortly before his death. This proposal involved the diversion from its source, for about 5 miles, of the stream, which provides the Quetta Garrison with its drinking water supply, by means of a new channel running along a hill side, till, at Urak, 7 miles from Hanna, it would attain a drop of about 1,000 feet, where it could be utilised to operate on two turbines capable of generating all the electrical energy needed to light up the whole Cantonment and Civil Town of Quetta. This scheme was rejected, it is understood, because of some fear that the drinking water supply might become contaminated in the process of operating the turbines needed for the generation of the electrical energy, though the installation of chlorinating plants lower down and the construction of aeration basins, consisting of a large number of fountains, could easily have disposed of this objection. However, allowing for the shake of argument, that this was a reasonable excuse for rejecting such a practical scheme, there is still a chance of harnessing the surplus water utilised for irrigation purposes, either according to Lt.-Col. Close's original plan above the Reservoirs at Urak itself, or lower down between Urak and Hanna, a distance of 7 miles, where a fall, sufficient for the purpose, could easily be provided at reasonable expenditure. The drop in height in this distance of 7 miles must be several hundreds of feet, whereas only a portion of this should suffice for creating the power needed, as is the case in the hydro-electric works installed on the Lower Bari Doab Canal, in 1926, where a fall of only six feet is being utilised for the generation of electrical energy, which in its turn is utilised to lift water to irrigate land on a much higher elevation than the canal.

In this connection the accompanying extract from "Nature," under date the 28th August, 1919, on the subject of the "Electrical Purification of Clays", should prove not only interesting but useful.

There is, however, another probable source of *alumina* in the *Sulphate of alumina* and Kaolin to be found in the neighbourhood of the extinct volcano known as *Koh-i-Sultan*, which is situated also in Baluchistan But this is

27 miles distant from the Nok Kundi Railway Station, in the Chagai District, where there is practically no drinking water. Not having visited the place I am not in a position to give any estimate of the quantity of this mineral likely to be available there.

[" Aluminium has a variety of uses in modern industries. It is esteemed on account of its low density, its rigidity and malleability. Besides its use for utensils, it has many applications in Electricity, metallurgy, aeronautics, etc. It is largely employed in the manufacture of alloys with nickel, copper, zinc and magnesium."—D. N. WADIA.]

Chromite, the best in the world, is fairly abundant in the hills between Khanozai in Pishin and Hindubagh in the Zhob District. The mines are being regularly worked by the Baluchistan Chrome Company and K. B., B. D. Patel, C.I.E., O.B.E. A Narrow Gauge Railway connects both Khanozai and Hindubagh with the Broad Gauge System at Khanai on the Quetta-Harnai-Sibi Loop line. " From Khanozai to Hindubagh are great exposures of gabbro and serpentine of upper cretaceous age. The gabbro, a basic intrusive rock, is the true home of the chromite in which it occurs as a primary constituent. Chromite, however, does not occur in the gabbro in masses of economic value. The change from gabbro to serpentine by hydration allows of the segregation of the chromite into ore-bodies of payable size. It is in the serpentine only that valuable chromite is found where it occurs in pockets." Laboratory tests gave its specific gravity as 4·297 and the percentage of chromium sesquioxide as 54·11 per cent. The area over which concessions for mining have been given is very small in comparison with the total outcrop of serpentine in which chromite may be expected to occur. Extending prospecting operations would almost certainly lead to the discovery of more chromite deposits (Baluchistan District Gazetteer, Vol. I, Zhob). The N. W. Rly. charge a rate of eight annas two pies per maund for the carriage of the ore from Hindubagh to Karachi, including transhipment charges at Khanai.

Gypsum (Sulphate of lime), used in the manufacture of Plaster of Paris, and as a fertiliser for grass, lucerne, clover, etc., is another of the natural products of Baluchistan. It occurs in large masses in the Mashalak range west of Quetta and also at the base of the lower Siwaliks, in the hills south-east of Pulaj and north-east of Shahpur at the western extremity of the Bugti hills. In the latter place, according to Mr. W. T. Blanford, " Some very beautiful white gypsum, or alabaster, was found in irregular masses some of them as much as a foot in diameter. Some of the masses are perfectly pure white in colour and quite as well adapted for ornamental purposes as the precisely similar stone that is carved into statuettes and vases at Pisa and other places in Italy."

Gypsum also occurs in beds of from 5 to 10 feet in thickness in the Eocene beds of the Bugti hills and the eastern flank of the Suleman Range. " It occurs in considerable quantities near Khattan and at Tung near Spintangi, in the Sibi District. As alabaster it also occurs at Mamand and in the Harnai valley."

In the Loralai District it occurs in small quantities in all places where coal has been found, and in large slabs 2′ × 1′ at the western end of the Hanki (Coal) seam.

Iron Pyrites, used in the manufactures of Sulphuric Acid, has been found in small quantities round about Quetta, *viz.*, in the Murdar and Chahiltan Mountan Ranges and at Hanna. Specimens have also been received from Fort Sandeman in Zhob and from Nichar in the Kalat District. There is no means of estimating, at present, the quantities available.

Limestone (Carbonate of lime) is the most abundant of all the rocks to be found in Baluchistan. It is safe to say that nearly every range of this very mountainous country consists of it, those around Quetta being described as massive limestone of the middle jurassic age. Considering that lime is beneficial as a plant food, in making clay lands permeable to moisture and in enabling it to absorb potash, ammonia and other salts, while its presence

is necessary in the process of nitrification, by which means nitrogenous matters in the soil are made available for the plant's use (Voelcker), it is surprising what little use we make of it. Beyond erecting Railway Buildings, bridges and retaining walls and converting, it into quick lime for building-mortar, white wash and purifying latrines, this vast source of wealth is absolutely neglected.

In 1914, a Company was floated outside of Baluchistan, for the establishment of a factory at Baleli, 8 miles from Quetta, where the limestone and clay were considered exceptionally suitable for the manufacture of cement; but the breaking out of the Great War led to the dissolution of the Company. Doubtless, with a little encouragement from the Local Government, a local Company could be started to carry out the scheme.

Once the supply of electrical energy in Quetta becomes a *fait accompli* it might become possible for another Company to start the manufacture of *Carbide of Calcium.*

Magnesite (Carbonate of magnesium), as such, does not appear to be very abundant in Baluchistan. The only specimen I have seen so far came from Hindubagh.

As for *dolomite or Magnesium limestone*, which contains the carbonates of magnesium and calcium, I do not remember having come across any specimens: but doubtless this also will be found in the Zhob and Nushki Districts.

Sulphate of magnesia (Epsom salt) abounds in the soil in the neighbourhood of Nushki, with the result that its waters also are heavily impregnated with it. No attempt has so far been made to extract it for commercial use.

Asbestos (a silicate of magnesia) occurs in large quantities " amongst the intrusive serpentines that border the Zhob valley both to the north and south, and which, from there, extend westward into the Pishin District and east and north-east as far as the Tochi valley. The mineral is practically abundant north-west of Hindubagh, near Tilerai Jan Mohamed on the road to Murgha Fakirzai, where it fills a complicated network of cracks of all dimensions which seem to result from the shattering of the serpentine rocks. Several hills consist entirely of this curious formation ".

Samples sent to Mr. W. R. Dunstan, Director, Imperial Institute, London, were sent to two of the principal firms of asbestos manufacturers and, with the exception of a selected specimen No. 16026 A, were not considered of any commercial value. The selected specimen, from which all extraneous mineral matter had been removed, was valued at £2 10*s.* per ton. It is possible that a better quality of this material may be procurable by mining at a lower level (Baluchistan District Gazetteer).

Manganese, in considerable quantities, is said to exist in the Las Bela State, but doubtless, owing to the difficulty of securing cheap transport, has not been worked so far. " The *binoxide of manganese* is the chief form in which this metal is found in nature and is the source from which all other compounds of manganese are obtained. Its chief mineral form is *pyrolusite*, which forms steel-grey prismatic crystals; but it is also found amorphous as *psilomelane* and in the hydrated state as *wad*. In commerce *pyrolusite* is known as black manganese, or simply manganese." It is largely used for the manufacture of bleaching powder. The glassmaker also finds use for it. It is also used as a cheap source of oxygen.

Sulphate of Manganese is employed by the dyer and calico-printer in the production of black and brown colours. Other useful combinations for which manganese is needed are *Sodium Manganate*, which, with water, forms " Condy's green disinfecting fluid ";—*Potassium Permanganate* or Permanganate of Potash, so largely used in many chemical operations and " Condy's red disinfecting fluid ", used in cases where a solid or liquid substance is to be deodorised (Bloxam).

In the circumstance, it seems advisable that some encouragement should be given to capitalists to come forward and work up this very useful mineral.

Potassium Chloride is an important natural source of the metal Potassium, the indispensable alkali, known as *Potash;* which appears to have been originally derived from granitic rocks, where it exists in combination with *Silica* and *Alumina* in the well-known minerals, *Felspar* and *Mica*. On the disintegration of these rocks, soils are formed which support plant life (Bloxam). As the fleeces of sheep contain a considerable proportion of salt of potassium with an animal acid, the wool washing, which is carried out on a large scale near the Yaru Railway Station, Quetta-Pishin District, should be able to produce *Carbonate of Potassium*. This is made by evaporating the resultant liquid and burning the residue.

Potassium Chloride being extracted from sea-water and from kelp (the ash of sea-weed), should not be difficult of manufacture in Las Bela, or Mekran.

Potassium Nitrate commonly known as nitre and saltpetre, is manufactured on a small scale, during the winter, by individuals in Killa Saifulla, Zhob District, for the manufacture of gun-powder for their own use. There is no trade in it (Baluchistan District Gazetteer). In India, saltpetre is generally manufactured from earth around the remains of old villages, which is found impregnated with this salt. Its presence is attributed to the " natural process of nitrification (Production of nitrates) which the solid and liquid excreta of cattle and men as well as vegetable and other refuse, have undergone. Wood and other vegetable ashes supply potash in the form of carbonate of potash, which then combines with the nitrates, producing nitrate of potash. The potash in the soil itself, more especially when the soil is clayey in nature, no doubt contributes also to the production of nitre. This explanation accounts for the nitre-containing earth being found mainly where habitations formerly stood " (J. A. Voelcker). In the circumstance, there should be no difficulty in manufacturing nitre on a large scale, if necessary, as Baluchistan is covered with the remains of old villages where the salt in question should be forthcoming.

Sodium Carbonate (Khār, ashkhār or sajji), in a crude form, is manufactured from different bushes in the western part of the Shorarud valley and in Segi and Bora Shah in Pishin. All bushes belong to the proprietors of the soil and care is taken to see that they are not cut without permission. The output per annum, from the Quetta-Pishin District, may be put down roughly at 30,000 maunds per annum. Sarawan is said to contribute about another 6,000 maunds. Barkhan and Musakhel Tahsils of the Loralai District may be credited with about 650 maunds and Sibi with about 9,500 maunds. (Quetta-Pishin District Gazetteer). Crude carbonate of soda is similarly manufactured in Kachhi and in the Las Bela State; but there is no means of estimating their outturns, even approximately.

Sodium Chloride (Common salt) is another of the natural products of Baluchistan. In the form of earth salt it is manufactured in the Segi Circle of the Pishin Tahsil to the extent of something like 6,000 maunds per annum, and, in Killa Saifulla, Hindubagh and Fort Sandeman, Zhob District, to the extent of about 1,300, 600 and 100 maunds per annum, respectively. In Kharan, at Wad-i-Sultan and Wadian, are large natural deposits of practically pure salt, averaging 98 per cent. *Sodium Chloride*, while in Mekran large quantities are manufactured in numerous places by evaporation of sea-water in pans, and of rain-water on salt tracts, for curing fish and domestic purposes.

Sodium Sulphate (Glauber's salt) is very prevalent in the soil in many places in the Quetta valley and doubtless also elsewhere in Baluchistan. No attempt has been made so far to extract it for commercial purposes. It can, however, be easily extracted by flooding and evaporation. In Europe it is manufactured from sea-water. This plan could also be adopted, if necessary, at any convenient spot along our extensive sea border.

Sulphur is procurable from mines situated in the hills at Sanni, 40 miles from Bhag in Kachhi, which in its turn appears to be about 15 miles from Bellput Railway Station. It is also obtainable in the Marri Hills near Sibi and near the Darjbent levy post 14 miles from Rindli. One of the samples

from Darjbent, examined by the Reporter on Economic Products to the Government of India, was found to contain 45·90 per cent. pure sulphur, which could be easily separated by some simple process of roasting and sublimation. As the earth yielded as much sulphur as ordinary pyrites with only half its specific gravity, it might, the Reporter on Economic Products thought, be exported in its natural condition as a source of sulphur, or sulphuric acid, or any other useful purpose for which sulphur may be required. Sulphur also exists in large quantities at Koh-i-Sultan, 27 miles north of the Railway Station at Nok Kundi, in the Chagai District.

Except in the case of Khär and salt, I know of no local regulations which would interfere with the removal, or production *in situ*, of the foregoing materials subject of course to the general mining rules.

No works for the manufacture of acid and heavy chemicals have yet been started in Baluchistan, through a more promising place for establishing such it would be difficult to find.

Enclosure.

"Nature," dated 28th August, 1919.

ELECTRICAL PURIFICATION OF CLAYS.

The phenomena known as electrical endosmose and cataphoresis, whereby matter in a very finely divided or colloidal state is capable of being influenced by an electrical potential, have been extensively investigated. For instance, when a colloidal solution of arsenious sulphide is placed in a cell and a direct current at a potential of 100 volts passed from suitable electrodes through the solution, the colloidal particles end after a time to collect round the positive pole, leaving a clear zone round the negative pole. It is found that nearly all substances, if in a sufficiently fine state of division, are attracted either to one pole or the other. It has also been observed that aggregates of certain fine particles can be dispersed and separated by adding, to the fluid in which they are suspended, minute quantities of alkali in the case of those particles attracted to the positive pole, and of acid to those which are attracted to the negative pole. Moreover, if the particles are not sufficiently susceptible to the dispersive effect of the added electrolyte, they can be made so by being allowed to absorb some colloid, such as colloidal silicic acid.

This latter discovery has a most important bearing on the clay industry. China clay and ball clay are examples of such aggregates of fine particles, and if a thick slip is made up of the clay and water, the addition of small amounts of alkali causes the clay particles to disperse, and the slip, as a consequence, to become much thinner and more mobile, the clay particles remaining in suspension a considerable time and exhibiting vigorous Brownian movements. On passing a current of electricity through such a suspension, the clay particles collect and adhere closely to the anode plate, the water collecting in a zone, substantially free from clay, round the cathode. Impurities in the original clay, such as mica, quartz, felspar, and iron compounds are either unaffected by the electrical potential and settle out, or attracted to the cathode. A means of purifyling clay on a commercial scale can thus be evolved from a consideration of the above phenomena, as was shown by the exhibit of raw and purified clays of the Osmosis Co., Ltd., at the recent British Scientific Products Exhibition.

The commercial equipment for such a process consists of a blunger, settling tanks to allow the coarse impurities to settle out of the suspension, and an Osmosis machine composed of a rectangular trough in which is arranged horizontally a cylindrical metal anode surrounded beneath the surface of the slip and at a short distance away from it by a cathode through which, by paddles or other means of circulation, the clay slip is driven. The cylinder is made to revolve slowly, and by means of a scraper the dried purified clay, containing 20—30 per cent. of water is collected.

The machine not merely collects the suspended clay and frees it from water, but subjects the suspension to an electrical purification as well, for

should there be, still in suspension with the clay, minute particles of mica, iron and silica that have not had time to settle out in the tank, these are not attracted to the anode, but for the most part remain in the effluent leaving the trough. Consequently, electrically osmosed clay is a purer product than can be obtained by any method of settling or centrifuging.

The improvements effected by the process are:—(1) Pyritic and other forms of uncombined iron are removed. (2) The sintering temperature of the clay is lowered so that a lower kiln temperature can be employed, with consequent saving of fuel. (3) Clay can be graded into different degrees of fineness. (4) Fireclays can be rendered more plastic and more refractory by this treatment.

Another very important application of catephoresis is the electrical filter-press. In this press the electrical potential is utilised as a means of driving out the water from suspension of fine particles; thus instead of needing pressures running up to 20 atmospheres in some cases where ordinary filtration is used, a head of 14 feet is ample for the purpose in the electrical filter-press. As an instance of the efficiency and speed with which filtering can be accomplished by such a press, a cake of china clay 4½ in. thick containing 25 per cent. of water can be made in less than two hours.

The application of electrical endosmose or electrical dialysis, in various industries, is of importance. Gelatine can be freed from all inorganic mineral matter, so that an ashless gelatine can be obtained of a purity which should be suitable for photographic purposes. There is clear experimental evidence that pure colloidal silicic acid can be prepared from sodium silicate and alumina from sodium aluminate by subjecting their solutions to an electrical potential in cells with suitable diaphragms through which the alkali can migrate. These are a few examples of useful developments, but it is evident that an increasing number of important commercial processes may be expected to arise out of the application of the principles underlying the above phenomena.

Government of Burma.

Letter No. 303-K.-28 (1023), dated the 25th February, 1929.

I am directed to reply to your letter Circular 189-T., dated the 14th October, 1928, in which you ask for certain information required by the Board in connection with the enquiry into the application of certain manufacturers of heavy chemicals for protection. With reference to paragraph 3 (*a*) of your letter I am to forward a copy of a Note on the occurrence in Burma of minerals required for the manufacture of certain heavy chemicals by Dr. J. Coggin Brown, O.B.E., Superintendent-in-charge, Burma Party, Geological Survey of India.

2. The local rules regulating the working of the more important minerals are contained in the Burma Minerals Concessions Manual. Rules regulating the working of limestone, Gypsum, etc., in Lower Burma are contained in Chapters XVIII-A and XVIII-B of the Rules under the Lower Burma Land and Revenue Act and in Chapter IX of the Directions issued under that Act, and in Upper Burma in Chapters XIII-A and XIV of the Rules under the Upper Burma Land and Revenue Regulation and in Chapter IX of the Directions under the Regulation. These Rules and Directions are contained in the Lower Burma and Upper Burma Land Revenue Manuals, copies of which, as well as of the Burma Mineral Concessions Manual, are probably available for the use of the Board.

3. The only chemical works of any consequence in Burma are those of the Burma Chemical Industries, Limited, at Rangoon, where Sulphuric, Nitric and Hydrochloric Acids are produced. It is understood, however, that the Burma Oil Company, Limited, are at present erecting a plant for the manufacture of their own requirements of Sulphuric Acid.

4. The import of Chemicals of all kinds into Burma amounts only to some Rs. 15 or 16 lakhs a year and it is doubtful whether tariff protection for the heavy chemical industry would affect this province materially, provided the result of protection is not to raise the price of artificial fertilisers. On general grounds, however, the Governor in Council considers that the case for protection is weak. In the first place, protection must send up the price of heavy chemicals, and this increase in price will affect the important Indian textile industry, which is not at present in a position to resist further blows. As compared with the textile industry the chemical industry is very unimportant, and if protection for the latter will have detrimental effects on the former it seems doubtful whether it should be given. In the second place protection for such chemical industries as exist in India will not, in the opinion of His Excellency in Council, assist in the solution of the real problem. One of the biggest handicaps on the development of chemical industries and many other industries in India is the lack of really cheap Sulphuric Acid. There are no supplies of free sulphur in India, and although the Government of India have assisted by removing the duty on raw sulphur, it seems clear that, so long as India must rely on imported sulphur, sulphuric acid can never be obtained cheaply unless it can be produced as a by-product from some other industry. The only large scale source of sulphur available in India to-day is the Sulphide ores of the Bawdwin Mines in the Northern Shan States; but the zinc concentrates which contain most of it are exported in their raw state and will continue to be so exported unless the Burma Corporation, Limited, can see their way to smelting ores in India and manufacturing sulphuric acid as a by-product.

5. There is, however, one direction in which the imposition of tariff duties on heavy chemicals may affect the interests of this province seriously. The fertility of the rice-producing areas in Burma could be considerably increased by the application of chemical manures. The soils on which rice is grown need nitrogen in its ammoniacal form and are also deficient in phosphorus. To supply these elements, Ammonium Sulphate and "Superphosphate" are required, and for their manufacture sulphuric acid is essential. I am to attach to this letter a copy of a Note on the manuring of paddy in Lower Burma by Mr. D. Hendry, Deputy Director of Agriculture, Southern Circle, in which he sets out at length the results of experiments made with artificial manures and in which he indicates that the Burmese cultivator is beginning to appreciate the importance of artificial manures and may be induced by demonstration and education to apply them to his land, if the price can be made reasonable enough to suit his purse. If the effect of the imposition of a tariff on heavy chemicals used in the manufacture of manures or on the manures themselves will be to raise their price, it may be impossible for the Burmese farmer to reap the benefit which might otherwise be anticipated from their employment, owing to the fact that the price at which they would be available would be too high. On this special ground, therefore, as well as on the general grounds already indicated, the Governor in Council is inclined to doubt the desirability of affording protection to the chemical industry.

Enclosure.

Note on the occurrence in Burma of minerals required for the manufacture of certain heavy chemicals, by Dr. J. Coggin Brown, O.B.E., D.Sc., etc., Superintendent-in-charge, Burma Party, Geological Survey of India, Rangoon.

SULPHUR.

G. A. Strover writing in 1873, stated that the annual production of sulphur in Upper Burma, under Burmese rule, was about 28,000 *viss* (or about 912 cwts.). It was distilled from nodules of pyrites found at various places, of which he gave a list, in blue Tertiary clays. E. J. Jones (1887) and C. S. Middlemiss (1900) both refer to the manufacture of sulphur from sulphides in the Maosun State (Southern Shan States). From a modern commercial point of view, these deposits possess no interest.

Native sulphur occurs on the volcanic cone of Barren island in the Bay of Bengal, which has been in the solfataric stage of activity from the early years of last century. Although the deposits appear to be large F. R. Mallet, an officer of the Geological Survey of India found in 1885 that they are quite superficial. They do not appear to be of any practical importance as Sir David Prain writing in 1891, stated that the layer of sulphur which had accumulated round the principal solfatara since 1884 was only from under one to two and a half inches in thickness.

Iron Pyrites.

Several quartz veins carrying iron pyrites were found by Dr. Coggin Brown near Hungwe and near Man Pat in the Tawnpend State of the Northern Shan States in 1914. Even if further exploration proved that they contained large quantities of the mineral, the inaccessibility of the area renders the discovery valueless as a source of sulphuric acid.

A deposit of iron pyrites is said to occur at Loi Leik Lkam in the North Hsenwi State from which a few tons were sent to the smelters of the Burma Corporation, Limited, at Nam Tu in 1925. The size of the ore body is unknown and the Corporation found it cheaper to import pyrite from Europe than to utilize this material.

Other Metallic Sulphides.

In the great ore deposits of the Bawdwin Mines, situated in the Tawnpend State, India possesses a reserve of sulphur which is unequalled in its Empire. The ores consist of the sulphides of lead, zinc, copper and silver; the sulphur accompanying the first, third, and last named metals is burnt off at Ham Tu, the zinc sulphide is exported. The actual reserves in sight in the mine on June 30th, 1928, totalled over 4,000,000 tons, containing, according to Dr. Coggin Brown, roughly about the one-half of one million tons of sulphur. In addition to this there are available some 3,500,000 tons of low grade ore, which is not removed at present, but which may be in the future, which on the authority of the same geologist contain at least 90,000 tons of sulphur.

It must be remembered that the limits of the ore at Bawdwin are not known and that later developments are expected to reveal great quantities of sulphides. Most of the sulphur is exported in the form of zinc sulphide and it is understood that the various schemes which have been brought forward from time to time to manufacture zinc in India and thus free the sulphur for the manufacture of sulphuric acid have been abandoned.

Magnesite.

Magnesite, the carbonate of magnesium, has not been found in Burma beyond a few odd specimens which may be regarded as mineralogical curiosities. Dolomitic limestones consisting largely of the double carbonate of calcium and magnesium are available in unlimited quantities in the Shan States.

Sodium Chloride (Common Salt).

Large quantities of common salt are manufactured by the evaporation of sea water in the coastal districts of Burma. Prior to the British occupation of the country the salt industry appears to have flourished in certain parts of the "dry zone". The water from deep wells in the Burmese petroleum belt is often noticeably saline. Records of brine springs and wells exist regarding occurrences in the districts of the Upper Chindwin, Katha, Myingyan, Pegu, Thayetmyo, Sagaing, Shan States (Northern) and Shwebo. Indeed, it may be stated that salt can be obtained from many of the sub-soil brines in most of the districts lying within the so-called waterless tracts of Burma, but whether it would prove profitable to manufacture sodium chloride from them as a basic material for the preparation of heavy chemicals is a matter which would need further investigation.

Potassium Nitrate (Saltpetre).

Strover gives a list of localities situated in the "dry zone" of Upper Burma at which potassium nitrate was manufactured in the times of the Burmese King. The average annual outturn, about 1873, is stated to have been about 1,300 cwts. Middlemiss in 1900 mentions the manufacture of saltpetre at Namtok (Southern Shan States) from earth gathered from beneath the floors of caverns. Rao Bahadur Sethu Rama Rau in an unpublished report on the geology of the Mergui district has drawn attention recently to the thick deposits of bat excreta which line the floors of the caves in the Mergui district, and which were at one time collected and used for the manufacture of this chemical. As a supply of large supplies of nitrates or other nitrogen-bearing products the known sources in Burma are quite negligible.

Sodium Nitrate.

This substance ($NaNO_3$) is not known to occur in Burma.

Bauxite.

Although some of the laterite deposits of Lower Burma probably contain bauxite, the hydrated oxide of aluminium, nothing has been found corresponding in any way with the large reserves of this mineral which are available in India. Bauxite is used in the refining of oil and it is understood that the Companies concerned import their requirements from outside sources.

Chromite.

Chromite occurs in small quantities in association with the serpentine rocks of the Tawnau Jade tract and in the foothills of the Arakan Yoma of the Henzada district. As far as is known the quantities available are too small to be profitably exploited.

Manganese Ores.

Various ores of manganese have been reported from time to time from a number of districts in Burma but none of them possess any economic importance.

Potassium Chloride.

Sylvite (potassium chloride) does not occur in Burma, as far as is known at the present time.

Gypsum.

Gypsum, or selenite, the hydrons sulphate of calcium is found in the Pegu beds of Central Burma. According to Sir Edwin Pascoe, "it has never been found as a definite bed, but occurs as the transparent variety known as sel nite in crystalline flakes and layers disseminated chiefly among the clays or mixed beds; the thickness averages about ½ to 1 inch, but may rise to 2 or 3 inches.

Limestone.

Limestone are abundant in many parts of Burma. The Amherst district is capable of furnishing unlimited supplies. Good limestones are known to occur in the Bassein district and in Ramri Island. The Sagyin Hills, 20 miles north of Mandalay, are, to a great extent, composed of a marble. Unlimited amounts of the same variety of rock occur in the Kyaukse district and enormously thick bands of it extend from Thabeitkyin in Katha district in beyond Mogok. Dolomitic and other limestones cover a large part of the Shan States. The rock is of common occurrence along the eastern base of the Arakan Yoma, and a limestone hill to the south of Thayetmyo has been extensively quarried for lime burning.

Phosphates.

There are no recorded occurrences of minerals phosphates in Burma. The "local regulations and concessions in respect of the production or removal" of all the more important minerals in Burma are given in the Burma Mineral Concessions Manual which contains the Rules laid down by the Governor General for the grant of licenses to prospect for minerals and of mining leases in British India and, in addition, the directions issued by the Government of Burma in connection therewith.

Special rules have been framed for the extraction of Stone, Laterite, Limestone, Steatite, Sandstone, Marble, Gypsum, clay and other minor minerals under enactments cited in the first direction mentioned above.

Certain special rules also govern the working of gem, amber and jade-bearing deposits, and of tin-bearing deposits by native methods in part of the Mergui district and the issue of petty oil-winning leases in Kyaukpyu.

Manuring of paddy in Lower Burma, by David Hendry, M.C., B.Sc., N.D.A., I.A.S., Deputy Director of Agriculture, Southern Circle, Rangoon.

On the 9½ million acres of swamp paddy land in Lower Burma where almost the whole of the Burma rice of commerce is produced, the paddy crop has hitherto been grown practically without manure. There is an impression abroad that this land receives an annual coating of river silt which enriches the soil and maintains its fertility. But so far as the main paddy is concerned this is not so: and the land which does receive this coating of silt, with the exception of some parts of the lower Delta, is generally in such a precarious position, liable to severe damage by floods, that paddy growing there is a very speculative business and may be left out of consideration in the present paper entirely. The main part of the paddy area receives no annual coating of silt, but is on such a level that while by means of small field embankments it can hold enough rain water to mature a crop with a growing period of 150 to 200 days, it is high enough to be comparatively safe from the flood waters of the Burma rivers during the monsoon.

The comparatively high prices ruling for paddy since the war have encouraged the extension of cultivation into low-lying end more precarious tracts which do receive silt, and it is chiefly owing to this fact that so much has been heard in the past few years of the increasing damage done by floods to the paddy crop: for these low-lying areas on the margin of cultivation, and more or less recently brought under the plough, have suffered most.

Permanent level of fertility reached.

The system followed, of continuous annual cropping with paddy is exhausting when practically nothing in the way of manure is returned to the soil; but most of the land has already lost its virgin fertility and has been reduced to a level of productiveness which now appears to be fairly constant—a level at which the plant food removed by the annual rice crop is made good by the natural break down of the soil. The only reliable statistics available do not show that there has been any progressive decline in fertility within recent times; and this is supported by Settlement and other reports going back farther than 1913-14 from which year comparable records of acreage yields are available. Taking the Hanthawaddy District Settlements Reports as an example, the Reports from 1872 to 1910 show that in the areas dealt with, there has been no decline in fertility during the time. The actual figures given show yields per acre well above the average now accepted for the country as a whole, and we are probably safe therefore in assuming that under the present system of cultivation a general average yield of about 1,500 lbs. per acre, apart from annual fluctuations, may be expected to continue in Lower Burma for some considerable time.

Under the circumstances this yield may be considered fairly good and compares not unfavourably with that of some other tropical rice-growing

countries. The following table compiled from figures extracted from the International Year Book of Agricultural Statistics shows the relation between the principal rice-growing countries in 1926. The figures must be regarded as a rough indication only, since methods of recording yields vary in different countries, and China, one of the largest rice-growing countries, records no figures at all. Thus, as an example, the acreage yield in India as a whole is based on the sown area while that for Burma is on the matured area only.

Principal rice-growing countries.

Country.	Acreage of rice.	Yield per acre. Lbs.
India	79,143,000	1,281
China	.....	...
Indo-China	12,795,000	1,041
Java	8,356,000	1,378
Japan	7,738,000	2,875
Siam	7,157,000	1,680
Philippines	4,252,000	1,014
Korea	3,885,000	1,565
French Guinea	2,038,000	890
Formosa	1,400,000	1,761
Madagascar	1,372,000	960
Brazil	1,323,000	1,130
United States of America	1,014,000	2,252
Ceylon	829,000	676
British Malaya	664,000	1,006
Soviet Russia	583,000	1,050
Sierra Leone	400,000	1,503
Italy	365,000	4,062
Egypt	191,200	2,847
Senegal	123,300	890
Spain	121,000	5,800
Mexico	118,400	1,360

Pre-War, 1909—1913.

The yields in Spain, Italy, and Japan are outstanding, and have been so for many years, due to the intensive methods adopted there: but it is worthwhile noting that until 1916 the yield in America was approximately the same as for Burma, and the higher figure now shown is a comparatively recent achievement. This increased yield has been brought about principally by the more extended use of fertilisers; and although a similar increase could be brought about in Burma by the same means, this could not in the past be done at a profit for reasons which will be adduced later.

Need for Manuring.

The need for manuring of paddy land in Lower Burma has been one of the subjects under investigation at the Hmawbi Experimental station for a number of years and among other experiments a series of plots treated with different manures was laid down in 1913 designed to ascertain what manurial constituents were deficient in these soils, and to what manurial treatment they would probably respond best. This experiment was continued for 10 years, the individual plots being manured as shown below for 5 consecutive years, and the controls left untreated. Manuring was then discontinued and all plots were observed for a further period of 5 years to record the residual

effect of the different manures employed. The results have been published in the annual reports of the Hmawbi Station but I have condensed them here into a single table which is given below:—

No.	Treatment (per acre).	5 years' manure per cent. increase over average of controls.	5 years' residual effect per cent. increase over average of controls.
(*a*)	(*b*)	(*c*)	(*d*)
1.	Cattle manure at 30 lbs. Nitrogen . . .	37·5	21·8
2.	Cattle manure at 50 lbs. Nitrogen . . .	52·3	34·5
3.	Cattle manure at 70 lbs. Nitrogen . . .	68·7	37·8
4.	Cotton cake at 50 lbs. Nitrogen	54·8	29·2
5.	Cattle manure at 30 lbs. Nitrogen Superphosphate at 30 lbs. P205. Sulphate of potash at 30 lbs. K20	53·0	54·0
6.	Cattle manure at 30 lbs. Nitrogen. Superphosphate at 20 lbs. P205	43·5	27·6
7.	Cattle manure at 30 lbs. Nitrogen. Bone Meal at 20 lbs. P205	51·0	31·8
8.	Bone Meal at 20 lbs. P205	26·5	9·5
9.	Superphosphate at 20 lbs. P205	35·3	15·3
10.	Sulphate of Potash at 20 lbs. K20 . . .	+5·0	−6·6
11.	Sodium Nitrate at 30 lbs. Nitrogen . . .	−17·0	−35·5
12.	Sodium Nitrate at 30 lbs. Nitrogen (applied as top dressing)	+5·0	−25·0
13.	Nitrolim at 30 lbs. Nitrogen	11·0	64·2
14.	Ammonium Sulphate at 30 lbs. Nitrogen . .	+32·5	−25·5
15.	Lime at 2,000 lbs.	24·0	1·9
16.	Ammonium Sulphate at 30 lbs. Nitrogen . . Superphosphate at 20 lbs. P205 . . . . Sulphate of Potash at 20 lbs. K20 . . .	35·5	17·5

Among other information provided by this table the most important facts are the indications given that the chief requirements of paddy on these soils are Nitrogen in the form of Ammonia, and Phosphate; that Potash is not shown to be a definite limiting factor; and that Nitrogen in the form of Nitrate is distinctly harmful. The deficiency in Nitrogen and Phosphate shown, is confirmed by the chemical analyses of these soils which are also published in the Station Reports, and subsequent experiments have borne out the correctness of the conclusions drawn. The Lower Burma soils differ from the Upper Burma soils in being distinctly acid, and respond to dressings of lime although in no very great degree; and experiments with lime have shown that while it is beneficial to the soil and increases the crop the cost renders its use uneconomic.

Indigenous Manures available.

The more or less readily obtainable indigenous manures able to supply the deficiencies indicated include cattle dung, bats' guano, fish waste, bone meal, rice bran, cotton cake, green manure crops, etc., but the quantities of each

are quite inadequate for the purpose of bringing about any marked increase in fertility. Cattle dung is by far the most important and the quality and amount of this available for paddy land may well be considered first.

In the system of cultivation followed, one pair of bullocks is able to work from 8 to 12 acres, and as there is practically no land other than paddy land worked by bullocks, an average of one pair of bullocks to every 10 acres is a reasonable figure to assume for the ratio of live stock to cultivated area. Cattle are only bred locally to a negligible extent owing to the unsuitable swampy conditions, and nearly all the working bullocks are imported from the dry zone of Upper Burma. This being so, the cultivator seldom keeps more bullocks than are strictly necessary to cultivate his land, and he has no young stock to augment his supply of cattle dung. Other cattle there are kept on the uplands by Indian cow-keepers for milk purposes, but these contribute practically no manure to the paddy land. The ratio of one pair of bullock to 10 acres of land is borne out by the figures of live stock and the cultivated area for the two great paddy-growing divisions in Lower Burma. The Pegu and Irrawaddy Divisions comprise between them 7,342,174 acres of cultivated land including gardens which constitute only about 6 per cent. of the whole; the live stock comprising bulls, bullocks, cows and young stock, and including all classes of buffaloes, amounts to 1,490,134 animals or 745,067 pairs, which is near enough 1: 10 for our purpose.

The amount of dung which a single bullock will contribute to the manure pit in the course of a year, according to records kept at the Hmawbi Station, is about 3 tons, or approximately 6 tons for a pair. If carefully conserved, this amount would be available each year for 10 acres of paddy land; but under village conditions the need for careful conservation is not appreciated, and the wastage is so great that not more than half this quantity ultimately finds its way to the land. In fact so little is the value of cattle dung appreciated in some of he more fertile tracts, that I have seen a cultivator throw it into a near-by-creek to avoid the trouble of storing and carting it on to his land.

The more ordinary way of using the available cattle manure, is to collect what has been loosely stored in the open for the past year and spread it on the nurseries which constitute a tenth of the holding; the main area is not manured at all. The manure so applied in addition to being deficient in quantity, is lacking in quality: concentrates are only fed to the cattle on a small scale, and when the manure has been stored in the open through part of the rains it is very poor stuff indeed, as analyses show.

There is a good deal of scope for improvement in the methods of conserving and applying this best of all manures, and efforts towards bringing this about are being made by the Agricultural Department: but even when the best has been done the fact remains that there is not enough cattle manure to go round, and a dressing which at best averages about 3 tons for 10 acres, can hardly be considered sufficient to maintain the fertility of the land, far less to improve it.

Of the other manures such as bats' guano, fish waste, bone meal, rice bran, cotton cake, etc., these are either strictly limited in quantity like the first three, or fetch higher prices for other uses outside general agriculture than they are worth as manure. Even the purely manurial substances like bats' guano and fish puano sell for much higher prices to gardeners and concerns growing valuable money crops than a crop of low money value per acre like paddy can afford to pay. The use of these expensive manures on paddy although it increases the outturn per acre considerably, results in a heavy monetary loss as experiments at the Hmawbi Station clearly show. Bone meal is on the border line and just manages to pay its way.

The growing of green manure crops constitutes a well recognised method of maintaining and improving soil fertility, but on the old paddy land these cannot be grown with any reasonable prospect of success. When the rains finish in early November, the soil dries up very quickly and assumes a cement-

like hardness in which no green crops will grow; even seeds broadcasted among the ripening paddy crop fail to establish themselves. Most of the known green manure crops and the different methods of growing them have been tried under these conditions, but have failed. The hard condition of the ground associated with the long rainless spell from November till May renders growth difficult, but in some of the retentive soils of the middle zone to the north of the main paddy area I have seen a green crop of sun hemp grow very well indeed.

These are the main sources of indigenous manure. Nightsoil is not included, for the people of the country will not touch it: and the attainment of a high standard of permanent and increasing fertility by this means, similar to that existing in China and Japan as described in King's " Farmers of Forty Centuries " appears to be outside the bounds of possibility.

Synthetic farm-yard manure appeared an attractive proposition for Burma but is expensive to make an experiments with it at Hmawbi since 1923 have been disappointing so far as profits are concerned.

Artificial Fertilisers.

This brings us to the use of imported fertilisers to augment the scanty supplies of indigenous organic manures and the reasons why these have not been more strongly advocated for paddy in the past.

To supply the important constituents of Ammoniacal Nitrogen and Phosphoric acid the manures available hitherto have been Sulphate of Ammonia and Superphosphate, and these have proved entirely suitable for the swampy conditions under which paddy is grown. But it has already been mentioned that a crop of low money value per acre like paddy cannot give an economic return for expensive manures. As I shall show later imported Sulphate of Ammonia and Superphosphate are cheaper than the indigenous manures already dealt with, and the question of whether it was economic or not to use these manures has depended upon the relative prices of the manure and the paddy, both of which fluctuated considerably in the past.

The prices of Sulphate of Ammonia and Superphosphate at Rangoon before the war, at the end of the war, and at the present time, are as follows:—

Year	Sulphate of Ammonia per ton.	Superphosphte (18—20) per ton.
1914	Rs. 240	Rs. 75
1919	Rs. 488	Rs. 150
1928	Rs. 170	Rs. 75

For 10 years before the war the threshing floor price of paddy in the districts close to Rangoon fluctuated from Rs. 96 per 100 baskets (approximately 5,000 lbs.) to Rs. 152 per 100 baskets. The price in 1914 was Rs. 125 and the average for the 10-year period prior to the war was Rs. 124. Since 1920 the price has fluctuated between Rs. 145 and Rs. 196 with an average of Rs. 176. In the present year the threshing floor price was Rs. 170 but contrary to custom has fallen since to Rs. 160 at the beginning of the rains.

Taking the general average crop as 1,500 lbs. or 30 baskets per acre, an application of 1 cwt. of Sulphate of Ammonia *plus* 1 cwt. of Superphosphate per acre can be expected to increase the crop by approximately 30 per cent. The actual increase to be expected varies with soil and other conditions, but that this figure is not an overestimate will be shown by the results of a recent experiment to be quoted later.

Taking the situation as it was in 1914 let us see what the monetary results of such an application to such a crop would have been.

Adding Rs. 10 per ton to the cost of Sulphate of Ammonia and to that of Superphosphate to get the manure from Rangoon on to the cultivator's holding, one cwt. of the former would cost Rs. 12-8 and the later Rs. 4-4, a total of Rs. 16-12. A 30-basket crop at Rs. 125 per hundred baskets would be worth Rs. 37-8. An increase of 30 per cent. on this would be Rs. 14-4 and the difference between Rs. 16-12 the cost of the manure, and Rs. 11-4 the resulting increase in the crop would be a loss of Rs. 5-8 per acre.

In 1928 the corresponding figure would be: cost of manure Rs. 13-4, value of crop Rs. 51, value of 30 per cent. increase, Rs. 15-5 result, gain of Rs. 2-1 per acre.

These figures are shown more concisely in the following form:—

——	Paddy price per 100 bkts.	Value of crop of 30 bkts per acre.	Value of 30 per cent. increase.	Cost of manure per acre.	Difference.
	Rs.	Rs.	Rs.	Rs.	Rs.
1914 . .	125	37·5	11·25	16·75	Loss 5·50
1928 . .	170	51·0	15·30	13·25	Gain 2·05

New Artificial Fertilisers.

This shows clearly the change which has been brought about since before the war, partly by the drop in the price of artificial manure and partly by the rise in the price of paddy. But a circumstance has arisen which is of greater importance. This is the advent of the new manures combining ammoniacal nitrogen and phosphate in one, produced at a cheap rate, and evolved as a result of the work done on high explosives during the war. Two of these are available now in India and one of them has been tried out over the past three years on paddy land at Hmawbi, and in the surrounding districts. With another now under trial, calculating the cost per acre on exactly the same basis as in the previous table, the cost of the same quantities of nitrogen and phosphate to produce the same effect would be Rs. 11-2 instead of Rs. 13-4 and the price of paddy would have to fall below Rs. 124 per 100 baskets before the balance of profit and loss were tipped in the wrong direction. These new manures also possess the added advantage of being single chemical compounds which require no mixing; and owing to their concentration, the transportation charges are cut in half.

Experimental Results.

The first of these new manures to come to hand for trial in 1924 was Ammo-Phos which was obtained from New York in two grades, 20/20 and 13/48. This five promising results, and an experiment was put down last year to determine the optimum dressing per acre. The quantities used were 50,100,200 and 300 lbs. per acre, and the plots for each were laid out in a continuous series, each treatment being replicated 6 times. The size of each individual plot was approximately 1/41, although the season was a good one, and the appearance of the plots during the growing season bore out the final weighing results, the percentage increases of from 47·7 per cent. to 118·6 per cent. are higher than can be normally expected. Taking the cost per ton of Ammon-Phos. *plus* freight at Rs. 230 for the 20/20 grade and Rs. 255 for the 13/48 grade; paddy at Rs. 170 per 5,000 lbs.; and allowing nothing at all for the increased straw which has no value in Burma, the

results of the experiments with the 20/20 grade and 13/48 respectively were as follows:—

Ammon-Phos: 20/20 grade.
Fields Nos. 75 and 76. Size of plots: 0·024 acre.
Variety of paddy: C19—26. Replicated 6 times: 32 plots.

Nature of treatment per acre.	Yield per acre. Grain straw.	Increase per acre grain straw.		Value of increas per are.	Cost of treatment per acre.	Profit per acre due to manure.	Per cent. increase in grain per acre.	
1	2	3	4	5	6	7	8	
	lbs.	lbs.	lbs.	lbs.	lbs.	lbs.	lbs.	per cent.
1. Control .	1,250	3,292	..	..	..	..	..	..
2. 50 lbs. .	1,846	4,158	596	886	20-4	5-2	15-2	47·7
3. 100 lbs. .	2,096	5,267	846	1,975	28-12	10-4	18-8	67·7
4. 200 lbs. .	2,542	6,504	1,292	3,212	43-15	20-8	23-7	103·4
5. 300 lbs. .	2,783	7,250	1,483	3,958	50-7	30-12	19-11	118·6

Standard error: 4·6 per cent.

Ammon-Phos: 13/48 grade.
Fileds Nos. 51 and 52. Size of plots: 0·024 acres.
Variety of paddy: C19—26. Replicated 6 times: 32 plots.

Nature of treatment per acre.	Yield per acre. Grain straw.	Increase per acre grain straw.		Value of increase per acre.	Cost of treatment per acre.	Profit per acre due to manure	Per cent. increase in grain per acre.	
1	2	3	4	5	6	7	8	
	lbs.	lbs.	lbs.	lbs.	lbs.	lbs.	lbs.	per cent.
1. Control .	1,533	3,846	..	..	..	..	..	..
2. 50 lbs. .	1,971	4,358	438	522	14-14	5-11	9-3	28·6
3. 100 lbs. .	2,017	5,200	484	1,356	16-7	11-6	5-1	31·9
4. 200 lbs. .	2,575	6,071	1,042	2,225	35-8	22-12	12-12	67·9
5. 300 lbs. .	2,650	55,659	1,117	1,813	38-0	34-2	3-14	72·9

Standard error: 3·7 per cent.

These exceedingly promising results and raise several points of interest which there is no space to discuss here; but one thing is made clear, and that is that profitable manuring of paddy with artificial fertilisers available in quantity is now within the scope of possibility. After discounting the admittedly high increases, which are nevertheless given as they weighed out, it must be remembered that the profits shown for one year only, and previous experiments at Hmawbi have shown that the effect of this manure lasts for two years, the increase the second year being from one-third to two-thirds in those in the year of application. The second year, or residual effect of the 13/48 grade is higher than that of the 20/20 grade, which is to be expected from the higher phosphate content of the former; but the quick returns obtained with the 20/20 grade in the first year are all important while money for at excessively high rate of interest. Incidentally interest charges have not been included in the above tables but the profits shown allow for a fair addition of this kind. In both cases the optimum rate of

application is 200 lbs. so far as profit per acre is concerned, but the outlay involved in such a dressing is hardly likely to commend itself to such land-owners and cultivators who may be induced to take up these manures for some time to come. Applications of 50 and 100 lbs. are quite satisfactory, however, and these should be good enough to begin with. The time of application is important. The best time is when the fields have been more or less drained off before transplanting. Applied later when the fields are full of water the manure is wasted.

Nitrogen Phosphoric Acid Ratio.

Before leaving these two grades of manure, I am tempted to quote another Hmawbi experiment showing the optimum ratio of Nitrogen to Phospheric Acid for the Paddy soils being dealt with. The experiment was a pot experiment and the results obtained indicate that the best ratio lies somewhere between 1: 1 and 1:3 of N: P_2O_5 with a strong assumption that it is about 1: 2.

Optimum Nitrogen: P_2O_5 ratio.

Variety of paddy: C15—10. Replicated 10 times: 60 plots.

No.	N : P^2O^5.	Treatment ratio.	Tillering.	Outturn.		Straw.	Grain straw weight ratio.	Remarks.
				Grain.	Chaff.			
1	2	3	4	5	6	7	8	9
				gm.	gm.	gm.		
1	Control .	..	8·6	29·58	0·98	45·47	1 ; 1·54	
2	1 ; ½ .	..	10·0	25·23	1·31	55·50	1 ; 2·20	
3	1 ; 1 .	..	9·5	30·17	1·00	52·10	1 ; 1·69	Standard error 1·6 or 5·3 per cent.
4	1 ; 2 .	..	8·6	34·68	0·45	50·99	1 ; 1·47	
5	1 ; 3 .	..	8·7	32·69	0·63	56·87	1 ; 1·73	
6	1 ; 4 .	..	9·2	28·33	0·75	58·98	1 ; 2·07	

These figures though fairly regular and indicative of whereabout the ratio lies are not accepted as final, and the experiment is being repeated this year on a field scale.

Another experiment on a field scale showing the ineffectiveness of Potash when added to Nitrogen and Phosphate manures on these soils might be quoted, but the full experiment will be found in the printed report of the Hmawbi Station, and it will suffice here to say that at present this manure does not pay its way.

Comparative cost of Cotton Manures.

While on the subject of these manures and their relative costs it is of interest to note the unit values of those which have been referred to in this paper, and taking present prices I have tabulated these below. With the exception of the slow acting Bone Meal it will be seen that indigenous manures are dearer per manurial unit than the new artificial fertilisers. Of course organic manures have an additional value of their own but here they

are limited in quantity, and any increase in demand is followed by sharp rises in price as has been noticed in the case of bats' guano.

Manure.	Place.	Price per ton.	N.	Analyses.		N.	United values Rupees.	
				P_2O_5	K_2O		P_2O_5	K_2O
1. Ammonium Sulphate.	Rangoon .	Rs. 170	21	..	..	8·1	..	..
2. Superphosphate 18/20.	Do. .	75	..	19	..	..	4	..
3. Sulphate of Potash.	Do. .	205	..	..	50	..	..	4·1
4. Ammo-Phos 20/20.	Do. .	220	16·48	20	..	8·35	4·12	..
5. Ammo-Phos 13/48.	Do. .	245	10·70	48	..	7·12	3·52	..
6. Bats' Guano .	Kyaukse .	55	5·03	1·86	0·83	8·62	4·25	4·36
7. Bone Meal .	Rangoon .	85	2·04	32·78	..	4·72	2·3	..
8. Fish Manure	Do. .	150	7·71	2·95	0·65	15·8	7·8	8
9. Cotton Seed Meal.	Do. .	82·5	5·90	2·70	1·45	10·38	5·23	5·1
10. Cotton Seed cake.	Do. .	88·4	6·71	2·34	1·33	10·2	5·12	5·24
11. Diammonophos 20/53.	Do. .	307	20·60	52·50	..	6·63	3·27	..
12. Special 20/20	Do. .	213·4	20·20	20·30	..	7·06	3·49	..

The cheapest manure of suitable composition in this list is No. 12. Import duty of 15 per cent. *ad valorem* has recently been imposed on these Ammonium Phosphate but this is not likely to continue and has not been taken into consideration above.

Other manures such as Urea and Cyanamid, etc., have not been mentioned here although experiments have also been carried out with them. Unit for unit, however, they are not so effective as the fertilisers dealt with and more extended experiments have not been included in the annual programme.

Conclusion.

This then is the situation we have arrived at. The cultivation of rice in Burma on the present enormous scale is of comparatively recent origin; from 1886 until the present year the paddy area has grown from 1,760,271 to 11,826,700 acres; and in this time the original virgin fertility of the soil has been largely exhausted. To maintain the standard of fertility at its present level the indigenous manures are barely sufficient, and to increase it they are quite inadequate. To achieve the desirable end of increasing the production per acre, there are several lines of approach: improved implements and cultivation can do a little, and the use of improved and higher yielding strains of paddy can also do a little: but the total improvement which can be attained by these means is small, and a really significant increase can only be brought about by better feeding of the crop.

Before the war and for some time after, the relation between the price of paddy and the price of the artificial fertilisers which were suitable for this purpose was such that manuring of this sort could not be undertaken at a profit. Since the war the position has changed; the price of paddy has risen and the cost of the old manures has fallen to its previous level. Furthermore, a new class of manures has become available, peculiarly adopted to the

needs of Lower Burma soils, and considerably cheaper than the Sulphate of Ammonia and Superphosphate which have been the standard manures in the past. The consequence is that artificial manuring has now become a paying proposition for paddy as it has been for many valuable crops in the past, and the Agricultural Department is now for the first time in a position to recommend these manures to the cultivators, with the assurance that under suitable conditions a reasonably good profit will result. It is most decidedly not intended that these manures should displace cattle manure which is still the best of all, but that they should be used to supplement what little supplies of this are available under the rather abnormal system of agriculture which obtains in Lower Burma. Thirty-six district trials were carried out with Ammo-Phos in the Southern Circle last year, and although the conditions for carrying out experiments in the districts are not such as to yield data comparable in accuracy with that obtainable on a fully equipped Experimental Station, the results showed that the response to the manure was sufficient to justify the belief that the Hmawbi experience is likely to be repeated further afield. About one hundred field demonstrations are therefore being put down on cultivators' holdings this year, and as experience accumulates, this work will be extended.

The question may be asked whether the Burmese cultivator will take to these new manures: I think he will. The process will be a slow one but there are indications that a beginning will not be difficult to make. Bone Meal and rice bran are beginning to be brought for manurial purposes even now, and I knew of one village which bought 20 tons of bone meal last year for its paddy land. These last mentioned substances are slow acting and return a very meagre profit, so that when new and more profitable manures are put at his disposal the cultivator is likely to respond. It is even just possible that experience of such manures may have an indirect effect of creating a keener appreciation of the manurial substances already at his

Statement supplying information about the raw materials mentioned in paragraph 2 of the Tariff Board's letter as found in Bengal.

Name of division.	Name of district.	Name of raw material.	Note about the material.	Whether there are any local regulations or concessions in respect of the production or removal of the materials.
1	2	3	4	5
1. Burdwan .	1. Birbhum	1. Lime stone.	It is found in small quantities in the sadar circle of the sadar sub-division. The quantity available is hardly sufficient for local consumption. There is no scope for the manufacture of lime on a big scale.	*Nil.*
		2. Iron ores	They are found in large quantities in Mahammadbazar and Dehucha in Mahammadbazar thana in the sadar sub-division. The exact quantity available cannot be estimated but it is reported that it is sufficient for commercial purposes and that a factory might pay.	*Nil.*
		3. Iron slags	They are found in very small quantities near Labpur in the sadar sub-division. They cannot be used for the manufacture of chemicals.	*Nil.*
	2. Bankura	1. Lime stone, Gutin.	This is a variety of hydraulic lime stone mixed with earth, sand and other impurities. It is available more or less throughout the district especially near small streams with clayey soil. It is collected as sweepings of the earth surface in gooting producing tracts and it is used specially for building purposes. It cannot be quarried in any large quantity in any place. Like ordinary laterite gravel it is not paying. The quantity available cannot be ascertained.	
	3. Midnapur	1. Lime stone and 2. Pyrites.	They are available in the Jhargram sub-division. The lime stone is available in fairly large quantities as superficial deposits almost all over the Jhargram sub-division and in smaller quantities in Ghatal. There are no lime stone quarries in the sub-division. Iron pyrites is found only near Gidhni mixed up with other materials but not in any very great quantity.	There are no local regulations or customs except that manufacturers of lime who collect these materials for local needs pay a nominal royalty to the zemindar for their removal.

Name of division.	Name of district.	Name of raw material.	Note about the material.	Whether there are any local regulations or concessions in respect of the production or removal of the materials.
1	2	3	4	5
1. Burdwan—*contd.*	3. Midnapur—*contd.*	3. Common salt.	Common salt is found by evaporation at places in the Contai sub-division in very small quantities. In Tamluk a saline crust is occasionally found on the soil in small quantities, especially on embankments of canals.	*Nil.*
	4 Hooghly	...	*Nil.*	*Nil.*
	5. Howrah	...	*Nil.*	*Nil.*
2. Presidency	1. Nadia .	1. Lime stone.	Found in very small quantities in the Ranaghat sub-division of the Nadia District.	*Nil.*
3. Dacca	...	*Nil.*	*Nil.*	*Nil.*
4. Rajshahi .	1. Jalpaiguri.	1. Lime stone.	Available in some quantities in some parts of Alipur Tahsil and in Kumargram Police Station.	*Nil.*
	2. Darjeeling.	1. Lime stone.	Available at Pala block in Kalimpong Government Estate at a distance of about 20 miles from the Kalimpong Road Station of the D. H. Railway. The estimated area is 5 acres. The quarry has not yet been worked, and the quantity available has not been estimated.	*Nil.*
5. Chittagong	1. Chittagong Hill Tracts.	1. Lime stone.	Found in small quantities of a poor quality in remote places. Extraction would be of little value as a commercial proposition.	*Nil.*
	2. Noakhali and Chittagong.	1. Salt	Illicit manufacture takes place in the seaboard areas but the quantity manufactured is inconsiderable.	*Nil.*

Government of Bihar and Orissa.

Letter No. 122/I. I. C.-1, Com.-R., dated the 10th June, 1929.

Subject:—PROTECTION FOR CHEMICAL INDUSTRY IN INDIA.

With reference to your letter No. Cir.-189-T., dated the 14th October, 1928, I am directed to forward for the information of the Board a statement showing the raw materials which are found in Bihar and Orissa together with the estimated quantities and the localities in which they occur so far as information is available. I am also to enclose a note giving a brief description of the production and use of each. A detailed account of the raw materials in the province will be found in Dr. Fermor's book on the mineral resources of Bihar and Orissa which is reproduced at pages 15 to 97 of the local Government's "Hand Book of Mining and Mineral Resources in the Province" a copy of which is also enclosed for the information of the Board.

2. The regulations governing the grant of mining concessions in waste lands which are the property of Government, are contained in a manual known as the "Bihar and Orissa Waste Lands and Mineral Concessions Manual, 1926" a copy of which is also enclosed together with a copy of the rules framed by the local Government governing the grant of similar concessions in court of wards estates and other private estates under the management of the Board of Revenue.

3. A list of the works which have been established in this province for the manufacture of sulphuric acid and sulphate of soda is annexed.

Enclosure No. 1.

Raw materials.	Localities in which they are found.	Local regulations or concessions, if any, in respect of the production or removal of these materials.	Estimated quantities.
1	2	3	4
1. Iron pyrites .	Iron pyrites are found in villages Hesalong, Jhumri Koira, Khokro, Pata, Rearda, Tankocha in Chandil police station in the district of Manbhum.	*Nil*	Not workable.
2. Common salt .	(*a*) Is found in villages Nabiganj, Kakri, Lakhnaura and Mustafabad in the jurisdiction of the Basatpur police station in the district of Saran. (*b*) In the district of Cuttack, Balasore and Puri of the Orissa Division.	(*a*) The manufacture of common salt in Saran is supervised by the Salt Department. In Orissa the manufacture of common salt is not permitted.	The annual output of common salt in Saran is about 445 maunds.
3. Potassium Nitrate.	Not found in abundance but traces of it are found almost everywhere in the jurisdiction of Chandil police station, Manbhum.	*Nil*	Not workable.
4. Sodium nitrate saltpetre.	Found all over the district of Champaran. "Nitrate saltpetre" in crude form is found in villages Nabiganj, Lakri, Lakhanpura and Mustafabad in the jurisdiction of the Basatpur po.ice station in the district of Saran.	In Champaran licenses to work saltpetre are granted by the landlords generally for a year at a time. They are extensively granted and there is practically no restriction.	Not workable.

Raw materials.	Localities in which they are found.	Local regulations or concessions, if any, in respect of the production or removal of these materials.	Estimated quantities.
1	2	3	4
5. Bauxite . .	Is found in western portion of the Ranchi District. A kind of white clay is found in Khurda subdivision of the Puri district, but it is not certain whether it is bauxite or not.	Not subject to any special regulation.	Not workable.
6. Chromite . .	Exists in Saltba block reserved forests, in the protected forest block No. 30 and in village areas of Jojuhatu, Rangamati and San Bankan adjoining the above forests in the Kolhan Government estate, Singhbhum.	Mining concessions are governed by rules in Bihar and Orissa Waste Land and Mineral Concessions Manual, 1926, local regulations imposed are the Diku Clause, Fire Clause, etc. (*Vide* pages 80, 87 and 103 of Bihar and Orissa Waste Lands Manual).	The total average quantity of chromite ore produced (as recorded in the annual report of the Chief Inspector of Mines) for the years 1925, 1926 and 1927 was about 2,400 tons.
7. Manganese .	Exists in small pocket deposits in many places in the Kolhan Government estate and in Dhalbhum pargana of the Singhbhum district. It is also believed to exist in Hazaribagh and in the Daltonganj thana in Palamau district but it has never been worked.	In Dhalbhum parganas the mineral rights are the properties of a private individual. In the Kolhan mining concessions are governed by the rules given in Bihar and Orissa Waste Lands and Mineral Concessions Manual, 1926; local regulations imposed are the Diku Clause, Fire Clause, Forest Clause, etc. (*Vide* pages 80-87 and 103, Bihar and Orissa Waste Lands Manual).	The total average quantity of manganese ore produced (as recorded in the annual report of the Chief Inspector of Mines) for the years 1925 to 1927 is about 4,000 tons. In Keonjhar Feudatory State the output of manganese in ore was 23,810 tons in 1926, 51,115 tons in 1927 and 72,411 tons in 1928. In Gangpur State the output was 10,379 tons in 1926, 7,960 tons in 1927 and 6,379 tons in 1928.
8. Limestone .	(*a*) In thanas Hazaribagh, Barkagaon, Ichak, Mandu, Ramgarh and Gola of the Sadr Subdivision and in some places of the Giridih subdivision of the Hazaribagh district.	(*a*) The limestone quarries in the sadr subdivision of the Hazaribagh district are properties of Ramgarh Ward Estate and their grants are governed by the rules for the grant of mining concessions in Wards and Encumbered Estates. These rules are based on the rules in the Bihar and Orissa Waste Lands Manual.	(*a*) The annual average output of this raw material in the Hazaribagh district is 3,008 tons.
	(*b*) In various places of the Ranchi district.	(*b*), (*d*), (*e*) and (*h*). The workings of the materials in Ranchi, Palamau, Shahabad excepting Kachwar hills which is owned by a private company and in Sambalpur are not subject to any special regulations. They are governed by rules given in the Waste Land and Mineral Concessions Manual 1926.	(*b*), (*d*), (*f*), (*g*), (*h*), (*i*), and (*j*) Not workable.

Raw materials.	Localities in which they are found.	Local regulations or concessions, if any, in respect of the production or removal of these materials.	Estimated quantities.
1	2	3	4
8. Limestone—*contd.*	(*c*) In Dalma, Khokro, Kumhari, Dungri, Koiro, Hansa-Kocha and Tundru in the police station Chandil, Manbhum.	(*c*) None . . .	(*c*) Not workable.
	(*d*) In thanas Latehar and Daltonganj in Palamau.	....	....
	(*e*) In Margohi, Domarkhar, Ramdihra, Tumba, Murli, Banjari, Kaseawan, Bazidpur, Bharahi and Kachwar hills in Sasaram subdivision of the Shahabad district.	....	(*e*) Output for the three years 1925, 1926 and 1927 was 248, 445, 253, 281 and 291,043 tons.
	(*f*) In an island in the Chilka lake in Puri district.	(*f*) and (*j*) Not reported	....
	(*g*) Lime is manufactured in the district of Cuttack from "ghootings" which are found in the beds of rivers and also by digging the ground in certain localities.	(*g*) The owners of the lands where the ghootings are available charge a royalty of about a rupee per cent. etc., for collecting them.	....
	(*h*) In Rampur zamindari in the sadr subdivision, Sambalpur.	....	The total average output of this material in Bihar and Orissa (as recorded by the Chief Inspector of Mines Annual Reports for the years 1925, 1926 and 1927) was about 266,000 tons.
	(*i*) Limestone in the shape of calcium carbonate is found to exist in small deposits in the Kolhan estate and in the shape of calcanous. Tufa is scattered in abundance all over the district of Singhbhum.	(*i*) In the Dalbhum pargana in Singhbhum the underground minerals rights are the property of a private individual. While in the Kolhan Government estate in the same district mining concessions are governed by the rules given in Bihar and Orissa Waste Lands and Mineral Concessions Manual 1926: local regulations imposed are the Diku clause, Fire clause, etc. (*Vide* pages 80-87 and 103, Bihar and Orissa Waste Lands Manual).	(*i*) In Gangpur Feudatory State the output of limestone was 412,421 tons in 1926, 764,083 tons in 1927 and 518,928 tons in 1928.
	(*j*) There is a certain amount of limestore in the Dami-i-ko estate in the Santal Parganas.	....	....
9. Phosphates .	Phosphate of lime and phosphoretic rock commonly called apatite is known to exist in Dhalbhum pargana of the Singhbhum district.	Not reported	603 tons of apatite was produced in Singhbhum in 1927, 718 tons in 1926 and 1,480 tons in 1925.

Enclosure No. 2.

Note.

Sulphur.—Bihar and Orissa shares the general poverty of India in deposits of sulphur or of sulphides suitable for the manufacture of sulphuric acid. Small quantities of iron pyrites are often found in the coal seams and also found scattered in Singhbhum and Mayurbhanj and in the former district there are sulphide ores of some importance.

Iron pyrites or other metallic sulphides.—No deposits of iron pyrites large enough to be worth exploitation have yet been found, although small quantities of pyrites are often found in the coal seams and also scattered in Singhbhum and Mayurbhanj.

Magnesite.—Several occurrences of chromiferous "peridotite" from which magnesite is formed as a secondary product have been found in Kolhan in Singhbhum but no magnesite has hitherto been discovered in these localities.

Common Salt.—"Formrely salt was manufactured on the coast of Orissa by two distinct methods. In the Balasore and Cuttack districts artificial evaporation was used, concentrated sea water being heated in unglazed earthenware pots with grass for fuel. In the Puri district, on the other hand, water from the Chilka lake was concentrated by solar heat in shallow pits fed by canals from the lake. The output in these districts amounted in 1875-76 to about 10,500 tons, but the production has been discontinued since 1898. The other sources of salt are the saltpetre earths of the alluvial tracts of Bihar, about 1,000 tons of refined salt being recovered annually as a by-product in the course of refining of saltpetre".

Potassium nitrate and sodium nitrate.—The conditions necessary for the formation of saltpetre in a soil—particularly meteorological conditions suitable to the efflorescence of the potassium nitrate at the surface, are ideally present in the Bihar section of the Gangetic alluvial plain. Several districts of Bihar are rich in nitrate—earths which have been worked for centuries by suitable methods. The main districts producing saltpetre are Muzaffarpur, Saran, Champaran and Darbhanga. The total annual output in these districts has been about 8,000 tons. The South Gangetic districts of Shahabad, Gaya, Monghyr and Patna produce about 600 to 800 tons annually.

Bauxite.—The deposits of greatest accessibility and importance are those on the plateaus or parts of the Palamau and Ranchi distircts at elevations of about 3,200 feet above the sea level of which Pakri Pat and Serendag (Ranchi district) are the most important. The deposit at Netarhat (Palamau) is of less value. The laterite averages about 30 feet thick. It also occurs in the laterite capping the Khondalite hills of Kalahandi State at elevations of 3,200 to 4,000 feet. The laterite is about 80 to 200 feet thick.

Chromite.—Occurs in Poru Buru, Kimsi Buru and other hills in the Kolhan west of Chaibassa (Singhbhum). Annual average output for five years (1914-18) was about 1,641 tons. The total quantities of chromite ore produced in this district as recorded in the annual reports of the Chief Inspector of Mines were 3,038, 1,623, and 2,552 tons respectively in 1925, 1926 and 1927.

Manganese.—Has been discovered at several localities in Bihar and Orissa chiefly in Gangpur State, with a maximum output of 55,060 tons in 1909. The total output from this State up to the end of 1919 was 238,343 tons mainly from Gariajhar. It is also found in Singhbhum where deposits have been located in eight villages. The production in 1906 and 1907 was 3,983 tons. Manganese has also been found in small quantities in the Kolhan, Meonjhar and Bonai States. Traces of manganese can also be found in the Katnowa hills and Pandipahari hills in the Monghyr district and in

Mayurbanj and Kalahandi States and a small percentage in the Raniganj coalfield. The total quantities of manganese ore produced in Singhbhum as recorded in the annual reports of the Chief Inspector of Mines were 195, 2,473 and 9,970 tons in 1925, 1926 and 1927 respectively.

Limestone.—Limestone found in Rohtas hills (Shahabad district) was tried for utilization in lithography. Specimens sent to Calcutta for trial were declared to be too siliceous and too thin for practical purposes. The total quantities of limestone produced in Bihar and Orissa as recorded in the annual reports of the Chief Inspector of Mines were 253,227, 253,966 and 291,043 tons respectively in 1925, 1926 and 1927.

Phosphates.—Phosphates of possible economic value have been found in the Province of Bihar and Orissa in the forms of "magazine," "triplite" and "apatite". Monazite is found associated with "apatite" in the Gaya district. The occurrence of "triplite" in considerable quantity at the Abraki Pahar mica mine near Singar in the Gya district has been known for many years. The phosphate (triplite) is also found in Gualatti mauza about 1½ miles from Banekhap. Ten tons of the mineral were extracted during 1914. "Apatite" occurs abundantly in some of the mica-bearing pegmatites of Hazaribagh and in the Giridih and Damodar valley coalfields. "Apatite" deposits of probable economic value have been located in Dhalbhum (Singhbhum) along a belt stretching for 12 miles S-37° E. from Pathalgora through Musaboni, Badea, Kanyaluka and Sungri to Khejaedari, where the total output in 1925, 1926 and 1927 was 1,480, 718 and 603 tons respectively.

Enclosure No. 3.

List of works established for the manufacture of sulphuric acid and sulphate of soda.

SULPHURIC ACID.

1. Tata Iron and Steel Company, Limited, Jamshedpur.
2. Bararie Coke Company, Managing Agents, Jardine Skinner and Company (for use in producing sulphate of ammonia).
3. The Jharia Sulphuric Acid and Company, Managing Agents, Turner Morrison and Company.
4. Girdih Sulphuric Acid Plant, Managing Agents, E. I. Railway.
5. Loyabad Sulphuric Acid Plant, Managing Agents, Barakur Coal Company.
6. Bararie Sulphuric Acid Plant, Managing Agents, Jardine Skinner and Company.

AMMONIA SULPHATE.

1. Tata Iron and Steel Company, Jamshedpur.
2. Burrakar Coal Company's Loyabad Coke Recovery Plant, Managing Agents, Bird and Company.
3. Lodna Colliery Company, Jharia, Managing Agents, Turner Morrison.
4. Bararie Coke Company, Managing Agent, Jardine Skinner and Company.
5. E. I. Railway by-product recovery plant, Giridih.

Director, Geological Survey of India, Calcutta.

Letter dated the 28th November 1928.

I have the honour to acknowledge the receipt of your letter No. 187-T. of the 14th of October 1928, in which you ask whether I would be good enough to prepare for the use of the Board a note upon the existing supplies of raw material required for the manufacture of certain chemicals specifically mentioned in paragraph 1 of the Government of India Resolution concerning the application of certain manufacturers of heavy chemicals for protection. You also ask for a statement showing the quantities of those raw materials and the localities in which they are found.

2. For your information I have the honour to forward to you under separate cover a copy of the Quinquennial Review of the Mineral Production of India for the years 1919-23, in which will be found a summary of such information as we possess concerning all the minerals specifically mentioned in paragraph 2 of your letter. From a perusal of this Review you will discover that estimates of quantities of the various minerals existing in India are very rarely given. This is for the reason that in most cases the data do not exist upon which reliable estimates could be framed. Under each mineral you will find a record of the principal localities from which the mineral is obtained, and I think you will find that this Review contains all the information that is available.

3. As estimates of the quantities of minerals that exist have in most cases not been made, the best guide is in most cases to be obtained from records of production which are given for 5 years (1919-23) under the heading of each mineral. The figures for subsequent years have been published in the Annual Review of Mineral Production, but for your convenience I have had these latter figures complied into a separate statement for years 1924-27, which is appended to this letter.

4. Taking the list of mineral substances named in paragraph 2, it is possible, however, to say at once, without any mention of precise quantities, which of these minerals exist in this country in quantities adequate for the chemical industry and which do not. The minerals of which there are adequate supplies are magnesite, common salt, potassium nitrate, bauxite, chromite, manganese ore, gypsum, limestone, and metallic sulphides. The minerals of which the supplies are inadequate or wanting are sulphur, iron pyrites, sodium nitrate and potassium chloride. The minerals of which there are moderate quantities are phosphates.

5. Although the relative data are given in the Quinquennial Review, of which a copy has been sent, nevertheless a few brief remarks on each of these substances may be usefully given here.

Minerals of which supplies are adequate.

Magnesite.—Magnesite is found in adequate quantities only at Salem in the Madras Presidency. The annual production during the last four years have varied from 19,638 tons to 30,461 tons. There is no coal in the neighbourhood. Magnesium salts can also be obtained from sea-water, as is known to the Tariff Board, as the result of their investigations into magnesium chloride.

Common Salt.—Common salt occurs in large quantities in the form of rock-salt in the Salt Range of the Punjab and also in Kohat and Mandi State, and there is a small annual output of coal in the Jhelum, Shahpur and Mianwali districts. Common salt is also obtainable from the Sambhar Lake in Rajputana and from sea-water round the Indian coasts. The total production of salt during the past four years has ranged from 1,295,144 tons in 1925 to 1,638,749 tons in 1926. None of the occurrences of rock-salt or workings for the extraction of salt from sea-water are near to coal deposits of any importance, except that the coal of Singareni in Hyderabad State is

fairly near to the Madras coast. The coal of the Talcher coalfield is near to the Orissa coast, but there is no industry for the extraction of salt on this coast.

Potassium Nitrate.—Potassium nitrate or saltpetre is one of the principal mineral products of India. It is extracted mainly from the alluvial soil near village sites in the Punjab, the United Provinces and Bihar and Orissa. There are coalfields in the Punjab, Central India and Bihar and Orissa, the latter coal deposits being relatively near to the saltpetre-producing districts of Bihar. The total exports during the past four years has ranged from 98,830 cwts. in 1926 to 167,700 cwts. in 1924.

Bauxite.—Bauxite is found in workable quantities in the Kolhapur State, and Kaira district in the Bombay Presidency, in the Jubbulpore and Balaghat districts of the Central Provinces, and in the Ranchi district of Bihar and Orissa, as well as in Kalahandi State and the Palni Hills, Madras Presidency. The best association of bauxite and coal is of the bauxite of Katni with the coal of Umaria, but the coal of the Ranchi district is also relatively near to the coalfields of Chota Nagpur. The total production of bauxite during the past your years has ranged from 4,310 tons in 1927 to 23,228 tons in 1924. But this production is no measure of what India could produce did the demand arise.

Chromite.—Chromite is found in workable quantities in Baluchistan, Mysore and Singhbhum, of which the last-named is by far the least important. The total output during the past four years has ranged from 33,382 tons in 1926 to 57,207 tons in 1927. Inferior coal is found in Baluchistan relatively near to the chromite deposits, but this conjunction is of no importance. The chromite of Singhbhum is of course relatively near to the coalfields of Chota Nagpur, but the quantities of chromite are small. There is no coal near the Mysore deposits.

Manganese.—Manganese-ores are found in workable quantities in many parts of India, of which the producing districts are shown in the Quinquennial Review. The total production during the past four years has ranged from 803,006 tons in 1924 to 1,129,353 tons in 1927. India is, perhaps, the most important producer of manganese-ore in the world, and the Central Provinces the most important manganese area. The only deposits of manganese-ore in India that are relatively near to coal deposits are the manganese deposits of Singhbhum and Keonjhar, of which the latter are of some magnitude (51,115 tons in 1927).

Gypsum.—Gypsum is found in important quantities in Bikaner and Jodhpur States in Rajputana and also in the Jhelum district of the Punjab. The production during the past four tyears has been steady at 34 to 38 thousand tons. There are also inferior deposits of coal in Bikaner State and in the Salt Range near the gypsum deposits of Bikaner and Jhelum respectively.

Limestone.—Limestone is found in large quantities in Assam, Bihar and Orissa, Burma, Central India, the Central Provinces and the Punjab, and there is probably no province in which supplies of this stone cannot be obtained in some quantity. The total production during the past four years has ranged from 1,851,455 tons in 1924 to 3,249,378 tons in 1927. In quality the limestones of India range from those sufficiently pure for use in the manufacture of calcium carbide and of cement down to argillaceous limestone suitable for hydraulic cement. A list of analyses of pure limestones is given in an article by myself on the manufacture of calcium carbide, calcium cyanamide and cyanides in India taken from the Indian Munitions Board Handbook, of which a copy is sent with this letter.

Metallic Sulphides.—There are no known deposits in the Indian Empire of either sulphur or iron pyrites of any considerable magnitude, but sulphides are worked on a large scale for their metal contents in the Northern Shan States at Bawdwin, where mixed sulphide-ore containing lead, copper, silver and zinc is mined. The lead, copper and silver ores are being smelted in

the country, but no attempt is being made to recover the sulphur. The zinc concentrates are exported for treatment, but if attempts are being made to recover the sulphur contained therein, this, of course, is taking place outside the Indian Empire. The production of lead-ore containing lead, zinc and silver has ranged during the past four years from 310,286 tons in 1924 to 450,777 tons in 1927; and the production of zinc concentrates obtained from the above have ranged from 18,650 tons in 1924 to 58,286 tons in 1927. Copper deposits of some magnitude are also being developed in Singhbhum, and the production of copper is expected to take place in the near future. I have no information, however, that any attempt will be made here to recover the sulphur.

Minerals found in moderate quantities.

Phosphates.—Two occurrences of phosphates of possible importance have been located, *viz.*, in the Trichinopoly district of Madras and in the Singhbhum district of Bihar and Orissa. The available amount of phosphatic nodules in the Trichinopoly district has been estimated at 18 million tons, but as these nodules are sparsely distributed and contain carbonate, no success has as yet been made of manufacturing superphosphates. In Singhbhum phosphates occur as apatite-magnetite rocks in a form of discontinuous lenses. The total quantity is not large, and before the phosphates could be used, the magnetite must be separated magnetically. A company formed to treat these deposits has gone into liquidation. The output of apatite-rock (entirely from Singhbhum) during the past four years has declined from 6,426 tons in 1924 to 603 tons in 1927.

Minerals of which there are no important deposits in India.

Sulphur.—A certain quantity of sulphur is obtainable from the volcanoes of the Barren Island in the Bay of Bengal and volcanoes in Seistan in Eastern Persia. There is also a sulphur deposit near Sanni in the State of Kalat in Baluchistan, but the total quantity of available sulphur has been estimated at only 10,000 tons. Sulphuric acid is now being made in many localities in India from imported sulphur.

Iron Pyrites.—This mineral, had it existed in quantity, might be a source of supply of sulphuric acid, but there are no known deposits in the Indian Empire of this mineral of economic importance. Some deposits of iron pyrites in the Madras Presidency are now being investigated by the Geological Survey of India. Their value has not yet been ascertained.

Sodium Nitrate.—There are no known deposits in the Indian Empire of sodium nitrate of any importance.

Potassium Chloride.—With the exception of the nitrate or saltpetre deposits of the Ganges valley, to which reference has already been made, the only potash salts worth mentioning are associated with the rock-salt of the Salt Range, and small quantities have been obtained from time to time as a bye-product during the extraction of the rock-salt. The total quantity of potash salts in the Salt Range may be considerable, but as these salts occur in discontinuous lenticles and irregular foliae, they are not likely to be worked profitably except as a bye-product of salt mining. The potash salts themselves are mixtures of sulphates of potash and magnesia with potassium chloride.

6. In addition to the substances mentioned in paragraph 2 of your letter, the chemicals mentioned in the Government Resolution of the 16th of July 1928 include others to which reference may be made, *viz.*, nitric acid and zinc chloride.

Nitric Acid.—This may be manufactured, not only from supplies of raw nitrates, such as potassium or sodium nitrate, but by making use of the nitrogen of the atmosphere, utilising for this purpose electricity generated either from coal or water power. The production of substances, such as

calcium cyanamide and cyanides, is discussed in the pamphlet by myself on the manufacture of calcium carbide, etc., already referred to.

Zinc Chloride.—For the manufacture of zinc chloride, zinc-ores would, of course, be necessary. These exist in abundance in the Bawdwin mine in the Northern Shan States, and a portion of the zinc concentrates now being exported could be utilised for this purpose.

7. You also ask in paragraph 3 of your letter for notes on materials that could be used as substitutes in the manufacture of chemicals for the production of which the missing materials are normally used. The substances enumerated in paragraph 2 of your letter, which I have shown above as inadequate, are sulphur and iron pyrites, sodium nitrate and potassium chloride. The sulphur and pyrites are required for the manufacture of sulphuric acid and sulphates. I have already pointed out that an alternative source exists in the form of metallic sulphides being mined at the Bawdwin mine in Burma, in the Northern Shan States, and at the copper mines in Singhbhum. Sodium nitrate is required for the manufacture of nitric acid, and I have mentioned in the preceding paragraph that such acid might be made direct from the nitrogen of the atmosphere. Potassium chloride appears to be required for the manufacture of potash alum. Potassium nitrate or saltpetre could presumably be used for this purpose, but it may be too valuable an article to be used in this manner, as it also contains nitrogen.

8. You also ask for information on the chemical composition and quality of the raw materials found in India which might have a bearing on their suitability for the production of the chemicals under enquiry. To reply to this in detail would require a very extensive note, and the information is not always in possession of this Department. Such information as we possess, however, is given in the respective notes on the various minerals in the Quinquennial Review of Mineral Production. Treating the problem generally, we may say at once that all the minerals of which I have noted that supplies are adequate are found in quality sufficiently pure for them to be utilizable in the chemical industry, whilst the metallic sulphates and the phosphates can only be used after suitable treatment (frequently very costly), owing to the necessity of separating the desired mineral from the valueless materials with which these minerals are mixed.

9. The following papers, to some of which reference has already been made in this letter, are sent under separate cover for the information of the Tariff Board:—

(1) Quinquennial Review of the Mineral Production of India for the years 1919-23, forming Vol. LVII of the Records of this Department.

(2) "The Manufacture of Calcium Carbide, Calcium Cyanamide and Cyanide in India," from the Indian Munitions Board Handbook of 1917.

(3) "Metallurgical Industries in India" from the same Handbook.

(4) "Elector-chemical Industries. Some considerations affecting their establishment in India." From Vol. I of the "Transactions" of the Institute of Engineers (India), published in 1921.

These last three papers were written by myself, and though, in respect of statistics, they are not up to date, yet, as regards general considerations, they still apply, and I can from my Author's copies supply additional copies if the Board so desire, whilst, if further copies of the Quinquennial Review are desired, these should be obtained from the Central Publication Branch.

10. In the final paragraph of your letter you express a wish to examine me after receipt of this note. Sir Edwin Pascoe is returning from leave on the 6th of December, and if the examination takes place after this date, you would probably prefer to examine him, but if my evidence could be of assistance, I should be glad to help also.

TABLE SHOWING THE PRODUCTION OF CERTAIN INDIAN MINERALS DURING THE 4 YEARS 1924 TO 1927.

1. *Minerals of which there are adequate supplies.*

—	1924.	1925.	1926.	1927.
	Tons.	Tons.	Tons.	Tons.
Magnesite	24,461	29,620	30,461	19,638
Common Salt	1,623,475	1,295,144	1,638,749	1,611,945
(*a*) Potassium nitrates (Saltpetre). Cwt.	167,700	126,973	98,830	123,018
Bauxite	23,228	10,070	4,956	4,310
Chromite	45,462	37,452	33,382	57,207
Manganese ore	803,006	839,461	1,014,928	1,129,353
Gypsum	38,123	36,244	34,473	38,105
Limestone and Kankar	1,851,455	3,108,710	3,095,578	3,249,878

(*a*) Export figures: figures for the production are not available.

2. *Minerals of which there are moderate supplies.*

—	1924.	1925.	1926.	1927.
	Tons.	Tons.	Tons.	Tons.
Lead ore	310,286	321,861	362,910	450,777
Zinc concentratees	18,650	16,810	48,834	58,286
Copper ore and Copper matte	2,973	(*b*)34,348	20,949	16,882
Phosphates (Apatite)	6,426	1,480	718	603

(*b*) Includes 26,319 tons of copper ore produced by the Indian Copper Corporation Limited, during both 1924 and 1925; separate figures are not available.

3. *Minerals of which supplies are inadequate or wanting.*

Sulphur, Iron pyrites, Sodium nitrate, Potassium chloride — *Nil.*

Agricultural Adviser to the Government of India.

(1) *Letter No. 44, dated the 14th January, 1929, from the Tariff Board, to the Agricultural Adviser to the Government of India, Pusa.*

The Tariff Board is at present engaged in an enquiry into the claim of the Indian Chemical Industry for protection. The principal products for which protection is asked for are heavy chemicals in the manufacture of which sulphuric acid plays an important part. One of the grounds on which protection is claimed is that an extension of the manufacture of sulphuric acid in India will have important results on the production of artificial fertilisers

such as superphosphates. It has been proposed that if protection is granted, it should take the form of a bounty on sulphuric acid, so as to avoid any increase in the cost of chemicals used in other industries and at the same time to reduce the cost of artificial fertilisers. The extent to which superphosphates are now used in Indian agriculture and the probable increase in their consumption hereafter are, therefore, matters of vital importance in this enquiry, and I am to ask if you will be so good as to supply the Board with such data as may be in your possession on this subject.

2. The Board proposes to visit Calcutta sometime about the middle of February and would welcome an opportunity of examining you. I am directed to enquire if it would be convenient for you to be present in Calcutta for the purpose at some date in the second fortnight of February.

3. I am to add that it would be of assistance to the Board if a note on the points raised in this letter could be sent so as to reach me not later than February 8th.

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(2) *Letter No. 890, dated the 7th February, 1929, from the Agricultural Adviser to the Government of India.*

With reference to your letters No. 44, dated the 14th January, 1929, and No. 79, dated 22nd January, 1929, I have the honour to state that a reasonable measure of protection if granted to the sulphuric acid trade in India might possibly result in the manufacture of this acid becoming more firmly established in this country. The drawback, however, is that many of the important raw materials, *e.g.*, sulphur, used in its manufacture, have to be imported and it has still to be shown that the industry if protected could produce the acid as cheaply as it can be imported. If this cannot be done, the chances are that the manufacture of heavy chemicals in India would suffer.

2. The main argument urged in favour of protection in this case is that it would lead to a reduction in the cost of artificial fertilizers, such as superphosphates, manufactured in India. The amount of superphosphate used in this country is at present very small indeed and the annual growth in consumption is very slow. Superphosphate is used mainly for plantation crops such as tea, coffee and rubber; the amount used by the ordinary cultivator is insignificant. There is little hope of the demand from planters expanding to any appreciable extent in the near future. As far as the ordinary cultivator is concerned the manurial problem in India is, in the main, one of nitrogen deficiency, and consequently there are much greater prospects of a rapid development taking place in the use of nitrogenous manures than in that of phosphates. In certain parts of India where the soils are deficient in phosphates, the demand for phosphatic manures such as bone meal and superphosphate is admittedly increasing: but the demand is still very small. It is generally conceded that the cost of superphosphate (including carriage and distribution) militates against the use of it as a manure for field crops. Until the cost of transport and distribution is materially reduced, there is little hope of its being used by cultivators on any considerable scale.

3. In this connection it may be pointed out that protection of one industry generally leads to a demand for protection from other allied industries. If the manufacturers of sulphuric acid are to be given protection, the manufacturers of superphosphate will in course of time follow suit, with the probable result that the internal price of "super" will be forced up.

4. I regret it will not be convenient for me to meet the Board in Calcutta in March as I shall then have to tour in Southern India. Mr. R. D. Anstead, Director of Agriculture, Madras, and Mr. C. M. Hutchinson, Chief Scientific Adviser to the Fertiliser Propaganda of India, Ltd., 18, Strand Road, Calcutta, have given a considerable amount of attention to the possibilities of phosphatic manures, I would suggest their being asked to give evidence before the Tariff Board.

(3) *Letter No. 128, dated the 11th February, 1929, from the Tariff Board, to the Agricultural Adviser to the Government of India.*

I am directed to acknowledge your letter No. 890 of 7th instant and to say that there appears to have been a misunderstanding of the intention of the Board in addressing you.

2. It was not the intention of the Board to ask you for any expression of your opinion regarding the general question whether it is desirable to grant protection to the manufacture in India of heavy chemicals. In its letter No. 44 of 14th January, 1929, the Board asked whether you would be good enough to supply any statistics in your possession regarding the extent to which superphosphates are now used in India for agricultural purposes and also to record a note giving an expression of your opinion regarding the probability of any marked expansion of their use for those purposes. This must largely depend on the price at which superphosphates can be sold and any information regarding the price at which the use of superphosphates in any branch of agriculture becomes definitely profitable would be of great assistance.

3. I am therefore to enquire whether you have in your possession any such statistics and if so to request that you will be good enough to supply the Board with copies of the same.

4. With reference to paragraph 4 of your letter I am to say that the Board is holding an important public enquiry in which it is essential that all relevant information, especially that obtainable from such disinterested sources as departments of Government, should be made available to the Board, and it is hoped that you will find it possible so to arrange your tour programme as to appear before the Board on the date set aside for the taking of your evidence.

5. The Board is inviting Mr. Anstead, Director of Agriculture, Madras, to appear on that date also, but the Board feels that it should have an opportunity of hearing the Agricultural Adviser to the Government of India.

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(4) *Letter No. 1511, dated the 21st February, 1929, from the Agricultural Adviser to the Government of India, Calcutta.*

With reference to your letter No. 128 of the 11th of February, I have the honour to say that there are no statistics available in my office regarding the extent to which phosphatic manures are now used in India or the price at which their use in any branch of agriculture becomes definitely profitable. Manurial experiments involving the use of phosphates have been carried out on some of the experimental farms in the provinces with a view to ascertaining whether the soil was deficient in this constituent of plant food. Experiments have also been conducted with the object of determining the quantity of phosphoric acid and nitrogen required to give the highest profit. In such experiments, however, superphosphate has been applied along with sulphate of ammonia, nitrate of soda, oil cake, green manure or cattle dung, and the fact of its being applied with other manures somewhat complicates the experiments. Combined phosphatic-nitrogenous fertilisers have, within the last two or three years, been placed on the market in India under such names as Ammophos, Leunophos, Diammonphos, Nitrophoska, and these manures have given very good results when applied to rice fields in Burma but from the results obtained it is impossible to say whether the increase has been due mainly to the phosphoric acid or to the nitrogen which these manures provide.

Superphosphate is being tested in India, in short, in combination with other fertilisers; it is seldom or never applied alone. Further, no systematic attempt has, as far as I know, been made in any province to find out the price at which superphosphate becomes definitely profitable. Any such series of experiments would, in order to give reliable results, have to be carried on for several years, for as phosphates are not readily washed out of the soil,

their residual value is considerable. Departments of Agriculture have been lamentably under-staffed and Directors of Agriculture have, in consequence, concentrated their attention on lines of work which are more likely to give in a reasonable time results of value to the country. The Royal Commission on Agriculture have, in their report, drawn special attention to the fact that the economics of manuring have not as yet been systematically studied in India. They have made recommendations with a view to remedying this state of affairs.

Superphosphate is being used in the planting districts of Bengal, Assam and South India as a manure for tea and coffee. It is being used, too, though on a very small scale, in combination with nitrogenous manures for such staple crops as sugarcane and rice. Though the isolated experiments carried out up to date on Government farms are not very reliable, the indications are that the demand in the villages for " super " and combined manures containing phosphate is increasing slowly. In the planting districts phosphatic manures are already being used on a fairly large scale. Any increase in the demand will depend very largely on the price at which planters can sell their tea and coffee.

In conclusion, I may say that in 1917 a committee was appointed to discuss " The value of Phosphatic Manures in India and the possibility of their manufacture on a larger scale ". For your information I enclose the report of that committee.

Copy of Report of the Committee appointed to discuss the " Value of Phosphatic Manures in India and the Possibility of their Manufacture on a Larger Scale ".

The terms of reference were:—

To report—

(*a*) Whether deterioration of soils has been noticed in the various provinces, and, if so, whether this is due to phosphate deficiency;

(*b*) Whether the needs or the efficacy of manuring with phosphates have been noticed or enquired into; and

(*c*) The possibility of procuring superphosphates in India at a figure which will render their application profitable to the cultivator.

The report of the Committee was as follows:—

(*a*) The Committee after considering the evidence available came to the following conclusion:—

> The Committee have not sufficient evidence before them to enable them to state definitely that any deterioration of the soil arising from depletion of phosphates has occurred generally throughout India. To decide this point experiments over a number of years would be necessary. Mr. Davis' results with indigo soils in Bihar point to actual deterioration having occurred in this area; but for India as a whole no such evidence at present exists.

(*b*) Under the second heading evidence showed that enquiries had been made with regard to the effects of phosphatic manuring in different provinces.

In the indigo districts of Bihar such manuring is plainly beneficial.

In Bengal and Assam on the old alluvium there is ample evidence that phosphatic manuring is of value and has given considerable increase with paddy (40 per cent.), mustard and other crops. On the old alluvium lime is also deficient and is probably necessary to enable phosphates to produce their maximum effect.

On the silt alluvium evidence is variable and no general conclusion can be drawn.

Pending further investigations, on the tea garden soils evidence shows that phosphatic manures are of great value. Basic slag and basic superphosphates give the best results. Bone manures and mineral phosphate when

applied to the soil have not given noticeable results except indirectly through green crops.

In the United Provinces in the eastern districts on opium soils it is possible that phosphate manuring may be useful. There is no evidence of systems of agriculture adopted in that province.

In the Punjab results appear to indicate that very little benefit is at present found in the use of phosphatic manures in most of the ordinary systems of agriculture adopted in that province.

In Burma soils of the delta show great variations. In some areas the phosphate supply is ample, in others deficient. In general, however, it appears that phosphates will probably prove to be an essential manure in the great rice-growing areas of Burma.

In Madras experiments with phosphatic manuring have been chiefly made with paddy. Marked deficiency in available phosphate is chiefly noticeable in old paddy soils. All forms of phosphates have yielded marked results. On the laterite high lands chiefly devoted to planting, crops, tea, coffee and rubber, paying results have been obtained by the use of basic slag and basic superphosphates.

In Bombay the need for phosphate was most felt in the rice lands of the Konkan, both superphosphate and bone meal repaying the cost of application. Outside this area the scarcity of nitrogen and organic matter appears to be the limiting factor except possibly in the case of leguminous crops, notably lucerne.

In the case of cane, phosphate alone has given poor results, but when used as a manure on a preceding green dressing crop the subsequent yield of cane was increased. Early ripening and greater purity of juice were noticed.

In the Central Provinces there appeared to be no indication of the need of phosphate in the black cotton soils. On the light soils of the province it has proved valuable in the case of paddy, sun-hemp and cane. Experiments have not gone far enough to indicate which form of phosphate is preferable.

(*c*) At present manufacture of superphosphate in India is in so elementary a stage that no definite conclusion can be arrived at regarding the price at which it will be procurable in the future. The retail price of superphosphate before the war was Rs. 60 to 65 per ton *ex*-factory or port of entry.

Taking India as a whole, however, there are sufficient supplies of phosphatic manures from all sources to meet the present demands, but there are isolated localities where the question of the supply of superphosphate in the immediate future appears to be important. In these, special facilities should be considered to expedite either local manufacture or the import of this commodity.

With a view to encouraging the extended use of phosphatic manures the Committee consider that a survey of the resources of the country in mineral phosphates should be undertaken by Government. In view of the vital importance to Indian agriculture of keeping the supply of phosphates at a price within the reach of the cultivator the Committee suggest that control over all the internal mineral resources of supply should be retained by Government.

The Committee recommend to the attention of workers the question of investigation of forms of phosphatic manures other than superphosphate as there seems to be distinct evidence in India that the less soluble phosphates particularly in conjunction with bulky organic manures are of great value.

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(5) *Copy of a telegram, dated the 27th February, 1929, from the Superintendent, Pusa Agricultural Institute, to the Agricultural Adviser to the Government of India, Calcutta.*

Shaw Wallace give following approximate figures of import of single and concentrated superphosphates in India. Single fourteen hundred tons in 1926 forty-seven hundred in 1927 and seven thousand in 1928. Concentrated three hundred tons in 1926, six hundred and fifty in 1927 and seventeen hundred in 1928. Madras and Bengal are chief places of import.

(6) *Letter No. 2678, dated the 3rd April, 1929, from the Agricultural Adviser to the Government of India.*

RESULTS OF EXPERIMENTS WITH SUPERPHOSPHATE IN INDIA.

As desired by the Tariff Board, I have the honour to forward herewith a note summarising the results of experiments with superphosphate carried out by the Agricultural Departments in various provinces. The data contained in the note were supplied by the Directors of Agriculture. I am also forwarding herewith a statement showing the results of trials carried out in various places by the Fertilizer Propaganda Company with superphosphate applied with other manures.

2. In this connection I beg to invite a reference to page 81 of the "Scientific Reports of the Agricultural Research Institute, Pusa, 1927-28", wherein the results of the permanent manurial and rotation experiments at Pusa, have been given. They demonstrate the value of superphosphate when combined with green manuring for the soils of Bihar.

Results of experiments with phosphatic manures in India.

The following is a summary of replies received from the Directors of Agriculture, Bengal, Bihar and Orissa, Bombay, Assam and Burma, to an enquiry regarding the results obtained from the use of superphosphate in their provinces.

2. *Bengal.*—Experiments to test the effect of superphosphate and ammonium sulphate on wheat and paddy have recently been started on the Rajshahi Agricultural Station. The results which are tabulated below are not conclusive. As all the red soils in Bengal are acid and most of the remaining soils contain practically no carbonate of calcium, superphosphate is not generally recommended:—

Wheat.

Treatment.	Number of plots.	Average yield per acre.			
		1926-27.		1927-28.	
		Grain.	Bhusa.	Grain.	Bhusa.
		Mds.	Mds.	Mds.	Mds.
Double superphosphate	4	13½	33¼	10¼	19⅛
Double supersulphate of ammonia	2	11¾	34½	10⅜	20
No manure	6	13¼	34¼	10	18⅞

Paddy.

Treatment.	Average yield per acre 1927-28.	
	Paddy.	Straw.
	Mds.	Mds.
Residual effect of the following manures which were applied to the previous crop of wheat:—		
Superphosphate	14¼	34½
Do. *plus* ammonium sulphate	17 1/10	38¾
No manure	17⅛	39¾

3. *Bihar and Orissa.*—An extensive series of experiments to ascertain the value of phosphatic manures is in progress in this province. The results have not yet been fully worked up and in many cases the trials are not yet complete. A brief summary of the more important information at present available is given below, from which it will appear that on the whole better results have been obtained with compound manures of the ammophos type than with superphosphate. Ammophos has an important advantage in that it is distinctly less hygroscopic than many mixed fertilizers.

(*i*) *Sugarcane.*—On the Sepaya Farm, in addition to a fair general manuring, an application of superphosphate and ammonium sulphate to supply 50 lbs. of P_2O_5 and 40 lbs. of nitrogen per acre gave an increased yield of 165 maunds of cane, valued at Rs. 55. An increase in super to provide 100 lbs. of P_2O_5 per acre gave an increase of 253 maunds of cane per acre, valued at Rs. 84, so that the additional application of phosphate gave a return of Rs. 29 against an expenditure of about Rs. 12. There are no figures to show the effect of ammonium sulphate alone, but an application of 100 lbs. of P_2O_5 per acre at a cost of Rs. 24 gave, in the present year, a return of about Rs. 60 or a nett profit of Rs. 36 due to phosphate.

On the Nawadah Farm in South Bihar where practically no crop can be grown to advantage without phosphatic manure it has been found that with an expenditure of Rs. 50 on manure, including 3 maunds of ammophos per acre costing about Rs. 24, a crop of 550 maunds of sugarcane can be raised with irrigation.

(*ii*) *Paddy.*—In an article published on page 104 of the Agricultural Journal of India, Vol. XVIII, Pt. 2, March, 1923, the economic results of phosphatic manuring for rice in South Bihar have been described. It has been shown that 1 cwt. superphosphate per acre applied along with a green manure gave in one case a return of Rs. 32 for an expenditure of about Rs. 8. Difficulties, however, arose over the green manuring as it was not successful in all years. Ammophos was therefore substituted for this combination, and very definite results have been obtained with it for a number of years. It contains 17 per cent. of nitrogen and 20 per cent. of P_2O_5. The earlier experiments showed that an application of 1 maund per acre of ammophos to rice at a cost of Rs. 9 gave on an average an increased yield worth Rs. 18 per acre, or a nett profit of Rs. 9. A similar figure was obtained in 1926 on farm plots and cultivator's plots. The results obtained in 1927 are tabulated below:—

Place of experiment.	Treatment.	Increased yield per acre over unmanured crop.		Nett profit per acre due to manuring.	Remarks.
		Grain.	Straw.		
		Mds.	Mds.	Rs. A. P.	
Jamui Farm (Monghyr District)	Ammophos 1 md. per acre.	7	21	15 0 0	
Khurda (Puri District).	Diamonphos, 30 srs. per acre. (This is practically pure ammonium phosphate.)	*5¼	...	8 0 0	* This increase is over an excellent unmanured crop of 23½ maunds per acre.
Nawadah Farm (Gaya District)	Ammophos 1 md. per acre.	6½		10 8 0	A bad year for rice crop on the farm.
Cuttack	Ammo phos	..	...	4 8 0	This increase was over an application of oilcake at the same cost.

(*iii*) *Leguminous crops.*—On the Gaya Farm, interesting results have been obtained with the use of superphosphate on leguminous crops. An application of 30 lbs. of P_2O_5 as super at a cost of Rs. 7 per acre increased yield of soybeans from $8\frac{1}{2}$ to $12\frac{1}{2}$ maunds per acre, and gave a nett profit of Rs. 17. On the same farm a leguminous fodder crop (*Meth*) yielded $91\frac{1}{2}$ maunds per acre without super and 141 maunds per acre with super—an increase worth Rs. 25 for an expenditure of Rs. 7.

(*iv*) The results on the whole demonstrate the importance of a combination of nitrogen and phosphoric acid for soils in Bihar and Orissa and experiments are in progress to determine the most profitable ratio of these constituents under different conditions.

4. *Bombay.*—Superphosphate is not at present a fertilizer of importance in Bombay and the Department of Agriculture is not pushing it.

5. *Assam.*—No systematic trials with phosphatic manures have been conducted in this province. A few experiments have been started at two of the farms this year.

6. *Burma.*—The results obtained in this province from the use of phosphatic manures applied singly or in combination with other manures on paddy are given in the following table. They demonstrate the superiority of compound manures of the ammophos type.

Manure applied per acre.	Total period of experiments.	Average increase per acre over the controls.	Remarks.
		%	
Bonemeal at 20 lbs. P_2O_5 . .	5 years.	26·5	
Superphosphate at 20 lbs. P_2O_5 .	do.	35·3	
F.y.m. at 30 lbs. N *plus* super at 20 lbs. P_2O_5.	do.	43·5	
F y m. at 30 lbs. N *plus* super at 30 lbs P_2O_5 *plus* sulphate of potash at 30 lbs. K_2O.	do.	53	
Ammonium sulphate at 30 lbs. N *plus* Super at 20 lbs. P_2O_5 *plus* sulphate of potash at 20 bs. K_2O.	do	33	No profit was obtained in ths beginning due to high prices of manures.
Ammophos (15% N and 20% P_2O_5) at 200 lbs. per acre.	2 years.	115·4	A nett profit of Rs. 28-11 per acre.
Ammophos (11% N and 48 % P_2O_5) at 200 lbs. per acre.	do.	90·8	A nett profit of Rs. 22 per acre.
Lennaphos (20% N and 18% P_2O_5)	1 year.	103·8	A nett profit of Rs. 23 per acre.
Diammophos (20 % N and 53 % P_2O_5.)	do.	110·9	A nett profit of Rs. 18 per acre.
Ammonium sulphate 30 lbs. N *plus* super at 45 lbs. P_2O_5.	do.	98·1	A nett profit of Rs. 11 per acre.

Results of treats with manures carried out by the Fertilizer Propaganda Company.

Provinces.	Treatment.	Number of plots.	Average yield, per acre.		Increase.	Percentage of increase.	Nett profit per acre.
			Treated.	Control.			
	Chillies.		lbs.	lbs.	lbs.		Rs. A. P.
Bombay .	Sulphate of ammonia.	1	2,687	2,023	664	33	32 11 0
	Sulphate of ammonia *plus* super	1	4,192	2,112	2,080	98	46 13 5
Madras .	Indigo refuse, sulphate of ammonia and super.	1	1,791	625	1,166	186	255 8 0
	F.y.m., sulphate of ammonia and super.	1	1,250	886	363	40	58 12 8
	F.y.m., indigo refuse, sulphate of ammonia and super.	1	1,192	880	312	35	58 14 4
Mysore .	F.y.m., sulphate of ammonia and super.	1	5,600	4,480	1,120	25	36 8 0
	Cabbage.						
Bombay .	Sulphate of ammonia.	1	7,530	5,315	2,215	41	108 13 0
	Sulphate of ammonia *plus* super.	2	4,418	2,632	1,786	67	40 7 1
	F.y.m., sulphate of ammonia and super.	2	8,216	3,771	4,445	117	172 7 3
	Tobacco.						
Bombay .	Sulphate of potash, super and nitrate of soda.	6	1,032	693	339	48	30 7 6
	Wheat.						
Bombay .	Sulphate of ammonia.	6	830	651	179	27	6 15 0
	Sulphate of ammonia *plus* super	8	920	589	331	56	15 12 6
	F.y.m., sulphate of ammonia and super.	7	769	542	227	41	6 1 0
	Groundnut.						
Madras .	Sulphate of ammonia *plus* super.	3	2,594	1,500	1,094	73	59 9 0
	Ragi.						
Madras .	Farmyard manure sulphate of ammonia *plus* super.	2	1,110	756	354	46	10 11 6

Provinces.	Treatment.	Number of plots.	Average yield per acre.		Increase.	Percentage of increase.	Nett profit per acre.
			Treated	Control.			
	Onions.		lbs.	lbs.	lbs.		Rs. A. P.
Bombay .	Sulphate of ammonia.	2	13,866	8 868	4,998	56	140 13 6
	Pondrette and sulphate of ammonia.	1	9,728	6,800	2,928	43	55 0 0
	F.y.m., sulphate of ammonia and super.	1	10,971	8,640	2,331	26	11 8 11

Results of two years' work carried out by the Fertilizer Propaganda Company of India to demonstrate the value of artificial fertilizers for various crops in India.

Provinces	Treatment.	Number of plots.	Average yield per acre.		Increase.	Per centage of increase.	Nett profit per acre.
			Treated.	Control.			
	Paddy.		lbs.	lbs.	lbs.		Rs. A. P.
Madras .	Sulphate of ammonia	13	3,091	2,503	588	23	26 13 11
	Sulphate of ammonia *plus* super.	20	2,656	2,330	326	13	12 13 6
Hyderabad	Do. do.	23	2,657	2,:02	755	34	18 11 9
Mysore .	Do. do.	4	3,081	1,988	1,093	54	36 11 0
Bombay .	Sulphate of ammonia.	7	3,374	2,508	866	34	30 0 0
	Sulphate of ammonia *plus* super.	1	3,881	2,161	1,720	79	25 2 9
	Farmyard manure and sulphate of ammonia.	3	2,760	1,920	840	43	29 12 0
Burma .	Ammophos . .	...	2,542	1,250	1,292	103·4	32 6 8
	Potato.						
Bombay .	F.y.m., sulphate of ammonia, super and sulphate of potash	6	15,699	9,875	5,824	59	124 1 4
	F.y.m. Nitrate of soda, super and sulphate of potash	6	13,866	9,875	3,991	40	74 0 10
Mysore .	F.y.m., sulphate of ammonia and super.	2	11,340	7,560	3,780	50	107 8 0
	Cotton.						
Bombay .	Sulphate of ammonia.	67	351	246	105	42	8 6 4
	Sulphate of ammonia *plus* super.	3	443	258	185	71	19 5 4
	Sulphate of ammonia *plus* cake.	12	517	323	194	60	19 15 9

Director of Agriculture, Madras.

(1) *Letter R. O. C. D.-277-29, dated the 26th February, 1929, from the Director of Agriculture, Madras.*

MANURES—PHOSPHATIC FERTILISERS—POSITION IN THE MADRAS PRESIDENCY—SUMMARISED.

With reference to your letter, dated the 11th February, 1929, I have the honour to enclose herewith in duplicate a note on the points raised regarding the position of phosphatic fertilisers in this Presidency.

Enclosure.

Note regarding the position of phosphatic fertilisers in the Madras Presidency.

In the Madras Presidency the Agricultural Department have carried out and published Soil Surveys of the Tanjore delta, the Guntur delta, the Kistna delta, the Godavari delta, the Periyar tract, and the Malabar district. In the majority of cases a deficiency in available phosphoric acid has been found, and in the Tanjore delta and the Periyar tract this deficiency is very marked indeed figures as low as 0·002 per cent. being common.

2. In practice it has been found that in the case of paddy certainly, and probably in the case of other crops also, if the percentage of available phosphoric acid falls below 0·01 the soil will respond to an application of phosphatic fertiliser. In many cases Nitrogen, important as it is, is not the controlling factor and the full benefit of nitrogenous fertilisers is not obtained unless phosphate is applied at the same time.

3. An extensive and detailed series of experiments was carried out on an Experiment Station in the Tanjore delta, Manganallur Experiment Station, for a series of years and these established the following facts*:—

(*a*) Insoluble phosphates like Bone meal and Rock phosphate, though not immediately available do become available fairly quickly, especially if used in conjunction with organic matter like green leaf.

(*b*) The average increased yield from the application of bone meal and rock phosphates is practically the same.

(*c*) The greatest increased yield is obtained by the application of fish manure, due to the stimulating effect of the organic nitrogen present.

(*d*) When superphosphate is used the following increased gain yields are obtained:—

No super	100
100 lbs. of super	130
200 lbs. ,, ...	123
300 lbs. ,, ...	139
400 lbs. ,, ...	140

(*e*) Superphosphate in conjunction with green leaves gives the highest yields, *i.e.*, a combination of phosphate with organic nitrogen.

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* Bulletin No. 85 of the Madras Agricultural Department.—A summary of the results of the Experiments on paddy conducted at the Manganallur Agricultural station, 1923.

(*f*) The continuous use of cattle manure greatly increases the cropping value of the land.

4. When we try to translate these results into practice on the ryots' land we at once encounter difficulties connected with the source of supply and the cost of phosphatic manures. There is never enough cattle manure to go round, but this difficulty can be largely overcome by supplementing it with artificial nitrogenous fertilisers, such as sulphate of ammonia, which have in recent years become cheap and easily obtainable. The phosphate problem, however, still remains to be solved. Our sources of supply are—

(*a*) Fish manure made on the West Coast of the Presidency,

(*b*) A deposit of rock phosphate near Trichinopoly,

(*c*) Bones, and

(*d*) Superphosphate.

5. *Fish Manure.*—The supply of this material is variable and cannot be depended upon. In recent years the catch of fish has been small and the price of the material has become too high for the ryots, especially when it has to be transported over long distances. There is a big export of fish manure to Ceylon and Japan and the export price is out of all proportion to its value in India for low priced crops like paddy, and the demand has now reached such a stage that even in years when fish are plentiful the price does not fall much. This will be seen from the following table which shows the exports of Fish manure and fish guano from the Madras Presidency.

Year.	Tons.	Price Rs.	Year.	Tons.	Price Rs.
1909-10 .	8,553		1916-17 .	9,031	140
1910-11 .	14,249		1917-18 .	10,374	125
1911-12 .	15,199	95	1918-19 .	16,459	85
1912-13 .	18,002	90	1919-20 .	34,284	110
1913-14 .	10,899	100	1920-21 .	9,581	120
1914-15 .	2,266	110	1921-22 .	6,555	120
1915-16 .	2,338	125	1922-23 .	14,644	125

6. *Trichinopoly Rock Phosphates.*—Near Trichinopoly there is a deposit of phosphatic nodules estimated to contain 8 million tons. These nodules contain 56 to 59 per cent. of phosphate of lime and about 16 per cent. carbonate of lime, the latter rendering their conversion into superphosphate uneconomical by the sulphuric acid process. Attempts have been made to utilise them in a finely powdered form, but with little success. Experiments carried out by the Agricultural Department have yielded somewhat inconclusive ansd inconsistent results when this phosphate is used in conjunction with green leaf and organic manure. This is possibly because the material was not ground sufficiently finely. It might be possible to manufacture superphosphate from it by an electrical process, but if at any time it is found possible to develop this deposit, care should be taken to avoid its exploitation for the benefit of countries outside India. Attempts have already been made to export it to Ceylon. Restrictions should be imposed by export duties or other means, to ensure its use in the Tanjore and neighbouring deltas, or at any rate for the benefit of the Madras ryots.

7. *Bones.*—By far this biggest source of indigenous phosphate is bones which can easily be collected and which are not difficult to grind. The effect of bone meal when used with green leaf or other organic manure has been conclusively proved to be very beneficial. But the controlling factor is price. Here again there is a very large export demand and the price of bone meal

has increased year by year until it is now so high that it scarcely pays to use it. This will be seen from the following table:—

Year.	Export from British India in tons.	Exports from Madras Presidency in tons.	Price per ton.
			Rs.
1909	...	10,959	...
1910	...	8,181	65
1911	...	8,560	70
1912	...	9,303	80
1913	...	9,425	85
1914	...	7,143	80
1915	...	5,146	75
1916	...	5,039	75
1917	...	3,920	60
1918	...	5,654	65
1919	...	11,744	80
1920	...	9,262	110
1921 }	88,985 {	9,143	90
1922 }		8,276	110
1923 }	84,571 {	16,797	120
1924 }	95,695 {	9,603	...
1925 }	70,987 {	7,492	...
1926 }	84,297 {	7,894	...
1927	...	5,748	...
1928	...	...	120

Now we may take it, as a result of experiments, that the addition of one cwt. of bone meal will give an increased yield of paddy of about 200 lb. of grain per acre. On this basis the economics of the position are as follows, the harvest price of rice in 1928 being taken at Rs. 8-11-5 per 100 lbs.

Value of increased yield in.	Profit with Bone meal at Rs. 65 per ton.	Rs. 85 per ton.	Rs. 120 per ton.
Rs. A. P.	Rs. A. P.	Rs. A. P.	Rs. A. P.
17 6 10	14 3 0	13 3 0	11 7 0

If the market price of paddy falls while the price of bone meal rises, the margin of profit is still further reduced.

It would, therefore, appear to be worth while endeavouring to reduce the price of bone meal to the ryot in some way or other if this is possible in order that he may be able to use this large source of indigenous phosphate at a profit. I am quite aware of the difficulties in the way of this and the arguments raised against any form of export control or tax by those opposed to such measures, including the Royal Commission on Agriculture in India themselves, but I still submit that the question is worthy of greater examination and consideration than it has yet received. It should be borne in mind that there are possibilities of using bone meal in other ways than applying it directly to the land in its raw state. Work on the utilization of the natural sulphur oxidizing power of certain soil bacteria for the solubilization of the phosphate of bone meal by composting carried out at Pusa showed that in a compost of bone meal sulphur, sand and charcoal the percentage of soluble P_2O_5 increased from 23·5 to 64·2 in 16 weeks and the

superiority of the compost as a manure was well marked in field trials. The use of bone meal in the preparation of the synthetic farm yard manure is related to this. It has been found that the addition of bone meal to composts of waste materials made by the Rothamsted method enables fermentation to take place much more rapidly and completely than when it is omitted. It also finds a useful place in the preparation of cattle manure by improved methods such as the loose box system or the dry earth system to supplement the phosphatic content of such a manure which is generally deficient in this plant food. Its use in all these ways is dependent upon its price.

8. *Superphosphate.*—Under present conditions the bulk of the superphosphate used in India is imported, but in the Madras Presidency, Messrs. Parry & Co., have for many years manufactured this fertiliser. The raw materials are sulphuric acid which they make for themselves, and bone char from their sugar factories. The supplies of the latter are very limited and the firm are now in the process of erecting, I understand, a small plant which should be capable of turning out 3,000 tons of super per annum. The cost of the acid, however, is high and the price of the fertiliser is not likely to fall below the cost of the imported product.

The price of superphosphate in the Presidency is shown in the following table.

Year.	Rs. per ton.	Year.	Rs. per ton.
1909	65	1917	85
1910	65	1918	90
1911	65	1919	90
1912	70	1920	100
1913	71	1921	110
1914	70	1922	100
1915	75	1923	105
1916	80	1924	98

Like all other fertilisers the price had a tendency to rise steadily until quite recently. Other distributing firms have recently come into the market, particularly Nitrams, Ltd., and at the present moment Superphosphate can be purchased at Rs. 80 per ton.

It will be noted, however, that even at this price it is nearly double the cost that it is in England. The following analysis of the cost was supplied to me by a distributing firm in 1926. Since then these items have been reduced so as to bring the retail price down to Rs. 4-8-0 per cwt. and it does not appear likely that it will be possible to manufacture superphosphate in India much cheaper than it can be imported.

	£ s. d.
London quotation 20 × 26 for Superphosphate S. P. 30 % *ex*-works	2 16 3
Sea freight, insurance, etc.	1 15 0
Cost c.i.f. Indian port	4 11 3
	Rs. A. P.
Equivalent to	62 0 0
Landing charges, harbour dues, etc.	5 5 0
Carting to godown	1 12 0
Carting from godown to railway station	1 12 0
Commissions to propagandists, sub-agents, banias, godown rent	7 0 0
Indo-Agri. profit	7 3 0

	Rs.	A.	P.
Selling price f.o.r. Madras	85	0	0
Average cost of freight up country, depots and cartage and handling at destination . .	12	4	0
Share of depot rent and salaries . . .	5	0	0
Cost of rebagging damaged bags and possible losses from burst bags	7	12	0
Retail *ex*-depot selling rate @ Rs. 5-8-0 per cwt.	110	0	0

Even at Rs. 4-8-0 per cwt. the price is high as compared with the price in England and any duty on it is to be deprecated as it would tend to raise its price still further.

Nitrogen-phosphate artificial fertilisers.

A number of new artificial fertilisers are now being put on the market under a variety of trade names, such as ammophos, leunophos, nitrophoska, etc., in which the nitrogen and phosphate are combined in various proportions, that is to say they are ammonium phosphates. These should have a great future. Theoretically they should do away with the need of applying nitrogen and phosphate as separate fertilisers and have the advantage of a saving in labour and transport. In the eyes of the Agricultural Department they have the advantage of compelling the ryot to use phosphate which he at present too often neglects.

It remains for the Agricultural Departments to test out these fertilisers scientifically and to determine just what proportions of nitrogen and phosphate are needed for different types of soil and crops, and any desired combination can be made. It is also necessary to determine whether it is advisable to apply the nitrogen and phosphate in one dose and at one time instead of separately and at different times in the crops' growth. It will no doubt take a little time before the Agricultural Department have made up their minds upon these points, but should their verdict be in favour of the combined fertiliser, there is a great possibility of this type of fertiliser replacing the nitrogen and phosphate as separate fertilisers. It is quite possible, therefore, that the present need for superphosphate may be short lived and this aspect of the situation should be very carefully considered before any steps are taken to subsidise or encourage its manufacture in this country on a large scale by protecting the sulphuric acid industry. There will no doubt always be a certain demand for superphosphate, but it is quite on the cards that this demand will not increase, in fact it may actually decrease should these new fertilisers justify the claims that are made for them.

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(2) *Letter No. R.O.C.D-277-29, dated 19th March, 1929, from the Director of Agriculture, Madras.*

During the course of my evidence I was asked to submit figures to substantiate my statement that it would be cheaper to use an ammonium phosphate fertiliser than a mixture of sulphate of ammonia and superphosphate. Some figures were supplied at the time to the Chairman by some one else and he remarked that this latter mixture was cheaper. I was not satisfied with this but left it at the time.

2. I now give the correct figures which are as follows. I have taken the standard dressing to be the one we use here on paddy, *viz.*, 80 lbs. sulphate of ammonia and 1 cwt. of superphosphate per acre.

Manurial dressing.	N	P_2O_5	Cost.	Trade price.
			Rs. A. P.	Rs. A. P.
80 lb. sulphate of ammonia .	16·48	21·28	6 5 0	176 12 0 per ton.
112 lb. superphosphate .			4 0 0	80 0 0 „
			10 5 0	
82½ lb. Leunophos . .	16·48	16·48	8 12 0	10 5 0 per 100 lb.
100 lb. Ammophos 20 : 20 .	16	20	11 0 0	11 0 0 „

3. Now it will be seen that 100 lb. of Ammophos is the nearest approach to the standard mixture and at present it costs annas eleven more to supply the same amount of nitrogen and phosphoric acid. To set against this, however, is the fact that we are transporting 100 lb. instead of 192 lb., that is to say, the freight and transport charges from Madras to the field are just halved and it becomes, as I stated, a cheaper thing to use even at the present price which will undoubtedly be lowered before long.

Director of Industries, Bombay.

Letter No. I. B. 62—2547, dated the 31st October, 1928.

With reference to your letter No. 179-T., dated the 9th October, 1928, addressed to the Secretary to the Government of Bombay, General Department, I am directed by Government to forward to you copies (with five spare copies) of the correspondence between this office and the Dharamsi Morarji Chemical Company, Limited, and the Eastern Chemical Company, Limited, and also correspondence with Messrs. Kemp & Co., Powel & Co. and the Alembic Chemical Company for the information of the Board.

Enclosure No. 1.

Copy of letter No. I. B.—31—3592, dated the 17th September, 1926, from F. E. Bharucha, Esq., L.M.E., M.I.M.E., M.I.E., Director of Industries, Bombay, to Messrs. The Eastern Chemical Co., Ltd., Bombay, and The Dharamsi Morarji Chemical Co., Ltd., Bombay.

I have to request you to kindly let me know what progress has been made by your firm in the production of chemicals which are essential in the various manufacturing industries and the kind of chemicals manufactured with their monthly output. If difficulties are experienced in obtaining the raw materials or in their manufacture, what these are and how you propose they can be surmounted. The object of the present inquiry is to advise Government whether any steps could be taken for local manufacture of chemicals with a view to reducing the large imports of chemicals, drugs and medicines into Bombay. I attach for ready reference a statement showing figures of imports of these articles for the five years ending 1923-24. I have not at hand the figures of last year but those previous to that year are a fair indication of the large import trade in foreign chemicals.

I would therefore request that you will be so good as to furnish me with the required information so far as chemicals manufactured by your firm are concerned. Regarding medicines and drugs I am asking for information from firms engaged in their manufacture. I shall appreciate any views you may

have to give concerning the general question of the local manufacture of chemicals, etc.

The favour of an early reply is requested.

Statement showing figures of imports of chemicals, etc., for five years ending 1923-24.

Year.	Chemicals.	Drugs and Medicines.
	Rs.	Rs.
1919-20	49,88,471	96,32,303
1920-21	94,77,887	96,15,785
1921-22	63,75,154	76,63,097
1922-23	67,11,352	79,90,107
1923-24	65,88,005	81,07,776

Enclosure No. 2.

Copy of letter No. E. C. L. 274, dated the 22nd September, 1926, from The Eastern Chemical Co., Ltd., to F. E. Bharucha, Esq., L.M.E., M.I.M.E., M. I. E., Director of Industries, Bombay.

We have the honour to acknowledge receipt of your letter No. I. B. 31—3592 of the 17th instant.

We thank you for giving us the figures of the total imports of chemicals for the five years ending 1923-24 and if you can give us an indication of the separate values of the chief chemicals included in these figures, it would be of considerable assistance to us and we will give you all the information we possess with regard to each item.

By the same opportunity we will forward you a statement showing the various chemicals at present manufactured by us together with our monthly output and particulars of the difficulties we have to overcome in obtaining supplies of raw materials.

Enclosure No. 3.

Copy of letter No. I. B. 31—3695-01, dated the 28th September, 1926, from F. E. Bharucha, Esq., L.M.E., M.I.M.E., M.I.E., Director of Industries, Bombay, to Messrs. Kemp & Co., Ltd., Bombay, N. Powell & Co., Ltd., Bombay, The Alembic Chemical Co., Ltd., Bombay, The Gujarat Chemical Works, Ahmedabad, Bhikha Kallyanji & Co., Madan Sons & Co., and Cash Chemists, Bombay.

It has been suggested to this Department in view of large imports of chemicals, drugs and medicines into Bombay for the last 5 years that steps could be taken for their local manufacture and this question so far as it relates to the manufacture of chemicals has been referred to the manufacturing firms of Bombay. It is in connection with the question of medicines and drugs that I have to request you to be so good as to let me know the progress your firm may have made in the manufacture of drugs and medicinal preparations and whether any difficulties were or have been experienced in the collection of raw materials, their manufacture and sale of finished products. If there have been difficulties, their nature may be stated. I may also be informed whether your firm are fully equipped to meet the Indian demand and if so to what extent. The total value of drugs and medicines manufactured and sold during a normal year may kindly be stated, and any useful information which you could give will be greatly appreciated. I am making this enquiry with a view to advise Government what steps could be taken as would reduce the large import trade in drugs and medicines. I attach a statement showing figures of value of these articles imported into Bombay for the five years ending 1923-24 exclusive on account of purchase by Government for your information.

I would therefore request you to kindly give me the detailed information on the subject and shall be glad to receive your views and criticisms in the matter. The favour of an early reply is requested.

Enclosure No. 4.

Copy of letter, dated the 30th September 1926, from Messrs. Kemp & Co., Ltd., Bombay, to the Director of Industries, Bombay.

In reply to your letter No. I. B. 31—3701, dated the 28th instant, we have to state that the amount of goods manufactured by us last year was 3,60,000 and that by doubling the Indian staff, our plant equipment which is up to date is capable of producing five times that amount.

The most of our crude materials are imported from England as unfortunately we are unable to trust the purity of drugs from Local Markets.

We also find that we can import these drugs at the same price, sometimes cheaper in spite of the infinitely better quality.

Enclosure No. 5.

Copy of letter, dated the 5th October 1926, from N. Powell & Co., to the Director of Industries, Bombay.

With reference to your letters Nos. I. B. 31—3700 and 3786, dated 28th and 30th September 1926, respectively, we beg to state that we have been manufacturing Surgical Instruments, Aseptic Hospital Furniture, Invalid's Furniture, Artificial Limbs, Splints, Trusses, Belts, all sorts of Orthopedic appliances, etc., for the last 27 years and have been supplying them throughout India, Burma, Ceylon, Aden, Persian Gulf, Mesopotamia, Afghanistan, etc. There is not a single Civil or Military Hospital in this country that does not possess some goods of our manufacture.

2. In the year 1904 we had a very large order from the Government of Bombay for equipping Sir J. J. Hospital. Again in the year 1909 we had another order worth about Rs. 50,000 for supplying Aseptic Hospital Furniture to the Bai Motlibai Hospital, Sir J. J. Hospital and several other Hospitals in the Presidency.

3. During the War we used to get regular orders from the Military Works, Simla, for supplying Aseptic Hospital Furniture to the War Hospitals in India, Alexandria, Mesopotamia and Persian Gulf. Government had confidently entrusted us with the work of fitting the several Base, Field and War Hospitals. The task was undoubtedly the difficult one that confronted us, but by keeping our factory working day and night, we managed to render our help and did the work to the entire satisfaction of the officers concerned. You will be convinced of this by perusing the testimonials some of which we have printed in the booklet sent herewith. The Lady Hardinge War Hospital, Cumbala Hill War Hospital, Gerard Freeman-Thomas War Hospital, Alexandra War Hospital and Scindia's Convalescent Home were all fitted up and equipped by us.

4. We rendered valuable service to Government during the War by treating a large number of soldiers, both Indian and European, free of charge by electricity in our Institute. Our Medico-Electric Institute is the only one of its kind in India and it is equipped with all the apparatus required for giving X-Ray and Electric treatment.

5. We are now the Pioneers in the manufacture of Artificial limbs. We have attained so much success in our Deformity Branch that from the year 1924 the Secretary of State for India in Council has been pleased to appoint us contractors for supplying Artificial limbs and Deformity appliances to patients belonging to the Civil and Military Hospitals throughout India.

6. Nearly 40 years ago was the foundation of our business laid and since then we have been endeavouring our best to bring our different lines to perfection. In order to meet the demand for Pharmaceutical preparations that is increasing day by day we had to install number of modern machinery at a great expense. We have spent lacs of rupees in equipping our works and laboratories with the required plant and machinery and the proper buildings. It is really a wonder to us as to how the Government is still not aware of this

when we have been already getting business from them. Mr. Bell, who was the Director of Industries, had visited our place with Sir M. Viswesar Aiyar some years ago and had personally seen our works.

7. We are manufacturing Pharmaceutical preparations since the year 1918. Our Laboratory is well equipped having all the modern apparatus and machinery and is worked on Electric and Steam Power. We manufacture all B. P. Pharmaceutical preparations such as Tinctures, Extracts, Liniments, Powders, Ointments, Spirits, Tablets, etc., etc., under the supervision of highly qualified chemists. In fact we are in a position to meet any demand for these preparations which are prepared according to the B. P. Standard. All preparations containing spirit are prepared in our Bonded Warehouse which is one of the best and most up-to-date.

8. We are at present experiencing some difficulty in obtaining Rectified Spirit for our Medicinal preparations. There are only few Distilleries in the Bombay Presidency and the manufacturers of Spirit have actually monopolised the situation. The Government Distilleries should, therefore, begin to sell the spirit at the lowest prices free of duty to the Manufacturers of Medicinal preparations who possess bonded warehouses. We understand the Government Medical Stores are manufacturing the spirituous preparations. If this is a fact they are coming in the way of manufacturers like ourselves and we are afraid this will impede the progress of the industry.

9. As regards the Crude Drugs, we buy some from the Indian market, some from New York and London and Hamburg Markets. These we have to purchase in large quantities in different seasons.

10. In conclusion we shall be highly obliged if your goodself will kindly give us an appointment and pay us a visit so that we may take you round our works and show you both our Surgical Factory and Pharmaceutical Laboratory. You may then get a personal knowledge and find out what we are actually doing. We shall feel much obliged if you kindly inform this to the Stores Department so that they, too, will be able to get an idea of our capacity.

Enclosure No. 6.

Copy of letter No. 3832, dated the 19th October 1926, from the Alembic Chemical Works Co., Ltd., Baroda, to the Director of Industries, Bombay.

With reference to your letter No. I. B. 31—3699, dated the 28th September 1926, we have the honour to state that the Alembic Chemical Works Company is a Limited concern formed and started in 1907 within British territory with its registered office at Bombay with the object of promoting chemical industries on this side of India.

Regarding the difficulties experienced by our company are summarized in the memorandum submitted by our Mr. B. D. Amin showing the requirements of the spirit industry, copy of which is enclosed herewith for your perusal.

Our Mr. B. D. Amin also recorded evidence before the Indian Industrial Commission in 1917 perusal of which will throw great light on various difficulties experienced in the development of various industries copy of which is enclosed herewith.

It is a well known fact that Alcohol plays a very important part as a chief ingredient or solvent in a large number of chemical medicinal as well as other industrial preparations.

The Commercial and Industrial community of this country naturally expects a favourable industrial policy from the Government following on the report of the Industrial Commission which has the following observations regarding this question.

"We recommend that a more liberal policy should be followed by the Excise authorities in respect of the class of denaturant prescribed

and more regard might be paid to the likelihood rather than to the mere possibility of frauds upon the revenue."

Our company is fully equipped to meet the Indian demand as we are manufacturing about four hundred gallons of Rectified Spirit of 68° O. p. per day.

Our company has made great progress in the manufacture of drugs and medicinal preparations after the reduction of duty on spirituous medicinal preparations. The greatest difficulty at present which we are experiencing is with regard to transport facilities. We have submitted a case to the Rates Advisory Committee as per clause 4 of Railway Board Notification No. 606-T., dated 25th March 1926, copy of which we herein enclose for your support. The rates fixed and classed by the Railway are so prohibitive that unless the reduction in freight rates is made it is very difficult to compete with imported Java spirit.

Cost of Rectified Spirit placed at the Distillery is Re. 1-8-0 per gallon and the cost of denatured spirit which is styled as Industrial Alcohol is Re. 1-10-0 per gallon and the alcohol percentage in both the Rectified Spirit and Industrial Alcohol being the same there is no reason why the railway fixed freights for Rectified Spirit under class 9 and denatured spirit or Industrial Alcohol under class 4 and medicines under class 8 and medicinal herbs or leaves and country drugs under class 4 at Railway Risk as there is no provision of rate under owner's risk.

The total value of drugs in medicines manufactured and sold during a normal year is about Rs. 5,00,000.

Spirituous medicinal preparations manufactured in India are restricted for free movements from province to province as each Provincial Government have not uniform excise rules and regulations and each provincial government wants to charge excise duty on articles consumed within its province, whereas in the case of imported spirituous preparation there is a free movement from province to province as they are required to pay custom duty of the Government of India at the place of import.

Enclosure No. 7.

Copy of letter, dated the 13th October 1926, from The Alembic Chemical Works Co., Ltd., Baroda, to the Agent, B., B. & C. I. Railway, Bombay.

Subject.—Rates for Ayurvedic medicines and British Pharmacopia medicines and other perfumery, etc., prepared locally in Indian Factories.

We beg to state that we manufacture in our factory situated at Baroda the following articles:—

1. Ayurvedic medicines.
2. Indian Perfumery from perfumed spirit.
3. Rectified spirit for use in Industrial purposes and as a solvent for medicinal drugs and manufacture of alkaloids from vegetable drugs and certain other articles.
4. Essences for Syrups and aerated waters.
5. British Pharmacopia medicines containing spirit.
6. Potable spirits such as Brandy, Whisky, Gin, Ginger Wine, Masala Liquor and country liquor for Abkari Farm.
7. Furniture polishes and Lacquers.
8. Denatured spirit for burning and motive power commercially called Methylated spirit.

Chief raw material for the manufacture of spirit both potable and Industrial is Mahuwa flowers and is brought to our factory siding in full waggon loads from Chhota Udepur side to Baroda *viâ* Vishwamitri and we are made to pay Re. 0-1-2 per B. M. from Vishwamitri to our siding for a distance of three miles on Broad Gauge Section of your railway.

The above articles manufactured at our factory at Baroda are exported to Bombay, Madras, Calcutta, and Karachi, for sale and export therefrom to other parts. They are also despatched locally to stations in India such as Ahmedabad, Hyderabad (Sind), Shikarpur, Succur, Delhi, Agra Fort, Cawnpore, Amritsar, Lahore, Benares, Allahabad, Surat, Nagpur, Belgaum, Ahmednagar, Poona, Nasik, Rutlam, Indore, Hyderabad (Deccan), etc.

Enclosed herewith is a statement A showing different rates taken out from the Goods Tariff, Part I-A now in force on B., B. & C. I. Railway.

It would appear therefrom that no rates are quoted for Ayurvedic medicines and other drugs prepared in our factory and owing to the absence of which we have to admit any nomenclature applied by the Railway station master as he may find suitable out of those quoted in the Tariff.

We may mention here that Ayurvedic medicines contain no spirit and for the purpose of railway conveyance are quite harmless. Medicines manufactured according to the requirements of "British Pharmacopia" do no doubt contain small quantity of spirit but they are also harmless.

To encourage Indian Industries, while the Provincial Governments in India have lowered the Excise Duty from Rs. 21-14-0 to Rs. 5 per proof gallon of spirit contained in medicines and made the concession applicable to Pharmaceutical Laboratories in Bond, the Railway companies have made no reduction in the freights. The rates now in force compared with those of pre-war time are abnormally high and prohibitive for an enterprise started in India. For articles and drugs imported from foreign countries into Bombay there are several quotations of low special rates and B., B. & C. I. Railway Goods Tariff, Part I-B is full of such quotations.

Besides, the present classification and nomenclature is so arranged that it helps the imported goods and where there is a slight difference there is a quotation of special rate. We would here submit that from a carrier's point of view the Railway Company should treat both the exports to foreign countries and the despatch of Indian made goods from one station to another same way as they do in the case of import traffic. If quotations of rates from Ports are compared with those quoted from inland places in India where similar articles are manufactured or prepared the difference will be self explanatory.

Recently a port has been opened at Okha by H. H. the Gaikwad's Government and there is another port Bedi near Jamnagar station. If you will please see the recent reduction made in rates on goods imported *viâ* these ports you will find they have quoted ·200 pie per maund per mile for all classes of goods irrespective of their quality without any terminals—either short distance or other terminals and ·100 per mile per maund for 1st and 2nd classes and ·160 per mile per maund for other eight classes *viâ* Bedi Bunder. There also both the terminals are foregone. At these rates the charges for medicines (irrespective of any classes) imported *viâ* Okha Port come to Re. 0-2-7 for a distance of 156 miles to Rajkot and Re. 0-0-6 for a distance of 55 miles from Bedi Bunder to Rajkot for I and II class goods, whereas the rates from Bombay to Sachin a distance of 156 miles for medicinal preparations at 8th class will work out Re. 0-14-8 per maund.

We therefore request that a more liberal view should be taken by your Railway to foster our industry and the rates as now quoted for the conveyance of medicinal drugs containing spirit or no spirit and other articles manufactured by our factory at Baroda may be reduced and brought to the level of 1st class.

It is an admitted fact that with facilities afforded in transit charges the trade in the country gets an impetus and is bound to increase and with this increase both the railway company and the trader will be a helping factor to each other automatically. During the last 5 years the railway earnings have gone up by leaps and bounds. This is of course due to the development of trade in the country and in fairness of the circumstances the railway authorities should not be partial to their interests alone. The profits of the com-

pany swell up, not only by Foreign Imports but the indigenous industries also contribute their share which is comparatively not a small one. It follows therefore that the latter should also in return get facilities by way of reduced rates for the transmission of their manufactures.

Further, the statistics show that there is a great reduction in the working expenditure of the Railways as compared with the previous years and it is hoped that this would receive attention when considering our application for reduction in rates.

As announced by the Railway Board, the above application is sent to you for submission to the Rates Advisory Committee as the rates affect more than one railway but the traffic originates at Baroda on B., B. & C. I Railway.

A.

Railway Freights.

The present railway freights on the following articles are classed as under :—

Name of the article.	Railway risk.	Owner's risk	Remarks.
Absolute Alcohol	10	9	
Ale and Beer including Porter and Stouts.	4	2	
Bottles	4	2	
Camphor	...	6	
Cardamom	4	...	
Catechu	2	...	
Caustic Soda	3	2	
Chemicals not explosive . . .	8	...	
Chloroform	8	...	
Cinchona	4	...	
Cinnamoni	6	4	
Corks	4	...	
Cubebs or Cubebchini . . .	6	...	
Country drugs	4	...	
Drugs, imported	8	...	
Drugs, Narcotic, Bhang, Ganja . .	9	...	
Empties	1	...	
Essences	9	...	
Æther	9	8	
Glass Carboys	6	4	
Glycerine, crude	2	...	

Name of the article.	Railway risk.	Owner's risk.	Remarks.
Glycerine other than crude . .	4	...	
Gum	4	2	
Industrial Alcohol including denatured Alcohol, Denatured spirit ordinary, Denatured spirit special, Methylated spirit, Mahua spirit denatured.	6	4	Morvi Railway charge Rectified Spirit as Methylated Spirit.
	Denatured spirit ordinary and special and methylated spirit are charged equal to second class.		R. & K. Ry. and O. & R. Ry. prepayment of freight not compulsory on consignment of Methylated Spirit booked by Messrs. Cario & Co., Rossa. Pages 245, 246.
Mahua flowers	2	...	Short distance from Vishwamitri to Baroda Re. 0-1-2 per B. M.
	1 over the Gujarat-Broach Ry. and Rajpipla State Ry.		
Medical stores, imported . . .	8	...	
Medicinal herbs	4	...	
Medicinal leaves	4	...	
Medicines	8	...	
Medicines, Narcotic	9	...	
Oils	4	2	
Perfumery	9	...	
Rose water	9	...	
Spirit, Rectified	10	9	Special rate from Ahmedabad to Carnac Bridge, owner's risk, for Gujarat Chemical Works. Page 29, Part IB.
Spirits, wines and cordials imported in casks or cases or hampers bottled or in jars.	6	...	
Spirits, wines and cordials not bottled, accepted at owner's risk only.	...	4	
Spirits, wines and cordials, country: includes, Liquor, Mhowra, Spirit P. D.	4	...	W/300 B. G. W/160 M. G., O. R.; L. charged at rates equal to second class on E. I. Ry. and other railways.
	See XVE, Part IB, page 142, Station to Station Rate.		
Wines, non-alcoholic . . .	6	4	

Enclosure No. 8.

Copy of letter No. E. C. L. 7, dated the 26th October 1926, from the Eastern Chemical Co., Ltd., Bombay, to F. E. Bharucha, Esq., L.M.E., M.I.M.E., M.I.E., Director of Industries, Bombay.

We have the honour to acknowledge receipt of your letter No. I. B. 31—4069 of the 19th instant giving separate values of the chemicals and chemical

preparations imported into India during the years 1919 to 1924, for which we thank you and, as desired in your letter No. I. B. 31—3592 of the 17th September, we append hereto a list of the principal chemicals manufactured at our Works at Rowli Hill, Dharavi, together with a statement showing the monthly outturn capacity of our plant.

In the manufacture of several of our products difficulty is experienced in obtaining the necessary raw materials and we give below one or two examples:—

Epsom Salt is manufactured from *Sulphuric Acid* of which, of course, we have an ample supply and *Magnesite* obtained from Salem in the Madras Presidency. To produce 100 tons of Epsoms we require 40 tons of Crude Magnesite and though supplies can be easily and cheaply obtained at mine-head, the Railway freight is so heavy that it increases our cost of production out of all proportion to the actual value of the raw material used.

The Magnesite Syndicate charge us Rs. 10 per ton delivered f.o.r. Salem and the Railway freight from Salem to Bombay amounts to no less than Rs. 33 per ton, *i.e.*, more than three times the cost of the raw material.

Printing Ink is manufactured from a variety of ingredients most of which have to be obtained from England and whereas the duty on imported Printing Ink is only 2½ per cent. of the c.i.f. price the duty payable on the components required for its manufacture in India is 15 per cent. in every case.

We have now perfected our Printing Ink and trials have been carried out on every type of machine and on several classes of paper varying from a highly glazed non-absorbent paper as used by the "Indian Daily Mail" to a rough and absorbent paper such as is used for the "Bombay Chronicle" and the results have been, without exception, an unqualified success.

We therefore suggest that the duty on imported Printing Inks should be raised to 15 per cent. or else that the ingredients necessary for its manufacture in India should be allowed to come into the country at 2½ per cent. Customs Duty only, as the result of the present system is to handicap the Indian manufacture very severely.

Transport.—Our Works are situated near Rowli Hill at the end of the Government Salt Pans Road and the most serious obstacle of all that we have to surmount is the fact that Government has closed this road to all lorries of over 1 ton although from time to time we have observed Government 5-ton lorries carrying Road Metal, Bricks, Building Materials, etc.

When our Works were built some 12 years ago lorries of any size and weight were allowed to pass freely to and from our Works and this was the case until October 1923 when a heavy lorry unfortunately fell down a 6 ft. bank owing to the side of the road collapsing. The road has now been repaired and strengthened and we do not consider that there would be any danger of a similar occurrence in the future but though we are continually requesting the Authorities concerned to reconsider their decision, the ban on heavy lorries has not been removed.

If you are able to help us in surmounting any of the difficulties detailed above we feel confident that we will capture a larger proportion of the Indian Chemical Business as a result of reducing our cost of production and delivery.

List of Principal Chemicals manufactured at our Works at Rowli Hill.

	Per mensem.
Acid Sulphuric—Accumulator and B. P. 95% .	40,000 lbs.
Acid Sulphuric—Commercial	220 tons.
Acid Nitric—B. P. 100%	6,500 lbs.
Acid Nitric—Commercial 84° Tw. . . .	32 tons.
Acid Hydrochloric—Commercial 32° Tw. (Muriatic).	35 ,,

	Per mensem.
Green Copperas—(Ferrous Sulphate)	120 tons.
Epsom Salts—(Mag. Sulph.)	200 ,,
Soda Crystals—(Sod. Carbonate)	
Glauber's Salts—(Sodium Sulph.)	
Liquid Disinfectant	6,000 gallons.
Printing Inks	15 tons.
Killed Spirit or Soldering Flux—(Liquid Zinc Chloride)	15 ,,

Enclosure No. 9.

Copy of letter No. C/259, dated the 29th November 1926, from the Dharamsi Morarji Chemical Co., Ltd., Bombay, to the Director of Industries, Bombay.

In reply to your No. I. B. 31—3593, dated 17th September 1926, we beg to submit the following statement for your consideration and for such action as you may be pleased to take.

The main difficulties in the way of our progress are:—

(1) Very keen foreign competition in the matter of certain chemicals, (2) Heavy Railway Freights on all Chemicals and Raw Materials and (3) Present financial stringency.

During the days of the war all countries had started factories for the production of War Materials. Since the close of the war many of them were transformed into Chemical Factories, which became a source of over-production in almost all the Western Countries. It has been this over-production which is one of the main causes of the dumping on the Indian Market. This dumping can only be met by a levy of higher tariff rates on all Foreign Chemicals. This, however, is a matter which can be dealt with by the Central Government and in view of this fact we approached the Government of India directly with applications, entreating that Government to request the Tariff Board to take up the consideration of this subject at an early date. Our applications to that Government were treated with scant courtesy. Unfortunately the cogency of our arguments failed to impress the Secretary to the Government of India, Department of Commerce, and he declined to forward the matter for an investigation at the hands of the Tariff Board. We append copies of the whole correspondence in this regard for favour of your perusal.

We know the Local Government has no direct control or connection with the working of the Tariff Board, but it is one of the Government's very essential duties to assist with a fostering care the healthy growth of a Key Industry on the success of which so many Industries depend.

Under the circumstances mentioned above, we hope you will strongly support our representation and urge upon the Government of India to refer this question to the Tariff Board at an early date.

The next point is regarding the treatment we get at the hands of the Railway Administration. When we first consented to establish our Factory at Ambernath, we were led to expect a liberal treatment from the Railway Administration in consideration of the fact that we were the pioneers in this industrial area and were thus instrumental in opening up a new centre which would expand their business. It is now more than five years we have been at Ambernath and the facilities afforded to us by the Railway have been next to nothing, as will be seen from what is stated below:—

(*i*) The station building remains what it once was, a small but scarcely big enough to provide standing room to the Railway Staff itself.

(*ii*) There is no platform: all heavy goods have to be lifted up into, or to be taken down from the wagons on a temporary platform lately erected.

(*iii*) There is no proper goods-shed and the goods coming in or to be despatched remain exposed to sun and rain alike, in all seasons, without being protected from the weather or properly guarded against theft or damage.

These appear to be but small matters, but inconvenience, unnecessary expenses and losses in breakages, etc., they have caused us can only be gauged by those who have had similar experience.

Of all the items relative to this question the recklessness in the matter of shunting operations is playing havoc and causing the greatest injury to our trade. Our consignments whether consisting of jars or carboys full of acids sent to Bombay and up-country stations or of empties being returned from our Bombay Godown or coming from our up-country clients, hardly ever reach their destination without tremendous amount of breakage occurring, howsoever securely they might be packed. Our clients have all along been complaining to us and we have even lost the patronage of some, on account of this. The loss of material and containers is by itself a considerable item, but the loss of custom is still more serious. We have complained to the Railway Administration in this connection a number of times, but our grievances have not in any material degree been redressed.

Under the circumstances there is only one remedy that we can suggest and it is that the Railway Authorities should be made responsible for the losses caused by rough shunting operations. This can easily be brought about by the Local Government interesting itself in the matter and recommending this remedy to the Railway Board.

As regards freights charged on raw materials coming in, or finished goods going out, we are constrained to say that we are not only not treated liberally, but not even treated in a reasonable or business-like way. We have had repeated correspondence with the Railway Administration, but we have not succeeded in waking them up to the necessities of the situation. We stand almost where we were five years ago.

As the Central Government have now acquired a more direct control over the G. I. P. and certain other railways, it would not be out of the proper sphere of the Local Government to forward to the Railway Board, with a forceful recommendation, our demand for a very special treatment in the matter of all freights on the incoming raw materials or the outgoing finished products.

Regarding the third question, that of the financial stringency, it would not be out of place to give you some idea as to how we are presently situated.

The Dharamsi Morarji Chemical Company, Limited, was started with a joint stock capital of Rs. 50,00,000 out of which about Rs. 30,00,000 have so far been paid up, and invested in the undertaking. The Company was started mainly with the object of supplying heavy chemicals to the Textile Industry and artificial manures to agriculture. All throughout the initial stage, as has been stated above, the concern has had to contend against unexpected and very severe competition and certain disabilities in the matter of Chemicals. Expert knowledge has had to be sought at the start at great expense. Advisers had to be engaged in England and experienced men were brought to manage the concern. As regards manures and fertilisers we have had to spend large amounts of money on propaganda work. The result has been that great losses have been sustained in the first case and large preliminary expenses have been undergone in the other.

By way of information, we may mention, here, that we are the only manufacturers of Chemical Manures in Western India. It has been proved beyond doubt that Indian soils generally are deficient in phosphates, while raw bones to the extent of nearly a lakh of tons on the average are annually being exported. These exports are draining the natural supply of phosphates year by year,

the inevitable result of which will be a complete dearth of this very important plant-food in time to come. This exportation and consequent process of impoverishment has to be stopped by all means. We have started with the manufacture of bone-superphosphate with a view to utilise this very valuable raw material of the country to the greatest advantage of Indian Agriculture as far as we can.

It need not be said that fertilisers do benefit the crops and bring better profits to the cultivator but the Manure Manufacturers, at least in the first stages, have to keep a large amount of money locked up in long credits.

The introduction of Chemical Manures is a novel experiment to the Indian cultivator; he is again very poor and being a cautious and conservative fellow he has to be persuaded to give the experiment a trial. In order to do this, a very vigorous propaganda has to be carried on and long credits have to be given. It need not be mentioned that as a matter of fact the Manure Manufacturer has to bear the whole brunt of the situation. If Government is really interested in the uplift of Indian Agriculture, it should come forward to help the Indian Manure Manufacturers who are entitled to the Government's best support.

The Local Government can fulfil this obligation by granting us a substantial subsidy or a long-term loan.

Suggestions for the improvement of the Chemical Industry in this Presidency can best be made after a detailed personal discussion between your good self and our representative. If you are of the same opinion, an appointment can be fixed up at your convenience at an early date and our representative will wait upon you.

Statement showing Capacity and present Production.

—	Present production in tons.	Present cost of production per ton.	Future maximum production in tons with existing plants.	Future cost of production per ton with maximum production.
		Rs.		Rs.
Camphor	2,800	57	8,000	38
Acid (Sulphuric)	...	...	...	...
Concentrated Acid	800	176	1,100	130
Hydrochloric Acid	610	218	900	194
Nitric Acid	100	562	270	465
Soda Sulphide	250	228	...	...
Aluminium Sulphate	450	102	...	...
Alum (Potash)	450	140	...	...
Zinc Chloride	300	566	...	...
Copperas (Green)	180	59	...	...
Copper Sulphate	100	398	...	...
Glauber's Salt	350	61	...	...

Copy of letter No. 199-T. (8), dated the 20th July 1928, from Rai Bahadur L. Sen, Assistant Secretary to the Government of India, to the Secretary, Tariff Board.

SUBJECT:—Reference to the Tariff Board on the question of protection for the Indian Chemical Industry.

In continuation of this Department Resolution No. 199-T (8), dated the 16th July 1928, I am directed to forward for information, copy of the correspondence cited on the margin between the Government of Bombay and the Department of Industries and Labour.

Letter from the Government of Bombay, No. 6407-II-B., dated the 23rd November 1927.
Letter to the Government of Bombay, No. 1-295, dated the 15th May, 1928.

Enclosure No. 1.

Copy of letter No. 6407-II-B., dated the 23rd November 1927, from the Secretary to the Government of Bombay, General Department, to the Secretary to the Government of India, Department of Industries and Labour.

SUBJECT:—Question of the local manufacture of chemicals, drugs and medicines.

I am directed by the Government of Bombay (Transferred Departments) to say that the question of the desirability of encouraging local manufacture with a view to reducing the large imports of chemicals, drugs and medicines into Bombay has recently been engaging their attention. In this connection I am to point out that the actual figures of imports of these articles into Bombay (chief port) for the five years ending 1923-24 are as under:—

	Chemicals.	Drugs and Medicines.
	Rs.	Rs.
1919-20	49,88,471	96,32,303
1920-21	94,77,887	96,15,785
1921-22	63,75,154	76,63,097
1922-23	67,11,352	79,90,107
1923-24	65,88,005	81,07,776

These figures are exclusive of the imports of chemicals, etc., on behalf of Government. With a view to obtaining material upon which to base proposals for the local manufacture of these articles, the Director of Industries in this Presidency addressed the two large manufacturers of heavy chemicals in Bombay, *viz.*, the Eastern Chemical Company and the Dharamsi Morarji Chemical Company, as well as a few manufacturing chemists. Their replies are summarised in paragraph 2 below.

2. The Eastern Chemical Company state that they have experienced difficulty in obtaining the necessary raw materials and they cite the example of Epsom Salts, for which large quantities of crude magnesite are apparently necessary. They complain that the railway freight on this article is so heavy that the cost of production of the salts is prohibitive. They also quote the instance of printing inks, for which most of the ingredients have to be obtained from England. Their complaint is that the tariff duty on these is so high that they cannot compete with imported inks.

The Dharamsi Morarji Chemical Company refer to three difficulties, *viz.*, (1) foreign competition, (2) railway freights, and (3) finance. As regards (1), they complain of dumping and state that the only remedy is protection. It seems that they have been in correspondence with the Central Government on the subject. With regard to (2) they point out that the railway authorities do not give them adequate facilities and charge too high freights. Here, too, they have been in correspondence with the Railway Administrations. With reference to (3), they complain of their large expenses and ask for a subsidy or long term loan.

Coming to the manufacturing chemists, Messrs. Kemp and Company say that it is cheaper to import their raw material which is also superior in quality to the indigenous article. Messrs. Powell and Company state that they can meet all demands but cannot get all their raw materials in India. The Alembic Chemical Company also point out that they can meet all demands but complain of high freights and transport difficulties and also of restrictions on the movement of spirituous preparations.

3. I am to observe that the replies received from the local manufacturers of heavy chemicals and others do not furnish adequate material for the formation of definite proposals for the local manufacture of chemicals, etc. Moreover, it is doubtful whether the local manufacture of chemicals can be organised on a scale which would permit this Presidency to compete on favourable terms with foreign manufacturers. The Bombay Government, therefore, venture to think that the question of competition with the gigantic chemical manufacturing interests in the rest of the world can only be undertaken as an All-India problem. The Government of India are probably aware that the world's trade in heavy chemicals is practically in the hands of less than half a dozen enormously wealthy companies and it is rumoured that four of the biggest of these concerns are to be amalgamated with a view to crushing all competition. In the opinion of the Local Government any idea of starting small local industries in opposition to the immense interests abroad is out of the question and the problem of the indigenous manufacture of chemicals in India can only be seriously tackled by treating it as an All-India one and having it investigated by the best experts obtainable.

4. That large scale chemical industries are possible in India appears to have been the opinion of the Indian Industrial Commission of 1916-18, but it is obvious that these industries must be started in localities where raw materials are readily available and communications and other conditions are favourable. Because Bombay, for instance, is a large user of heavy chemicals, it cannot be inferred that Bombay or even the Bombay Presidency is the proper place in which to start the manufacture of even a single chemical. There are a large number of factors to be taken into consideration. Firstly, with regard to the supply, it is axiomatic that it is most economical to manufacture articles where the raw material is found, but this is modified by other considerations. The climatic conditions may be unfavourable for the manufacture or the place may be unsuitable for the distribution of the finished product to the markets. It might, therefore, be more economical in the long run to despatch the raw material to more conveniently situated places for manufacture and distribution. The Local Government are of opinion that these are the primary considerations and that it would have to be decided by a central authority in what place the factories should be set up for each chemical. Having settled this, the next question would be the cost of manufacture, including plant and establishment. It would then have to be worked out with the utmost care at what cost the finished product could be placed on the large markets and that cost compared with the cost at which the imported article could be sold in the same markets. Here the question of freights and tariff would arise and it would have to be calculated to a nicety what freight and tariff rates would have to be imposed to enable the indigenous article to compete on favourable terms with foreign imports. All these preliminary matters having been decided, the crux of the whole problem would then be reached, *viz.*, finance. An enormous capital would be required if a prolonged struggle with foreign

interests were anticipated and that there will be such a struggle is fairly certain. It is doubtful whether a sufficient amount could be provided without the very substantial help of Government. The Local Government consider that private enterprise alone would never be able to overcome foreign competition.

5. In view of the circumstances set forth above, the Bombay Government are inclined to the opinion that the problem of organising local industries to reduce the imports of foreign chemicals, etc., is one which will require a most patient and exhaustive investigation at the hands of experts and I am to enquire whether the Government of India are prepared to have the whole question examined by a committee of such experts. I am also to observe that if Government took the lead in patronising local manufactures of chemicals, it might give the required impetus to the investment of private capital in such enterprises. Over and above the question of patronage to local manufactures, the difficulties due to high freight charges and tariff duties, the inadequacy of transport and the question of protection are matters which can be handled by Government alone. I am accordingly to request that the Government of India may be moved to take the necessary steps to remove the difficulties of the local manufacturers mentioned in paragraph 2 of this letter.

Enclosure No. 2.

Copy of letter No. 1-295, dated the 15th May 1928, from the Secretary to the Government of India, Department of Industries and Labour, to the Secretary to the Government of Bombay, General Department.

SUBJECT:—Question of the local manufacture of chemicals, drugs and medicines.

I am directed to refer to your letter No. 6407-II-B, dated the 23rd November 1927, in which the Local Government enquire whether the Government of India are prepared to have the whole question of organizing local industries with the object of reducing the imports of foreign chemicals, drugs and medicines examined by a committee of experts.

2. It will be within the recollection of the Local Government, though no reference is made to this in your letter, that as a result of the recommendations of the Indian Industrial Commission the Government of India initiated certain action with the object of developing chemical industries and organizing chemical research in this country. The Commission in Chapter IX of their report had recommended the appointment of a special Committee, including a distinguished chemist from abroad, to form late proposals for the permanent organization and terms of employment of a new Chemical Service and for the location and equipment of research laboratories and in pursuance of this recommendation, the Government of India appointed in November 1919 the Chemical Services Committee under the presidency of Professor F. J. Thorpe. That Committee stated in the forefront of their report their opinion that the development of the chemical industries of India could only be adequately realised through the agency of an efficient Government Chemical Service. But their recommendations in this respect could not be carried into effect in view of the lack of support received from Local Governments. In this connection, reference is invited to the letters from the Government of Bombay, Nos. G-15 of the 8th March 1921, and the 20th January 1923. In the absence of the services of trained chemists no general survey of the chemical problems of India has hitherto been undertaken. The Government of India have, however, examined the question in the light of your letter of the 23rd November 1927 with the assistance of the best technical advice available to them.

3. The Indian Industrial Commission in paragraph 79 of their Report recognised the difficulty of the problem of developing chemical industries in India. They pointed out that owing to the great variety and the relatively small quantities of each kind consumed in India under peace conditions,

local manufacturers had confined their attention to the few " heavy " chemicals which were in sufficient demand to support an economic unit of manufacture and, as in the case of acids, were protected by heavy sea freights. The complexity of the problem may, however, be better appreciated from what is stated below. In the Local Government's letter chemicals, drugs and medicines are dealt with together, but the position will be clearer if chemicals are considered separately from drugs and medicines since the problems presented are not the same.

4. The total imports of chemicals into British India have in the past five years been as follows:—

	Rs.
1922-23	2,01,69,541
1923-24	2,04,74,317
1924-25	2,02,82,640
1925-26	2,02,63,680
1926-27	2,44,35,046
1927-28	2,64,93,977

More detailed figures for the year 1926-27 are given in Appendix I. Many chemicals are imported into India, or in fact are used in India, only in small quantities and the total number of chemicals made for one purpose or another is extremely large. The number of different chemicals imported into India is probably several thousands, although many of them are used only for special and very restricted purposes. For this reason it seems likely that most of the chemicals coming under the head of " Other sorts of chemicals " are required in quantities so small that it would not be feasible to manufacture them in India. These doubtless include the " fine " chemicals, while the remaining materials, valued at about 178 lakhs, come generally under the heading of " heavy " chemicals. A deduction has been made for sulphur which is not a chemical but a raw material.

5. By far the most valuable of the chemicals imported into India is sodium carbonate. If this were manufactured in India, it may be taken that other allied manufactures would be carried on together with it. The nature of these would depend on the process adopted. The two principal processes are the Leblanc process and the ammonia soda process. The Leblanc process produces large quantities of hydrochloric acid and is economically practicable only if there is a sale for the acid. At present in India the demand for hydrochloric acid is small. It is true that a supply of relatively cheap hydrochloric acid might stimulate some other branch of chemical industry, but this possibility is too speculative to make the Leblanc process an attractive venture. Apart, therefore, from other difficulties the Government of India consider that the difficulty of disposing of the large output of hydrochloric acid is too great to make this process feasible.

6. For this reason they believe that if sodium carbonate can be manufactured in India, it is likely to be by the ammonia soda process, which produces sodium carbonate *viâ* the bicarbonate. From the carbonate could be produced caustic soda and sodium silicate. Consequently a convenient group of manufactures appears to be:

	Imports into India in 1926-27. Rs.
Sodium Carbonate	58,34,215
Sodium bicarbonate	9,11,135
Caustic soda	18,06,452
Sodium silicate	2,58,799
	88,10,601

The imports of these materials are thus about half of the total imports of heavy chemicals.

7. In view of the large scale on which the alkali industry is conducted in England and elsewhere it is obvious that only large scale manufacture could be economically successful in India. If all the needs of India could be supplied from one factory, this condition would be satisfied as the consumption approximates to 5,000 tons a month. A single large factory would, however, introduce an only too familiar difficulty, that of distribution. The sea freight from Calcutta to Bombay is much the same as that from a British port. On the other hand, the division of manufacture among different centres would mean that the output from each was insufficient for economic working except in Bengal.

8. Here the demand is great, since more than half of the sodium carbonate imported into India goes to Bengal. A factory near Calcutta would therefore be suitably placed provided raw materials were available. This, however, is not the case. The principal materials required are salt, limestone and fuel. None of these is on the spot, while most of the salt used in Bengal is imported from abroad. Salt is the most obvious starting point for the manufacture of the majority of sodium compounds and, because of the importance in industry of these compounds, the supply of salt is a point of fundamental importance in the chemical industries. In India salt is obtained from the Salt range or the salt sources in Rajputana, which are however remote from industrial centres, or by the evaporation of sea water on the coasts of Bombay and Madras. There is no such industry in Bengal. Moreover one part of salt yields rather less than one part of soda. Over one part by weight of limestone is also necessary in addition to fuel and ammonia, so that the distribution of the raw materials which is all important is, unfortunately, an adverse factor. There is, in addition, the possibility of utilizing alkaline earths as a source of sodium carbonate, but the investigations hitherto made into this question seem to indicate that the cost of manufacture and the difficulties arising from the distribution of the raw material are effective obstacles in the way of profitable manufacture on a large scale. In Europe the alkali industry exists only in localities where the raw materials are immediately available and the conditions prevailing in India render it in all probability impossible to manufacture in this country except under heavy protection.

9. Sulphuric acid is made in India from imported (Sicilian) sulphur. The amount of acid imported is negligible so that the industry may be regarded as firmly established in India. Nevertheless, the small scale of manufacture and the necessity of using imported sulphur (there is no native sulphur in India) make the price of the acid high—not high enough to permit the importation of acid, but high enough to affect adversely the general tendency of prices of other chemicals whose manufacture involves the use of sulphuric acid.

10. Sulphuric acid, owing to its corrosive nature and the high cost of freight, is best made near the point of consumption and this gives a sort of natural protection to the Indian industry. But this does not apply to materials manufactured from sulphuric acid. It is generally acknowledged that sulphuric acid is of primary importance among chemicals and its high cost in India must hamper the chemical industry. On the other hand the small extent of the chemical industry, is one reason for the high price of sulphuric acid.

11. No other chemical imported into India approaches those discussed in its importance and it is doubtful if any could well form the basis of a separate industry. Some however might be manufactured in existing factories in addition to present manufactures. Each of these presents a problem of its own and the Government of India have no doubt that the advisability of attempting the manufacture of each of the more important chemicals has been carefully considered by the different Indian manufacturer.

12. There are however certain general considerations that adversely affect the majority of chemical industries. These are—

(1) The prices of the basic materials, alkali and sulphuric acid, are very high compared with those prevailing in other manufacturing countries.

(2) Raw materials are in general inconveniently situated and therefore involve high freight charges.

(3) The demand for most chemicals is so small that large scale manufacture is out of the question unless export is possible. For reasons (1) and (2), however India can seldom compete in the export market.

Perhaps the most important of these points is the small demand that exists at present. In those branches of chemical manufacture in which elaborate machinery and skilled supervision are necessary, it is evident that only large scale production is feasible. The demand for chemicals is, however, largely governed by the general industrial development of a country and it would be difficult for the Indian chemical industry to develop substantially without a large advance in other industrial activities.

13. What has been said above refers to chemicals only. As regards drugs and medicines, details of the imports, amounting to some two crores, are given in Appendix II. A comparison of these figures with Appendix I shows that there is nothing in common between the two sets of imports and they cannot in any way be classed as one industry or group of industries. The drugs and medicines include the so-called 'patent' medicines. The manufacture of these is clearly a matter which must be left to private enterprise. The remaining items, except cod liver oil, are all vegetable products. Their production cannot suitably be taken up by a chemical manufacturer.

14. In the last sentence of your letter, the local Government request that the Government of India be moved to take the necessary steps to remove the difficulties of the local manufacturers mentioned in paragraph 2 of your letter. These difficulties are (1) foreign competition, (2) finance and (3) high railway freights. Special reference is also made to the tariff duty on the ingredients required for printing inks. With regard to this last point, I am to invite your attention to the report of the Indian Tariff Board regarding the grant of protection to the Printer's Ink Industry, where the question was thoroughly examined, and to the action taken by the Government of India on that report. As regards railway freights, I am to invite your attention to Railway Department Resolution No. 606-T., dated the 25th March 1925, as amended by Resolution No. 606-T., dated the 24th January 1927, which relates to the appointment and the functions of the Railway Rates Advisory Committee. This Committee already provides the required means for conducting a proper enquiry into complaints from local manufacturers in regard to unreasonableness of railway freights.

15. The two other difficulties mentioned, foreign competition and finance, raise wider issues. One method which has been suggested of meeting foreign competition is by tariffs, but in this connection it is important to bear in mind that in general chemicals are also the raw materials of other industries which desire their free importation. For example, in order to assist the cotton industry in Bombay, the customs duties on certain chemicals have been abandoned. It is not therefore possible to consider any particular chemical merely as the finished product of its factory, without regard to its uses as a raw material for other industries. In individual cases where protection may be considered desirable, the existence of the Tariff Board provides the necessary means for the examination and justification of any proposal for protection and the Government of India in fact propose to refer to the Tariff Board, as soon as its programme of work permits, the applications for protection received from Messrs. Dharamsi Morarji Chemical Company, and the Eastern Chemical Company of Bombay. Further, so far as chemicals are concerned, though the total imports amount on the average to some two crores, the amount, apart from alkalies, is only large because of

the large number of products over which it is spread. The amount is actually small compared with the chemical trades of other countries. The Local Government rightly realize that the starting of such local industries in opposition to the immense interests abroad is out of the question, but in the circumstances above explained it is difficult to visualise, as in paragraph 4 of your letter, a vast concern apparently with numerous factories in different parts of India, and it is doubtful whether the inauguration with Government assistance of any such concern could be justified by results.

16. On a review of the whole situation, the Government of India are not convinced that the special assistance of the Government of India in financing such a venture is a practicable proposition or that there are such special features in the situation as to justify the treatment of chemical industries differently from other industries. In the absence of concrete proposals from existing chemical manufacturers, they doubt whether the appointment of a Committee suggested would be productive of valuable results. They have, however, recently addressed Local Government generally on the subject of central co-ordination of industrial research and if His Excellency the Governor in Council has no objection, they propose to forward your letter, which has a bearing on that question, to the other Local Governments and to invite their suggestions upon it. A copy of this letter will probably be forwarded also, but the Government of India will welcome any criticisms or comments of the views expressed in it which the Government of Bombay desire to offer.

Copy of correspondence is forwarded to the Commerce / Railway / Education, Health and Lands Department for information.

APPENDIX I.

	Rs.	Rs.
Acetic Acid	1,41,370	1,20,338
Carbolic Acid	39,695	52,668
Citric Acid	50,255	37,095
Nitric Acid	14,268	23,252
Oxalic Acid	43,490	49,993
Sulphuric Acid	22,281	63,953
Tartaric Acid	1,52,345	1,46,448
Other Acids	1,69,691	1,72,101
Alum	3,96,625	3,57,580
Aluminium Sulphate	2,80,682	2,53,874
Ammonia and its salts only	1,78,945	1,89,773
Other sorts	6,44,694	6,59,905
Arsenic and its oxides	1,65,031	1,01,762
Bleaching materials	7,85,216	8,88,551
Calcium Carbide	5,98,320	8,89,575
Ferrous Sulphate	14,737	14,311
Copper Sulphate	3,09,515	2,76,115
Naphthalene	80,673	1,37,307
Other disinfectants	6,04,659	7,94,255
Glycerine	3,66,236	2,91,010
Lead acetate	2,30,066	1,75,211

	Rs.	Rs.
Litharge	31,136	49,395
Other lead salts	10,917	18,161
Magnesium Chloride	2,22,579	1,62,578
Magnesium Sulphate	1,47,243	2,03,294
Other magnesium salts	36,227	54,185
Potassium bichromate	1,75,534	1,66,138
Potassium Chlorate	6,53,303	4,96,687
Potassium Cyanide	7,875	11,440
Other sorts	2,45,506	3,91,192
Sodium Bicarbonate	9,11,135	8,32,626
Sodium Bichromate	1,91,686	3,07,271
Borax and Boric Acid	1,99,416	2,64,599
Caustic Soda	18,06,452	19,62,784
Sodium Cyanide	5,85,647	5,62,806
Sodium Sulphide	3,48,345	3,55,128
Sodium Carbonate	58,34,215	60,00,580
Sodium silicate	2,58,799	2,81,844
Other salts	4,39,497	6,67,743
Sulphur	15,99,109	19,93,801
Zinc Chloride	4,46,271	4,12,310
Other Zinc salts	20,380	9,911
Other sorts of chemicals	49,74,980	55,94,413
TOTAL	2,44,35,046	2,64,98,971

Director-General of Department of Commercial Intelligence and Statistics.

Letter dated the 7th December 1928.

"IMPORTS OF HEAVY CHEMICALS INTO KATHIAWAR PORTS."

With reference to your letter No. 845, dated the 24th November 1928, on the above subject I have the honour to enclose a statement showing the quantity and value of the heavy chemicals imported into the Kathiawar Ports during the last five years and in the last seven months of 1928-29. These figures have been specially compiled from the returns submitted to this Department by the Kathiawar States and are incomplete inasmuch as quantities of chemicals in certain returns were shown under a combined head as "chemicals" or "chemical products" without the names of the particular chemicals or groups to which they belong. There is also a lack of uniformity in the denomination of quantity.

Statement showing quantity and value of the heavy Chemicals imported into the Kathiawar ports during the years 1923-24 to 1927-28 and the seven months April to October 1928.

	1923-24.		1924-25.		1925-26.		1926-27.		1927-28.		Seven months, Apil to October, 1928.	
	Quantity.	Value.	Quantity.	Value.	Quantity.	Value.	Quantity.	Value.	Quantity.	Value.	Quantity.	Value.
		Rs.		Rs.		Rs.		Rs.		Rs.		Rs
Acid, Sulphuric . . Cwt.	...	...	...	..	...	...	...	...	81	823	225	2,467
Bleaching powder . . ,,	...	...	...	...	45	547	1,401	14,010	18,073	1,28,435	12,555	92,122
Chloride of lime . . ,,	...	...	...	...	...	...	531	5,510	1,846	18,586	...	...
Potassium Bichromate . ,,	...	...	...	...	...	...	...	...	331	7,524	340	8,132
Sodium Bichromate . . ,,	...	...	...	...	...	...	...	...	1,206	26,163	1,955	22,892
Soda Caustic . . . ,,	...	...	...	...	...	..	20	300	430		330	4,193
,, . . . Drum	...	...	...	...	...	...	...	...	1	6,843	...	...
,, . . Packages	...	...	...	...	...	...	...	...	30		...	...
,, . . . Casks	...	...	...	...	...	...	...	...	30		...	...
Sodium Carbonate (Soda ash and Soda Crystals). Cwt.	...	...	9,683	54,039	8,400	53,600	9,620	68,700	27,492	1,42,275	7,521	45,942
Sodium Carbonate (Soda ash and Soda Crystals) Packages	...	...	...	...	...	...	1,800		...	...	...	...
Sodium bicarbonate . . Cwt.	...	...	...	..	565	3,820	20	595	320	3,635	1,705	17,274
,, ,, . Packages	...	...	...	...	...	...	50		.	...	...	...
Sodium nitrate . . . ,,	...	...	...	...	...	...	...	...	5	82	...	...
,, sulphate . . ,,	...	...	...	...	...	...	...	...	20	1,166	75	2,440
,, acetate . . ,,	...	...	...	...	...	...	...	...	200	5,743	...	...

N.B.—Figures incomplete, inasmuch as certain returns for October 1928 have not yet been received.

His Majesty's Mint, Bombay.

Letter dated the 15th January 1929.

With reference to your letter No. 26, dated 8th January 1929, forwarding a printed extract, I have the honour to state that the price quoted to the Mint by a German Firm is correctly cited in the extract as 2 annas 3 pies per pound of acid. This figure, however, represented the cost of nitric acid of a purity of about 65 to 66 per cent., actually the German acid is supplied about 99 per cent. pure, in returnable aluminium casks, and the price actually quoted was Rs. 24-8 per cwt. nett delivered at the Mint, which is equivalent to about 3 annas 6 pies per pound of this pure acid or 2 annas 3 pies per pound of 65-66 per cent. acid. I think the figure of 3 annas per pound given in the extract as the minimum price of acid from the Eastern Chemical Company, also referred to 65-66 per cent. acid, though this is not definitely stated in the extract. The amount of such acid required by the Mint in the near future is calculated at about 200 tons annually.

2. As regards actual purchase, it is believed that the general policy is likely to be to buy the acid in the cheapest market irrespective of its origin, unless the difference in price is quite small. As the same course is likely to be pursued by the public it would seem that the local manufacture of nitric acid could not long be continued without protection, in face of the very low prices offered by the German importing firm.

Collector of Salt Revenue, Bombay.

Letter No. 40-42, dated the 30th March 1929.

With reference to your letter No. 277 of 28th instant, I have the honour to state that the issue price of salt without duty at the following Government salt sources in the Bombay Presidency, is as under:—

	Per maund. Rs. A. P.
Kharaghoda	0 4 3
Kuda	0 3 6
Dharasna-Chharvada	0 3 9

Cordite Factory, Indian Ordnance Department, Aruvankadu, Nilgiris.

Letter No. W. M.-695, dated 16th October 1928, from G. S. Butler, Esq., B.A. (Oxon.), F.I.C., Works Manager.

Ref.—Your No. 188-T., dated 12th/13th October 1928.

I return herewith, duly corrected, the evidence tendered by me before the Board on the 11th instant.

2. I also enclose the information regarding costs which I was asked to furnish.

Cost of Manufacture of Sulphuric Acid.

Particulars.	Cost per cwt.		
	1925-26.	1926-27.	1927-28.
	Rs.	Rs.	Rs
Acid, Nitric	4·8	·57	·45
Brimstone	2·32	2·01	2·15
Labour	·17	·18	·22
Steam	·87	1·24	·90
Power	·01	...	·02
Compressed air	...	·13	·10
Repairs to plant	·29	·33	·27
Repairs to buildings	...	...	...
Depreciation on plant	2·03	2·52	1·75
Depreciation on buildings	·46	·55	·41
Miscellaneous overhead charges	1·21	1·30	1·18
Total cost of Sulphuric Acid (60% strength)	7·84	8·83	7·45
	Equal to 5·44% of the cost of Cordite.	Equal to 6·7% of the cost of Cordite.	Cost of Cordite not yet available.
Cost of concentration to 95% strength	4·07	3·69	3·74
Total cost of Sulphuric Acid, concentrated 95% strength.	11·91	12·52	11·19

NOTE.—Some of the acid is concentrated to 95 per cent. strength and some to 92 per cent. strength.

Cost per cwt. of brimstone delivered at Factory:—

	Rs.	A.	P.
1925-26	6	14	5
1926-27	5	15	3
1927-28	6	6	3

Cost of Manufacture of Nitric Acid.

Particulars.	Cost per cwt.		
	1925-26.	1926-27.	1927-28.
	Rs.	Rs.	Rs.
Acid, Sulphuric	13·15	12·01	11·77
H_2SO_4 cost of concentration to 92% strength.	4·62	5·66	5·62
HNO_3 Distillation (concentration of weak nitric acid).	3·25	5·61	4·04
Soda Nitrate	19·63	19·20	15·93
Timber firewood	·95	·90	·96
Labour	1·55	1·81	1·52
Compressed air	·91	1·32	1·01
Repairs to plant	·59	·66	·68
Repairs to buildings	·03	·02	...
Depreciation on plant	·82	·74	·63
Depreciation on buildings	·15	·13	·12
Miscellaneous overhead charges . . .	8·98	10·43	11·10
Total cost of Nitric Acid .	54·63	58·49	53·38
	Equal to 18·84% of the cost of Cordite.	Equal to 21·61% of the cost of Cordite.	Cost of Cordite not yet available.

Cost per cwt. of nitrate of soda delivered at Factory:—

	Rs.	A.	P.
1925-26	13	5	10
1926-27	13	4	9
1927-28	10	15	1

The Agent, Great Indian Peninsula Railway.

(1) *Dated the 7th January 1929.*

STATEMENT No. 1.

Statement showing General Classification, G. I. P. Railway Exception and Special Rates per maund for certain Chemicals and Acids.

Commodity.	General Classification		G. I. P. Exception.	Special Rates.			
	R. R.	O. R.		From	To	Per md. O.R. *W.-120 L.	Per md. per mile.
	Class.	Class.	Class.*			Rs. A. P.	Pie.
Sulphuric Acid	8	6	4 W.-300	Bombay . . .	Poona . . .	0 7 2	·72
p.d. L.	1·04	·83	·62 O. R.		Sholapur . . .	0 15 7	·66
					Vid Wadi for Secunderabad.	1 4 1	·64
					Vid Raichur . .	1 7 7	·64
					Nagpur . . .	1 11 10	·64
Hydrochloric Acid	10	9	.....	Ambernath . . .	Bombay (Byculla) .	0 2 10	·89
p.d. L.	1·87	1·25	.....		*Vid* Dadar . . .	0 2 7	·94
					Poona . . .	0 5 3	·77
					Sholapur . . .	0 13 9	·67
					Vid Wadi . . .	1 2 4	·65
					Vid Raichur . .	1 5 8	·64
Nitric Acid	10	9	.....		Nagpur . . .	1 10 4	·64
p.d. L.	1·87	1·25	.....		Delhi Sadr . . .	2 10 3	·55

*See page 2.

Statement showing General Classification, G. I. P. Railway Exception and Special Rates per maund for certain Chemicals and Acids —contd.

Commodity.	General Classification.		G. I. P. Exception.	Special Rates.			
	R. R.	O. R.		From	To	Per md. O.R. *W.-120 L.	Per md. per mile.
	Class.	Class.	Class.*			Rs. A. P.	Pie.
Magnesium Sulphate . . . . as Epsom Salt.	4 ·62						
Ferrous Sulphate . . . . (Sulphate of Iron) p.	1 ·38						
Potash Alumina . . . . (Chemicals (not explosives) N. O. C.).	8 1·04	...	When booked from Bombay at rates equal to 6th class O. R. W.-300 L.*				
Aluminium Sulphate	1 ·38						
Sodium Sulphide	3 ·58	2 ·42					
Zinc Chloride d. L.	4 ·62						
Copper Sulphate	4 ·62			Ambernath to Cawnpore and *viâ* . . .		2 4 2 per maund.	·54
Glauber's Salt	3 ·58	2 ·42					

* W.-300 means minimum weight for charge is 300 mds. per wagon.
W.-120 do. do. 120 do.
O. R. means "At owner's risk."
L. means loading and unloading to be done by owners.

STATEMENT No. 2.

Rates for Ores, Common (Bauxite).

1 Stations.		2 Classification.		3 Distance.			4 Special rates per md.			5 Ordinary rates per md.		
From	To	M. S. M.	G. I. P.	M. S. M.	G. I. P.	Total.	M. S. M.	G. I. P.	Total.	M. S. M.	G. I. P.	Total.
								Per Ton on C. C.*				
Katni	Bombay	1st class *·38*	1st class *·33*	...	673	673	...	10 0 0 *·11*	10 0 0	...	1 5 11	1 5 11
Do.	Dadar	Do.	Do.	...	667	667	...	10 0 0 *·11*	10 0 0	...	1 5 11	1 5 11
Do.	Ambernath	Do.	Do.	...	644	644	...	10 0 0 *·11*	10 0 0	...	1 5 5	1 5 5
				Viâ Poona.			*Viâ* Poona.			*Viâ* Poona.		
Belgaum	Bombay	Do.	Do.	245	121	366	...	...	...	0 8 5	0 4 5	0 12 10
Do.	Dadar	Do.	Do.	245	116	361	...	...	...	0 8 5	0 4 5	0 12 10
Do.	Ambernath	Do.	Do.	245	84	329	0 4 8 *·23*	0 2 3 *·32*	0 6 11	0 8 5	0 3 4	0 11 9

NOTE.—Italic figures show pie per md. per mile.
* Rates in column 4 are charged on the carrying capacity of the wagon used.

STATEMENT No. 3.

Rates for Magnesite, Crude, etc.

Stations.		Classification.			Distances *viâ* Jalarpet, Arkonam and Raichur.				Special rates per maund *viâ* Jalarpet, Arkonam and Raichur. * O.R. C.C. L.				Ordinary rates per maund *viâ* Jalarpet, Arkonam and Raichur.			
From	To	S. I.	M. S. M.	G. I. P.	S. I.	M. S. M.	G. I. P.	Total.	S. I.	M. S. M.	G. I. P.	Total.	S. I.	M. S. M.	G. I. P.	Total.
Salem . .	Bombay . .	1st class. *·38*	1st class. *·38*	1st class. *·38*	75	398	443	916	0 1 2 *·19*	0 6 5 *·19*	0 7 1 *·19*	0 14 8	0 2 11	0 6 11	0 14 8	1 8 6
Do. . .	Dadar . .	Do.	Do.	Do.	75	398	438	911	0 1 2 *·19*	0 6 5 *·19*	0 7 1 *·19*	0 14 6	0 2 11	0 6 11	8 14 6	1 8 4
					Viâ Guntakal.				*Viâ* Guntakal.				*Viâ* Guntakal.			
Do. .	Ambernath .	Do.	Do.	Do.	75	340	406	821	0 1 2 *·19*	0 6 6 *·23*	0 6 7 *·19*	0 14 3	0 2 11	0 6 6	0 13 6	1 6 11
					Viâ Arsikere and Poona. Mysore.				*Viâ* Bangalore City and Raichur. Mysore.				*Viâ* Arsikere and Poona. Mysore.			
Kadakola .	Bombay . .	Do.	Do.	Do.	113	522	121	756	0 3 6 *·44*	0 7 6 *·38*	0 7 6 *·20*	1 2 11	0 4 1	0 14 10	0 4 0	1 6 11
Do. .	Dadar . .	Do.	Do.	Do.	113	522	116	751	0 3 6 *·44*	0 7 11 *·38*	0 7 6 *·21*	1 2 11	6 4 1	0 14 10	0 4 0	1 6 11
										C.M.				C.M.		
Do. .	Ambernath .	Do.	Do.	Do.	113	522	84	719	0 3 6 *·44*	0 5 4 *·25*	0 6 7 *·19*	0 15 5	0 4 1	0 8 6	0 3 4	0 15 5

NOTE.—Italic figures show pie per maund per mile.
* O.R. means "At owner's risk."
C.C. means charges are levied on the carrying capacity of the wagon used.
L. means loading and unloading must be done by the owners.

STATEMENT No. 4.

Rates for Bones.

Stations.		Classification.		Distance *viâ* Poona.			Existing special rates per maund *viâ* Poona.			Ordinary rates per maund *viâ* Poona.		
From	To	M. S. M.	G. I. P.	M. S. M.	G. I. P.	Total.	M. S. M.	G. I. P.	*O. R. W.-160 L	M. S. M.	G. I. P.	Total.
Dharwar .	Bombay . .	1st class. *38*	1st class. *38*	320	121	441	...	...	...	0 9 6	0 3 11	0 13 5
Do. .	Dadar . .	Do.	Do.	320	116	436	...	...	...	0 9 6	0 3 11	0 13 5
Do. .	Ambernath .	Do.	Do.	320	84	404	0 7 5 *28*	0 3 3 *46*	0 10 8	0 10 10	0 3 4	0 14 2
Haveri .	Bombay . .	Do.	Do.	379	121	500	...	...	...	0 11 1	0 3 11	0 15 0
Do. .	Dadar . .	Do.	Do.	379	116	495	...	...	...	0 11 1	0 3 11	0 15 0
Do. .	Ambernath .	Do.	Do.	379	84	463	0 7 10 *25*	0 3 3 *46*	0 11 1	0 12 8	0 3 4	1 0 0
Gudgeri .	Bombay . .	Do.	Do.	354	121	475	...	...	...	0 10 4	0 3 11	0 14 3
Do. .	Dadar .	Do.	Do.	354	116	470	...	...	...	0 10 4	0 3 11	0 14 3
Do.	Ambernath .	Do.	Do.	354	84	438†	0 7 8 *26*	0 3 3 *46*	0 10 11	0 11 11	0 3 4	0 15 3

NOTE.—Italic figures show pie per maund per mile.
*O. R. means "At owner's risk."
† These rates are subject to the condition the traffic must be consigned in two metre gauge wagons or multiples thereof.
W.-160 means minimum weight for charge is 160 maunds per metre gauge wagon.
L. means loading and unloading to be done by owners.

(2) *Letter No. 133894, dated 12th March, 1929, from the Great Indian Peninsula Railway, Bombay.*

* * * * * *

During the hearing of my oral evidence before your Committee on the 7th January, 1929, I was asked for, and promised to furnish information upon the following points :—

(*a*) What objection there was, from the point of view of the railway, of granting protection by means of reduced railway rates, the reduced rates to apply to the protected industries only.

(*b*) What the reason was for the fixation of minima to the class rates.

(*c*) In the event of the railways concerned receiving the support of the Rates Advisory Committee in objecting to a recommendation of the Tariff Committee to charge minimum rates to assist an indigenous industry, whether there would be objection to the difference between rates recommended by the Tariff Committee and those ordinarily charged by the railways being made up by Government.

(*d*) Whether it would be feasible for the G. I. P. Railway and other Railways concerned to reduce rates for bones to the minimum of the class when consigned to Ambernath or Dadar for the chemical works.

(*e*) Whether it would be feasible for magnesite crude to be charged at the minimum of the class rate.

(*f*) The practicability of conveying sulphuric acid in tank wagons.

(*g*) The reason for the following commodities being classified differently :—

Glauber's salt.
Epsom salt.
Zinc chloride.
Copper sulphate.
Sodium sulphide.

(*h*) Whether any weight condition is attached to the present schedule for the carrying of manures.

4. I send herewith a memorandum dealing with each of these points.

Enclosure.

MEMORANDUM.

(A) *Objections to the granting of protection by means of reduced railway rates, the reduced rates to apply to the protected industries only* :—

(*a*) For protection by railway rating to be effective, rates for the protected articles must be lower than for the imported article, and, in ordinary circumstances, the longer the haul the greater would be the difference, for example, if indigenous acid sulphuric were reduced to 3rd class, O. R. and imported acid sulphuric remained at 6th class, O. R., the difference per maund would be :—

	Rs.	A.	P.
50 miles haul	0	1	1
100 ,, ...	0	2	1
200 ,, ...	0	4	2
400 ,, ...	0	8	4
800 ,, ...	1	0	8

Presumably protection should not be based on length of haul for if say Re. 1 per maund or Rs. 27 per ton was considered the correct amount by which freight for indigenous sulphuric acid should be cheaper than imported sulphuric acid, then, for all hauls less than about 790 miles, the difference would be inadequate, whilst for 800 and over the difference would be excessive. It would be impossible to estimate with any accuracy what total difference in freight on all consignments to all distances was secured, and the protection thus afforded could have no mathematical exactness.

(*b*) The alternative to different class rates for imported and indigenous articles would be to fix a difference in total freight at all consuming points. For example, at Sholapur, indigenous sulphuric acid would be freighted at, say Re. 1 per ton less than imported. Indigenous sulphuric acid would be contained from Dadar or Ambernath and the Railway would be required presumably to make the freight from both Dadar and Ambernath the same, whilst from Bombay it would be Re. 1 dearer. Ambernath would lose its geographical advantage over Dadar and, in fact, the rates from Ambernath would be increased, and exactly the same position arises if Nagpur were the market to be served. The existence of a factory at Dadar would invariably operate against a factory situated in the interior.

(*c*) To secure any difference in freight between imported and indigenous articles, it would be necessary to quote innumerable special station-to-station rates at great cost to the Railways. All rates competitive with other railways would be disturbed and the further quotation of rates on ordinary rating principles would be subjected to a restraint that would cause considerable diversion of traffic.

(*d*) The benefit to the industry would be very indefinite on account of the tendency of rates to change in sympathy with changing economic conditions. It would be impossible for the Tariff Committee to fix definitely for any long period the rates to be applied to any particular industry and its competitors, both foreign and those situated in other parts of India.

(*e*) It would be necessary to obtain a declaration that articles were made in India before the protective rates were applied to them, but the railway could not accept any responsibility in the matter. Railways would naturally object most strongly to performing work for which the Customs and Excise Departments were created. It is work to which they are unsuited; it would cause unpleasantness with their constituents, and would involve expenses for which railway operating revenue is not intended.

(*f*) If the system of fixation of rates for particular industries by Tariff Committees were once admitted, it would gradually be applied to one industry after another and the work of rating on railways would become so hampered that it would be impossible to continue to fix rates on sound economic principles; and the position would become so complicated that the Rates Advisory Committee would find it impossible to adjudicate on many of the cases brought before them.

(*g*) It is true that an indirect bounty given by a reduction in rates would not tend to raise the price of the article as direct protection would, but the same result would be obtained by a direct bounty. A direct bounty, as compared with an indirect bounty through the rates, would have the advantage of being applicable to local sales as well as to bookings by rail. It would have the further advantages of being definite, and of being an obvious instead of a concealed charge on the public revenues, and, consequently, in much less danger of being continued after the necessity for it had ceased. Railway rates and industrial conditions interact on one another, and tend to become so interwoven that a protected business would feel it a greater burden to have rates raised than to have a direct bounty removed, when the time same that the Tariff Board considered that the protection should be removed. It is undesirable to use railways as a cloak behind which to give protected industries concealed preference instead of an open bounty, or tariff protection.

(*h*) It would constitute undue preference under the Railway Act.

(*B*) *The reason for the fixation of minima to the class rates.*

The minimum was introduced many years ago when the guaranteed railways were built. The railway being guaranteed by the State, it was necessary to impose a minimum rate so as to obviate cut-throat competition.

(*C*) *The difference between rates recommended by the Tariff Committee and those ordinarily charged by the railways being made up by Government.*

The only way in which it could be done, without tending to chaos in rating, would be for Government to give a rebate of a certain portion of the ordinary rate, for a fixed period, as is done, for instance, for fodder in times of famine. This method, although the least objectionable, would yet not be free from some of the important objections mentioned in the statement under heading (A).

(*D*) *Reducing rates for bones to the minimum of the class when consigned to Ambernath or Dadar for the chemical works.*

One-tenth pie would be too low a rate for bones. Its introduction might cause the opening of a bone mill and we could not refuse the same rate to the mill, which would use the bones for export purposes only. Would the chemical works guarantee to utilise the bones only for a special purpose, and not to sell them or sinews or crushed bones for export or in competition with the bone mills at Vikhroli and Thana? There would be opportunity for evasion which would require adequate check to safe-guard railway revenues, and, as the cause is outside railway control, the safe-guards should be provided free of cost to the railway.

(*E*) *Magnesite crude being charged at the minimum of the class rate:*

There would be objection to charge magnesite crude at the minimum of the class even if the two other railways concerned also agreed, because magnesite crude would require to be carried at the same rate to other destinations and the railways would be unable to withstand sea competition and traffic in magnesite would travel *viâ* Madras and by sea to Bombay.

(*F*) *Conveying sulphuric acid in tank wagons.* It is practicable to carry sulphuric acid in tank wagons.

(*G*) *The reason for the following commodities to be classified differently.*

Glauber's salt.
Epsom salt.
Zinc chloride.
Copper sulphate.
Sodium sulphide.

A reference was made to the General Secretary of the Indian Railway Conference Association enquiring the reasons for the classification of these commodities. The General Secretary states that he is unable to give the reasons for the existing differences in classification, but the question would be placed before the Committee at their next meeting.

(*H*) *Weight condition attached to the present schedule for the carrying of manures.*

There is no weight condition attached to the present manure schedule so far as the conveyance rate is concerned. We charge a higher terminal for smalls than for wagon load consignments.

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(3) *Letter, dated the 8th April, 1929, from the Great Indian Peninsula Railway.*

Re SPECIAL RATE FOR SULPHURIC ACID FROM AMBERNATH TO TATANAGAR.

Your demi-official No. 322 of 6th April, 1929. It is a fact that a special rate for sulphuric acid from Ambernath to Tatanagar was quoted in the year 1923, but this was at the request of the Dharamsi Morarji Chemical

Company, that it was much cheaper for them to transport their acid to Tatanagar by the rail-cum-sea route *viâ* Bombay and Howrah than by the all rail route *viâ* Nagpur, but if the two railways concerned saw their way to reduce their freight rate they would book all their acid by rail. In order therefore to capture this traffic to the railway route, a special rate of Rs. 357 per wagon, O. R. W. R. L. P. was quoted from Ambernath to Tatanagar (*viâ* Nagpur) in conjunction with the B. N. Railway, with effect from 8th March, 1923. This rate was based at As. 5-6 per wagon per mile. The rate was subsequently cancelled, with effect from 1st December, 1926 because it was not being used. It is understood that the manufacture of sulphuric acid commenced at Tatanagar in 1924. The following traffic was despatched at this rate:—

	Maunds.
1923	7,591
1924	567
1925	*nil*
1926	*nil*

(4) *Telegram No. 337, dated the 16th April, 1929, from the Secretary, Tariff Board, to the Great Indian Peninsula Railway, Bombay.*

Your R. C. 603 of 8th instant. Please wire what carrying capacity was assumed per wagon for the special rate quoted, from Ambernath to Tatanagar.

(5) *Telegram No. R. C. 1055, dated the 19th April, 1929, from Mr. Raper, Commercial Department, Great Indian Peninsula Railway, Bombay, to the Secretary, Tariff Board.*

Your wire of 16th, 3 standard maunds per wagon were assumed for the special rate quoted from Ambernath Station to Tatanagar.

The Agent, East Indian Railway.

(1) *Letter dated the 7th December, 1928.*

With reference to your letter No. Cir.-187-T., dated 14th October, 1928, I beg to say that the complaints have been made by certain Chemical Works in the Bombay Presidency, and it is therefore only possible for the East Indian Railway, which is not concerned in the carriage of either the raw materials or the finished products of the complainant Companies, to deal with these allegations on very general lines without reference to any particular industry, commodity or circumstances.

On the East Indian Railway there are only two Chemical Manufacturing centres of special importance, *viz.*, Konnagar and Cawnpore, and we have been very liberal in the matter of any requests for concessions made by the Chemical Companies in these places. Such requests have been confined to the following commodities only—

Sulphur,
Sulphuric Acid,
Alum,
Sulphate of Iron,
Bauxite,

for all of which suitable concession rates to the satisfaction of the applicants have been readily conceded.

It will be observed from the memo. giving particulars of rates on each commodity, that no preference is shown to imported chemicals and acids, but on the contrary, there are preferential rates in favour of the indigenous manufacturer. No fault, also, can be found with the charges on such raw materials for which a demand for movement over this Railway exists. It is always our special aim to foster the development of indigenous industries and if any specific case of hardship under existing rates adjustments can be quoted, we would be very glad to examine the matter.

As regards the question of facilities on this Railway, we have at the present time 19 Tank wagons ear-marked for the transport of sulphuric acid in bulk, and they have fully met requirements in this respect. No application for similar or other special facilities for the transport of chemicals or other acids has been received, but in the event of the demand arising, the question would undoubtedly receive the fullest consideration.

The details herewith submitted probably cover all or most of the ground of investigation in respect to freight charges and facilities for the transport of the chemicals and acids under reference. Any further information required will be promptly submitted on hearing from you as to the particular point or points that may remain undealt with, and if it is still considered necessary to secure oral evidence from the railway in this connection over and above the written evidence submitted, we shall be very pleased to furnish it.

Enclosure No. 1.

MEMORANDUM IN REGARD TO RATES ON CHEMICALS, ACIDS AND RAW MATERIALS.

(a) Chemicals and Acids.

1. *Sulphuric Acid.*—Listed under dangerous goods. Classified 8th class at R. R. and 6th class at O. R., and charged on this basis when in small quantities subject to a minimum weight for charge of 20 maunds. In booking from Ghaziabad, Delhi, Bareilly, Cawnpore, Konnagar and Howrah, where acid is manufactured, charge is made on the actual weight.

On the E. I. Railway sulphuric acid in wagon loads of 300 maunds is charged at 4th class rates at O. R. and this applies to all movements in wagon loads. No special concessions are quoted for imported acid.

Numerous special rates are, however, in operation for wagon load despatches as well as bulk despatches in tank wagons from the principal points on the system where acid is manufactured. A list of these special rates and points between which they operate will be found in Annexure "D".

2. *Hydrochloric Acid.*—
3. *Nitric Acid.*— } Listed under dangerous goods. Charged at 10th class rates at R. R. and 9th class at O. R., subject to a minimum weight for charge of 20 maunds except when booked from Delhi, Ghaziabad, Cawnpore, Konnagar and Howrah when charges are made on actual weight. No special rates quoted for imported movement. The following special rates are in operation:—

Hydrochloric Acid.—Cawnpore to *viâ* Ghaziabad Re. 0-9-8 per maund O. R. per 4-wheeled wagon.

Cawnpore to *viâ* Ghaziabad Rs. 101 O. R. WR/300L.

Nitric Acid.—Same as above.

4. *Magnesium Sulphate or Epsom salts.*—Classified 4th class at R. R. No special rates quote from the ports. The only special rates are the following, conceded to the Cawnpore Chemical Works:—

	Per md. Rs. A. P.	
Cawnpore to Delhi . . .	0 10 0	at O. R. W/300L.
,, *vid* Ghaziabad . .	0 9 6	

5. *Ferrous Sulphate.*—Provided for in the classification under the nomenclature "Copperas" charged at 1st class rates at R. R., also moved under the head Sulphate of Iron charged on the same basis. No special rates quoted for the ports but the following rates are quoted for sulphate of iron from chemical manufacturing centres:—

	Per md. Rs. A. P.	
Konnagar to Cawnpore . .	0 8 1	O. R. W/300L.
,, to Delhi . . .	0 10 0	

6. *Potash Alum or Potassium Aluminium Sulphate.*—Not provided for in the General Classification of Goods, but would probably be charged (subject to further investigation) on the same basis as Aluminium Sulphate Item 7.

7. *Aluminium Sulphate.*—Charged at 1st class rates at R. R. No special rates quoted from the ports or elsewhere.

8. *Sodium Sulphide.*—Charged at 3rd class rates at R. R. and 2nd class rates at O. R. No special rates from ports or elsewhere.

9. *Zinc Chloride.*—Listed under dangerous goods. Charged at 4th class at R. R. No special rates quoted from the ports or elsewhere, except *vid* Gomoh (for traffic from Tatanagar) to Cawnpore and Mirzapur, these reduced rates, however, being specifically applicable to zinc dross only.

10. *Copper Sulphate.*—Charged at 4th class rates at R. R. No special rates quoted from the ports or elsewhere.

11. *Glauber's Salt or Sodium Sulphate or Salt Cake.*—Charged at 3rd class rates at R. R. and 2nd class rates at O. R. No special rates quoted from the ports or elsewhere.

(b) Raw Materials.

12. *Alunite or Alum stone.*—Raw material for potash alum. Not specially provided for in the General Classification of Goods, and no recorded demand for movement of such traffic.

It is a mineral akin to bauxite (item 13) and would probably be subject to the same basis of charge although this could only be decided after a full investigation.

13. *Bauxite.*—Raw material for Aluminium Sulphate—Classified 1st class at R. R., but charged over the East Indian Railway at O. R., C. C., L at C/N telescopic scale the basis of which is:—

	Per md. per mile.
For the first and up to 75 miles	·333
For extra distance above 75 miles but not exceeding 150 miles to be added to the charge of 75 miles .	·200
For extra distance above 150 miles but not exceeding 300 miles to be added to the charge for 150 miles .	·170
For extra distance above 300 miles but not exceeding 400 miles to be added to the charge for 300 miles .	·125
For extra distance above 400 miles to be added to the charge for 400 miles	·100

A list of reduced special rates for bauxite ore will be found in Annexure "E".

14. *Brimstone.*—See under Sulphur item 32.

15. *China Clay.*—Raw material for aluminium sulphate—classified 1st class at R. R. but charged over the East Indian Railway O. R., C. C., L at C/N scale rates (see item 13).

A number of reduced special rates are quoted for China clay for use in paper mills, pottery manufacture, etc.

16. *Coal Dust.*—Raw material for Sodium Sulphide—Reduced rates for coal apply.

17. *Copper.*—Raw material for copper sulphate—copper (ingots, sheets and slabs) is classified 4th class R. R., and 2nd class O. R., and is charged on this basis. No reduced rates are quoted.

18. *Copper ore.*—Raw material for ferrous sulphate—classified 2nd class R. R., and charged on this basis. No reduced rates.

19. *Copper Oxide or Cupric Oxide.*—Raw material from Copper Sulphate —Indexed to Colours, Paints and Dyes Div. " B " 4th class R. R. and 2nd class O. R., and charged on this basis. No special rates.

20. *Dolomite.*—Raw material for Magnesium Sulphate or Epsom Salts. Not provided for in the General Classification of Goods. Is a mineral substance akin to Limestone and is charged accordingly on this Railway—1st class rates at R. R., and at C/N scale O. R., C. C., L (see item 13). A very large number of reduced rates for Lime and Limestone from the principal producing centres are in operation.

21. *Hydrochloric Acid.*—Raw material for Zinc chloride—see Item 2.

22. *Hydrogen Chloride.*—Raw material for Hydrochloric Acid—Not specifically provided for in the General Classification of Goods and no recorded demand for this movement.

23. *Iron Pyrites.*—Raw material for Ferrous Sulphate—Pyrites are not specifically classified in the General Classification of Goods. They are a mineral substance and would probably be charged if offered for despatch at the rates applicable to Ores common N. O. C. classified 1st class.

24. *Magnesium Limestone.*—Raw material for Epsom Salts—Not provided for in the General Classification of Goods, and no recorded demand for movement. Further investigation would be necessary to determine the charges leviable on such traffic, but charges would probably be as for Dolomite, item 20.

25. *Magnesium Sulphate or Epsom Salts.*—Raw material for Glauber's Salt—See item 4.

26. *Nitrate of Soda.*—Raw material for Glauber's Salt. Listed under dangerous goods. Classified 2nd class at R. R. and charged on East Indian Railway at C/L scale C/300. Basis of scale is:—

	Per md. per mile.
For the first and up to 100 miles	·380
For extra distances above 100 miles but not exceeding 300 miles to be added to the charge for 100 miles	·220
For extra distances above 300 miles but exceeding 600 miles to be added to the charge for 300 miles	·130
For extra distances above 600 miles to be added to the charge for 600 miles	·110

No special rates.

For the manurial purposes, charged at C. F. F. scale basis of which is 1/10th pie per maund per mile (minimum rates) *plus* terminals.

27. *Pyrites.*—Raw material for Sulphuric Acid—See item 23.

28. *Sodium Chloride or Common Salt.*—Raw material for Glauber's salt. Classified 1st class. Charged over the East Indian Railway in wagon loads at C/L scale (see item 26). Numerous special rates in operation.

29. *Saltpetre.*—Raw material for Nitric Acid—Listed under dangerous goods. Classified 2nd class at R. R. Charged in wagon loads O. R., at C/L scale and for manurial purposes at C. F. F. scale. See item 26.

30. *Scrap Iron.*—Raw material for Ferrous Sulphate—Classified 1st class. Numerous special rates to and from iron manufacturing centres to Calcutta for export over-seas, and between other points where a demand for large movements has arisen.

31. *Spent Oxide of Gas Works.*—Raw material for Sulphuric Acid. Ordinary spent Oxide or Oxide of Iron, falls under the nomenclature Earths N. O. C. and is classified 1st class and charged in wagon loads O. R., C. C., L at C/N schedule scale. See item 13.

Spent Oxide of Gas Works is not provided for in the General Classification of Goods. In the English Railway Classification it is listed under dangerous goods. Rates and conditions for its movement on Indian Railways under this head do not exist at the present time, and would have to be specifically provided for.

32. *Sulphur.*—Raw material for Sulphuric Acid—Classified 3rd class at R. R. and 1st class at O. R. in wagon loads of 300 maunds. Charged on this basis. The following special rates are in force for Sulphur for Sulphuric Acid manufacture.

	Rate.	
	Rs. A. P.	
Howrah to Cawnpore . .	0 11 0	O. R., W/300L.
Howrah to Ghaziabad . .	0 15 7	

33. *Sulphureted Hydrogen.*—Raw material for Sulphuric Acid. Not provided for in General Classification of Goods. Indexed under dangerous goods in English Railway Classification. Rates and conditions of carriage on Indian Railways do not at present exist, and would have to be specifically provided for.

34. *Sulphuric Acid.*—Raw material for:—

Aluminium Sulphate.
Potash Alum.
Copper Sulphate.
Hydrochloric Acid.
Ferrous Sulphate.
Magnesium Sulphate.
Nitric Acid.
Glauber's Salt.

See item 1.

35. *Sodium Sulphate or Glauber's Salt.*—Raw material for Sodium Sulphide—See item 11.

36. *Zinc.*—Raw material for Zinc Chloride—Zinc (ingots, sheets and slabs) is classified 2nd class R. R. and is charged on this basis. No special rates are quoted.

37. *Zinc Blende.*—Raw material for Sulphuric Acid. Not provided for in the General Classification of Goods, and no recorded demand for movement. It is a mineral substance and would be charged at the same rates as for zinc, item 36, or Zinc Ore also charged 2nd class.

Enclosure No. 2.

Statement showing special rates for acid, sulphuric or oil of vitriol or vitriol between the undermentioned stations.

Stations.		Rates.	Conditions.
From	To		
Vid Asansol (for traffic from Tatanagar.)	Mokameh ghat and *vid*.	Rs. 0-3-2 per md.	OR W/300 L.
Cawnpore . . .	Agra City and Jumna Bridge.	(157 miles) Rs. 70 per wagon.	In tank wagon; OR; L.
Do. . . .	*Vid* Agra East Bank for traffic to Ahmedabad and Petlad	(157 miles) Rs. 70 per wagon.	Do.
Do. . . .	Benares Cantt. .	(202 miles) Rs. 91 per wagon.	Do.
Do . . .	Bhadohi . . .	(175 miles) Rs. 91 per wagon.	(OR-W/R-340L in tank wagons.)
Do. . . .	Ghaziabad . .	(258 miles) Rs. 0-10-9 per md.	OR
Do. . . .	Do. . .	(258 miles) Rs. 117 per 4-wheeled wagon.	OR-W/R; L
Do. . . .	*Vid* Ghaziabad and *vice versa*.	(258 miles) Rs. 0-10-9 per md.	OR
Do. . . .	Do. . .	(258 miles) Rs. 117 per 4-wheeled wagon.	OR-W-R; L
Cawnpore . . .	Konnagar . . .	(623 miles) Rs. 305 per 4-wheeled wagon.	OR; in tank wagon; L
Do. . . .	*Vid* Saharanpore	(368 miles) Re. 0-14-5 per md.	OR
Do. . . .	Do. . .	(368 miles) Rs. 156 per 4-wheeled wagon.	OR-W-R; L.
Ghaziabad and *vid* . .	Chakeri . . .	(264 miles) Rs. 120 per 4-wheeled wagon.	Do.
Ghaziabad . . .	Cawnpore . . .	(258 miles) Re. 0-10-9 per md.	OR
Do. . . .	Do. . . .	(258 miles) Rs. 117 per 4-wheeled wagon.	OR-W-R; L
Giridih (Kurhurbaree) .	Konnagar . .	(198 miles) Rs. 191 per wagon.	OR-W-R; in bulk, L
Vid Gomoh (for traffic from Tatanagar).	Agra City *vid* Agra East Bank.	602 miles) (*a*) Re. 0-8-2 per md.	OR W/300; L
Do. .	Cawnpore and *vid* (except for traffic to B. & N.-W. Railway stations and *vid*).	(445 miles) Re. 0-6-0 per md. (*a*)	Do.
Do. .	*Vid* Saharanpore .	(752 miles) Re. 0-10-0* per md.	Do.
Do . .	*Vid* Ghaziabad . .	(703 miles) Re. 0-9-7 per md.	Do.
Do. . .	Hathras and *vid* (except for traffic to R. & K. Railway *vid* Kasganj).	(618 miles) (*a*) Re. 0-8-5 per md.	Do.

(*a*) The differential rule as regards distance applies.

* This rate will come into force from 1st December 1928.

Stations.		Rates.	Conditions.
From	To		
Vid Gomoh (for traffic from Tatanagar).	Jumna Bridge (Agra) and *vid*.	(602 miles) (*a*) Re. 0-8-2 per md.	OR W/300 ; L
Do.	Moghalserai	(332 miles) (*a*) Re. 0-3-9 per md.	Do.
Burn Co.'s siding	Kulti	(10 miles) Rs. 28 per wagon.	OR, WR, 12½ tons in tank wagons ; L
	Lodna Colliery Co.'s siding (Pathardihi).	(46 miles) Rs. 73 per 4-wheeled wagon.	OR ; L in tank wagons.
Lodna Colliery Co.'s siding (Pathardihi).	*Vid* Asansol	(46 miles) Rs. 72 per wagon.	OR, WR ; L, 12½ tons in tank wagons.
	Ghaziabad and *vid*	(730 miles) Rs. 904 per wagon.	OR ; in tank wagons, L.
Lodna Colliery's siding (Pathardihi and *vid* Pathardihi exchange link.)	Tatanagar	Re. 0-9-9 (*b*) per md.	OR, W/300, L in tank wagon E. I. Re. 0-1-3 and B. N. 0-8-6.
	Bhowra siding	Re. 0-2-7 (*c*) per md.	Do. E. I. 0-1-3 B. N. 0-1-4
Konnagar	*Vid* Howrah for traffic to Tatanagar.	(10 miles) Rs. 26 per wagon.	OR, WR, 12½ tons in tank wagon ; L
Kulti	Cawnpore	(491 miles) Rs. 214 per wagon.	OR, WR, L in bulk.
Do.	Do.	(491 miles) Re. 0-6-7 per md.	OR, C/270 ; L
Do.	Giridih	(72 miles) Rs. 136 per wagon.	OR, WR in bulk ; L
Do.	Konnagar	(132 miles) Rs. 182 per wagon.	Do.
Kusunda (for traffic from Loyabad Coke Oven's siding *vid* Kankanee link).	Burn Company's siding.	(39 miles) Rs. 68 per wagon.	OR ; L in tank wagon.
Kusunda (for traffic from Loyabad Electric Supply and Coke Co.'s siding, *vid* Kankanee).	Pathardihi (for traffic to Lodna Colliery Company's siding).	(12 miles) Rs. 32 per wagon.	Do.
Pathardihi (for traffic from Lodna Colliery Co.'s siding).	Burn Company's siding.	(46 miles) Rs. 73 per wagon.	Do.
Pathardihi	*Vid* Naihati (for traffic to Budge-Budge).	(159 miles) Rs. 206 per wagon.	OR ; WR/3 L40, in tank wagons.
Sijua (for traffic from Bararee Coke Oven's siding).	Burn Company's siding.	(43 miles) Rs. 69 per wagon.	OR, in tank wagons, L.

(*a*) The differential rule as regards distance applies.
(*b*) In addition to this rate empty haulage of Rs. 15-6-0, *viz.*, E. I. Rs. 1-4-0, B. N. Rs. 14-2-0 per tank wagon is to be levied.
(*c*) In addition to this rate empty haulage of Rs. 2-8-0, *viz.*, E. I. Rs. 1-4-0, B. N. Rs. 1-4-0 per tank wagon is to be levied.

Enclosure No. 3.

Statement showing rates for Bauxite ore OR, C-C; L between the undermentioned stations.

STATIONS.		RATE PER TON.		
From	To	G. I. P Ry.	E. I. Ry.	Total.
		vid	Naini	
		Rs. A. P.	Rs. A. P.	Rs. A. P.
Dundi . . .	Howrah . .	3 3 9 190	8 10 9 509	11 14 6 699
Katni . . .	Do. . .	2 8 0 167	7 8 0 509	10 0 0 676
Katni-Marwara (for traffic from Lime siding).	Do. . .	2 8 0 169	7 8 0 509	10 0 0 678
Niwar . . .	Do. . .	2 11 0 175	7 13 0 509	10 8 0 684
Katni Marwara (for traffic from Lime siding).	Konnagar	2 8 1 169	7 7 11 500	10 0 0 669
Katni . . .	Kumardub siding.	2 13 6 167	6 3 8 366	9 1 2 533
Katni . . .	Konnagar .	2 8 1 167	7 7 11 500	10 0 0 667
Vid Katni Marwar .	Do. .	2 8 1 169	7 7 11 500	10 0 0 669
Katni Marwara (for traffic from Lime siding).	Kumardubi siding.	2 13 6 169	6 3 8 366	9 1 2 535
Niwar . . .	Do .	2 15 8 175	6 3 9 356	9 3 5 541
Do. . . .	*Vid* Naihati .	0 1 8* 175	0 4 8* 489	0 6 4*per md. 664 OR, C-C, L.
Do. . . .	Barakar .	2 15 8 175	6 8 9 356	9 3 5 541

* This rate applies to crude bauxite ore only.

(2) *Note on the policy of the East Indian Railway in regard to indigenous industries.*

1. The policy of the E. I. Railway may be defined as follows :—

(*a*) The railway is fully alive to the importance of the development of indigenous industries and is out to give every assistance that will encourage the establishment of new and the development of existing industires on its system, in the shape of reasonable

facilities, reduced rates on raw materials, and if necessary and provided also that it was feasible to do so, on the finished products as well.

(*b*) The railway holds that no preference should be accorded to competitive foreign products and that any concessions to the latter should be open to indigenous products moving under the same conditions and on the same terms.

(*c*) The railway is not prepared to admit that the imported product should be discriminated against and that preference should *ipso facto* be accorded to indigenous products wholely and solely because they are of domestic origin. Railways are primarily commercial undertakings and their tariffs must be so adjusted as to secure a maximum volume of traffic at the most favourable rates, always having regard to the mutual interests of their constituents and themselves, and subject to the obligations imposed on them by the Railway Act.

2. As regards assisting indigenous industries the railway views the matter as Sir Thomas Robertson did in his report on Indian Railways (1903), *viz.* :—

> " The more numerous the local industries are along a line of railway the greater always is the prosperity of that railway. They not only give their products to the railway to carry but their presence creates a great deal of traffic in passenger and goods, which but for the local manufactories would never come to the railway at all."

3. In respect to the question of the feasibility of quoting reduced rates on the finished products of an indigenous industry of the nature of the Chemical industry, the position is a particularly difficult one for the railway, for the simple reason that as their products largely constitute the raw materials used by other indigenous industries, the railway is not in a position to confine its consideration of the rating issue merely as between the indigenous product on the one hand and the imported commodity on the other, but must also take into account the possible effects on the other industries of a reduction granted to the indigenous product alone.

Just as the chemical industry would expect to be unhampered in the securing of their raw materials, it also seems to the interests of these other industries that they should have an equal facility of purchasing their raw material from the cheapest and most efficient sources and to secure as low freights as possible on such raw materials.

To take a case in point, is the railway to debar the glass works at Bajhoi and Firozabad from getting sulphate of soda or sulphate of copper from Calcutta and compel them to take it from Cawnpore or some other centre? In other words, is the railway to keep up the rates on the imported product to benefit the chemical industry probably at the expense of glass industry? How are these conflicting interests to be reconciled?

The Bajhoi Glass Works, just prior to the introduction of the C/L scale for sulphate of soda, applied for reduced rates from the port of Calcutta. They were extending their activities to the production of glass panes, and they contemplated the purchase of their requirements from Calcutta. Could the railway in such circumstances have told them to buy their requirements from the Cawnpore chemical works?

Moreover, any reduction the railway can afford or find itself competent to make in the case of the indigenous product may not suffice for ensuring the use of that product as against the imported chemical. Is the consuming industry in such a case to be debarred from the benefits attaching to concession rates from the port? Would not the railway also find it difficult to reconcile such an attitude with their avowed policy of assisting indigenous industries generally?

4. As regards the question of freight rates on indigenous products as compared with those applicable to competitive foreign products the railway would enunciate its policy in this respect in the words of the Indian Industrial Commission (1916-18) thus :—

> " The governing principle which, we think, should be followed in railway rating, so far as it affects industries, is that internal traffic should be rated as nearly as possible on an equality with traffic of the same class over similar distances to and from the ports."

5. In regard to the matter of discrimination against the imported product merely on the ground of indigenous manufacture this contemplates the products of an industry from which an individual railway derives no direct advantages in the shape of freight on raw materials and subsidiary traffic.

Take for instance the two Chemical Works in Bombay whose claim for protection is the subject of this enquiry. The E. I. Railway probably carries none of their raw materials and derives no direct benefit from them. In any event let us assume that this is the case. Should the E. I. Railway charge traffic from these works at lower per maund per mile rates than imports from the Calcutta port solely on the ground that the former are Indian manufactures? To accept this as a policy is tantamount to a definite acceptance by railways of the principle of protection of indigenous industries against outside competition. Under such a policy the Railway Tariff structure would aim at low rates for all articles of domestic origin, low rates on raw materials whether of domestic or foreign origin and high rates on competitive finished productions of foreign origin. The implications, immense significance and far reaching effects of such a policy are obvious.

The essential factors to be taken into consideration are :—

(*a*) There are well defined obligations imposed on railways by the railway act.

Rates must be reasonable and there must be no undue preference or disadvantage. Discrimination in rates against an imported product based wholly and solely on protective considerations could not be justified under the provisions of the law as it stands. The trader or consumer of imported products is entitled to the same benefits or protection under the Railway Legislation as any other constituent of the railway.

(*b*) The interest of manufacturers located at the ports have to be considered.

This is obvious since so many industries are concentrated at the ports, and would be adversely affected by a policy of undue discrimination in rates against traffic moving from the ports for the benefit of industries located at internal centres.

In this connection the railway would invite attention to paragraph 128 (3) of the Report of the Indian Fiscal Commission, which reads as follows :—

> " We recognise with the Industrial Commission the danger of a policy of individual concessions to industries and of treating railway rates as an indirect method of subsidy by the State. But we think that within the limitations laid down by the Industrial Commission it is not unreasonable that special rates should be granted for a term of years to new industries, and even to others if they can make out a proper case for special treatment."

6. Subject to the incidence, where necessary, of the limiting factors referred to, the railway is fully prepared to give every consideration to representations from the Chemical industry in the matter of freight charges on their raw materials required in the manufacture of acids and on heavy chemicals.

7. The other issue raised by the Tariff Board is the question of facilities. The terms may refer to physical connections such as assisted sidings or to transport facilities. As regards the former the railway is always prepared to give consideration to requests for siding facilities and there are standard terms and conditions on which such sidings are provided. As the provision of sidings involves a railway in the investment of capital outlay a necessary

condition that must be satisfied is that the traffic prospects are sufficiently good to justify the outlay in question.

In that matter of transport facilities, the issue really arises in the case of the specialised equipment necessary for the transport of acids in bulk. On this railway 19 tank wagons have been specifically allotted for the transport of acid in bulk, mainly sulphuric acid, for factories along the line, and these have adequately met all requirements in this respect.

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(3) *Note regarding the details of the rates position with particular reference to the transport of chemicals by the East Indian Railway.*

1. All goods are classified within 10 classes of maxima and minima rates which are sanctioned by the Railway Board.

2. Matters affecting the General Classification of goods are dealt with by the Indian Railway Conference Association and their recommendations are subject to the approval and sanction of the Railway Board.

3. The railway has the authority to fix its own rates within the maxima and minima limits laid down by the Railway Board in the form of the General Classification of goods. In respect to general reductions in rates and other matters of great importance the approval of the Railway Board, however, would be obtained.

4. A statement is attached giving the chemical industries and their location along the East Indian Railway, together with particulars of the sources from which the raw materials are obtained and an idea of the destination to which their products are despatched also the special bases of charges in force below the ordinary or class rates applicable. This statement is supplemental to the information already conveyed officially to the Tariff Board by the Agent, East Indian Railway.

It will be noticed that special lump sum rates have been quoted in numerous instances both for the raw materials and the finished products of the indigenous chemical works situated along the East Indian Railway and that in many cases similar concessions do not obtain for traffic from the port. On the other hand any rates, which are lower than those applicable under the General Classification available from the port apply equally for traffic originating at internal points.

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(4) *Letter dated the 11th March, 1929.*

This is the further note I undertook to furnish this morning at the request of the President.

Enclosure.

NOTE.

The following is a comparison of the existing and reduced coal rates from the Jherriah Coalfield to selected destinations :—

Station to.	Rate per ton. Present including terminals, etc.	Proposed including terminals, etc.
	Rs. A. P.	Rs. A. P.
Cawnpore	7 3 0	6 10 0
Delhi	9 7 0	8 10 0
Agra City	8 8 0	7 12 0
Bombay	13 12 0	12 6 0
Karachi City	15 13 0	14 0 0
Madras	12 11 0	11 7 0
Ahmedabad	13 2 0	11 11 0
Amritsar	11 12 0	10 7 0
Lahore Cantonment . .	12 0 0	10 12 0

It may be noted that in case of destinations, such as Bombay, Ahmedabad and Karachi, the rates are actually calculated on distances by alternative shorter routes but applied *viâ* the East Indian Railway route.

For example :—

Distance and rate by the alternative shorter route.		Distance and rate by the E. I. Railway route.	
Distance from Bhaga (*vid* Nagpur).	Miles.	Distance from Jherriah (*vid* Naini).	Miles.
Bhaga to Nagpur . .	633	Jherriah to Naini . .	345
Nagpur to Bombay . .	518	Naini to Bombay . .	840
	1,151		1,185

	Rate per ton. Rs. A. P.		Rate per ton. Rs. A. P.
Rate for 1,151 miles	11 6 0	Rate for 1,185 miles .	11 8 0
E. I. Ry. terminal .	0 4 0	E. I. Ry. terminal .	0 4 0
G. I. P. Ry. terminal	0 4 0	G. I. P. Ry. terminal	0 4 0
G. I. P. Ry. Ghat charge . . .	0 8 0	G. I. P. Ry. Ghat charge . . .	0 8 0
TOTAL .	12 6 0	TOTAL .	12 8 0

The rate of Rs. 12-6-0 per ton by the alternative route (*viâ* Nagpur) has therefore been applied *viâ* Naini.

(5) *Letter dated the 18th March, 1929.*

As desired, I attach a note with necessary Tables concerning the further information you called for over the phone this morning.

Enclosure.

Note by the Chief Commercial Manager, Rates and Development, East Indian Railway.

SUMMARY OF BASES OF CHARGE FOR DIFFERENT COMMODITIES AT PRESENT ACCORDED BY THE EAST INDIAN RAILWAY.

The calculated Distance Tables for the C/L and C/N Schedules which accompanied this office note, dated the 7th instant, only show the rate for a maximum distance of 900 miles as this is approximately the longest lead for which consignments can travel over the East Indian Railway, as the bases of charge as illustrated apply to the East Indian Railway alone.

However, I now attach six copies each of revised tables of these Schedule rates calculated up to a maximum lead of 1,200 miles as desired. These revised tables are marked "1" and "2" respectively.

Similar tables in regard to the rates applicable—

(1) Bones and Bone Meal,
(2) Oil Seeds, and
(3) Oil Cake

are also attached herewith marked "3", "4" and "5" respectively.

STATEMENT I.

(1) MAGNESIUM SULPHATE (EPSOM SALT), (2) FERROUS SULPHATE (COPPERAS) OR (SULPHATE OF IRON), (3) POTASH ALUM (ALUM), (4) ALUMINIUM SULPHATE, (5) SODIUM SULPHIDE, (6) ZINC CHLORIDE, (7) COPPER SULPHATE, (8) SODIUM SULPHATE, (9) SULPHUR, (10) NITRATE OF SODA, (11) SODIUM CHLORIDE.

Existing Schedule Rate (C/L Schedule).

Distances.	C/L Schedule rate (without terminals).	(Basis) Per maund per mile.	Distances.	C/L Schedule rate (without terminals).	(Basis) Per maund per mile.
	A. P.	Pies.		A. P.	Pies.
50	1 7	·38	650	10 7	·20
100	3 2	·38	700	11 0	·19
150	4 1	·33	750	11 6	·18
200	5 0	·30	800	11 11	·18
250	5 11	·28	850	12 5	·18
300	6 10	·27	900	12 10	·17
350	7 5	·26	950	13 4	·17
400	7 11	·24	1,000	13 9	·17
450	8 6	·23	1,050	14 3	·16
500	9 0	·22	1,100	14 8	·16
550	9 7	·21	1,150	15 2	·16
600	10 1	·20	1,200	15 7	·16

STATEMENT II.

(1) LIME STONE O. R. C. C. L. (UP TO 300 MILES), (2) IRON SCRAP O. R. C. C. L.

Existing Schedule Rate (C/N Schedule).

Distance.	C/N Schedule rate (without terminals). Per maund.	(Basis) Per maund per mile.	Distance.	C/N Schedule rate (without terminals). Per maund.	(Basis) Per maund per mile.
	A. P.	Pies.		A. P.	Pies.
50	1 5	·34	650	8 7	·16
100	2 6	·30	700	9 0	·15
150	3 4	·27	750	9 5	·15
200	4 0	·24	800	9 10	·15
250	4 9	·23	850	10 3	·14
300	5 5	·22	900	10 8	·14
350	6 0	·21	950	11 1	·14
400	6 6	·19	1,000	11 6	·14
450	6 11	·18	1,050	11 11	·14
500	7 4	·17	1,100	12 4	·13
550	7 9	·17	1,150	12 9	·13
600	8 2	·16	1,200	13 2	·13

STATEMENT III.

(1) BONES, (2) BONE MEAL.

(Existing Rate (C/N Schedule).

Distance.	Rate (without terminal). Per maund.	(Basis) Per maund per mile.	Distance.	Rate (without terminal). Per maund.	(Basis) Per maund per mile.
	A. P.	Pies.		A. P.	Pies.
50	1 5	·34	650	8 7	·16
100	2 6	·30	700	9 0	·15
150	3 4	·27	750	9 5	·15
200	4 0	·24	800	9 10	·15
250	4 9	·23	850	10 3	·14
300	5 5	·22	900	10 8	·14
350	6 0	·21	950	11 1	·14
400	6 6	·19	1,000	11 6	·14
450	6 11	·18	1,050	11 11	·14
500	7 4	·17	1,100	12 4	·13
550	7 9	·17	1,150	12 9	·13
600	8 2	·16	1,200	13 2	·13

STATEMENT IV.

OIL SEEDS.

Existing Schedule Rate (C/B—C/M Schedule).

Distances.	C/B—C/M Schedule rate (without terminal).	(Basis) Per maund per mile.	Distances.	C/B—C/M Schedule rate (without terminal).	(Basis) Per maund per mile.
	A. P.	Pies.		A. P.	Pies.
50	1 5	·34	650	9 1	·17
100	2 10	·34	700	9 6	·16
150	3 8	·29	750	9 11	·16
200	4 6	·27	800	10 4	·16
250	5 4	·26	850	10 9	·15
300	6 2	·25	900	11 2	·15
350	6 7	·23	950	11 7	·15
400	7 0	·21	1,000	12 0	·14
450	7 5	·20	1,050	12 5	·14
500	7 10	·19	1,100	12 10	·14
550	8 3	·18	1,150	13 3	·14
600	8 8	·17	1,200	13 8	·14

STATEMENT V.

Oil Cake.

Existing Schedule Rate (C/FF Schedule).

Miles.	C/FF Schedule rate (without terminal). Per maund.	(Basis) Per maund per mile.	Miles.	C/FF Schedule rate (without terminal). Per maund.	(Basis) Per maund per mile.
	A. P.	Pies.		A. P.	Pies.
50	0 5	·10	650	5 5	·10
100	0 10	·10	700	5 10	·10
150	1 3	·10	750	6 3	·10
200	1 8	·10	800	6 8	·10
250	2 1	·10	850	7 1	·10
300	2 6	·10	900	7 6	·10
350	2 11	·10	950	7 11	·10
400	3 4	·10	1,000	8 4	·10
450	3 9	·10	1,050	8 9	·10
500	4 2	·10	1,100	9 2	·10
550	4 7	·10	1,150	9 7	·10
600	5 0	·10	1,200	10 0	·10

Coal and Coke.

Existing Rates.

Miles.	Rate per ton (without terminal).	Per maund per mile equivalent.	Miles.	Rate per ton (without terminal).	Per maund per mile equivalent.
	A. P.	Pies.		A. P.	Pies.
50	1 2	·16	650	7 13	·08
100	2 7	·17	700	8 1	·08
150	3 9	·17	750	8 8	·08
200	4 11	·17	800	8 13	·08
250	5 11	·16	850	9 3	·08
300	5 15	·14	900	9 8	·07
350	5 15	·12	950	9 15	·07
400	5 15	·10	1,000	10 3	·07
450	6 6	·10	1,050	10 10	·07
500	6 11	·09	1,100	10 15	·07
550	7 1	·09	1,150	11 6	·07
600	7 6	·09	1,200	11 10	·07

Receiving and terminal charge:—

N.-W. Railway	As. 2 per ton.
G. I. P. Railway	,, 4 ,,
B., B. & C. I. Railway	,, 4 ,,
B. & N. W. Railway	,, 2 ,,
E. B. Railway	,, 2 ,,

SUMMARY OF BASIS OF CHARGE FOR DIFFERENT COMMODITIES AS AT PRESENT ACCORDED BY THE EAST INDIAN RAILWAY.

Finished Product.

	In Small Lots. Pies per md. per mile.	In Wagon Loads. Pies per md. per mile.
1. Sulphuric Acid	·83	·42
2. Hydrochloric Acid	1·25	·42
3. Nitric Acid	1·25	·42
4. Magnesium Sulphate (Epsom Salts)	·42	
5. Ferrous Sulphate (Copperas) or (Sulphate of Iron)	·38	
6. Potash Alum (Alum)	·38	
7. Aluminium Sulphate	·38	
8. Sodium Sulphide	·42	
9. Zinc Chloride	·42	
10. Copper Sulphate	·42	
11. Sodium Sulphate	·42	
		1—100 miles ·380
		Plus 101—300 miles ·220
		Plus 301—600 miles ·130
		Plus 601 miles and above ·110

Raw Materials.

1. Bauxite (Ores N. O. C.)	·38	1—500 miles ·12
		501 miles and above ·10
2. Sulphur	·58	1—100 miles ·380
		Plus 101—300 miles ·220
		Plus 301—600 miles ·130
		Plus 601 miles and above ·110
3. China Clay	·38	1—500 miles ·16
		501 miles and above ·14
4. Coal (with effect from a date to be notified)	...	(1) For traffic carried for distances 400 miles and under:
		1—200 miles 0·165
		Plus 201—400 miles 0·13
		(2) For traffic carried for distances over 400 miles:—
		1—200 miles 0·15
		Plus 201—400 miles 0·06
		Plus 401 miles and above 0·06
5. Copper	·42	·42
6. Copper Ore	·42	1—500 miles ·12
		501 miles and above ·10

	In Small Lots. Pies per md. per mile.		In Wagon Loads. Pies per md. per mile.
Raw Materials—contd.			
7. Copper Oxide or Cupric Oxide (Colours Div. B)	·42	1—400 miles	·42
		401—650 miles	·35
		651 miles and above	·30
8. Limestone	·38	1—75 miles	·333
		Plus 76—150 miles	·200
		Plus 151—300 miles	·170
		From 301—500 miles	·12
		501 miles and above	·10
9. Hydrogen Chloride—Not classified, dangerous, and no traffic moving.			
10. Iron Pyrites	·38	1—500 miles	·12
		501 miles and above	·10
11. Nitrate of Soda	·42	1—100 miles	·380
		Plus 101—300 miles	·220
		Plus 301—600 miles	·130
		Plus 601 miles and above	·110
12. Pyrites	·38	1—500 miles	·12 *
		501 miles and above	·10
13. Sodium Chloride (Salt N. O. C.)	·38	1—100 miles	·380
		Plus 101—300 miles	·220
		Plus 301—600 miles	·130
		Plus 601 miles and above	·110
14. Saltpetre (Crude)	·38	*Plus* 601 miles and above	·110
15. Iron Scrap	·38	1—75 miles	·333
		Plus 76—150 miles	·200
		Plus 151—300 miles	·170
		Plus 301—400 miles	·125
		Plus 401 miles and above	·100
16. Spent Oxide of Gas Works—Not classified, dangerous commodity.			
17. Sulphurated Hydrogen—Not classified, dangerous, and no traffic moving.			
18. Zinc	·42		·42
19. Zinc Blende—Not classified and no traffic moving. Would probably be charged as for Item (1).			

N.B.—With the exception of the items marked *, the following terminal charges are leviable in addition to the above quoted rates:—

(1) On Coal. Re. 0-4 per ton.

(2) (*a*) On Howrah traffic—

	Below 75 miles. Pies per md.	*Over 75 miles.* Pies.
Local Booking	8	8
Through Booking	5	5
(*b*) On other traffic—		
Local Booking	9	6
Through Booking	6	3

Bengal Nagpur Railway Co., Ltd.

(1) *Letter dated the 2nd March, 1929.*

Herewith as verbally requested six copies of our memorandum in connection with rates for certain acids and chemicals, etc.

MEMORANDUM IN REGARD TO RATES FOR CERTAIN CHEMICALS, ACIDS AND RAW MATERIALS OVER THE BENGAL-NAGPUR RAILWAY.

(*a*) *Acids and chemicals.*

1. *Sulphuric acid.*—Listed under dangerous goods—charged over B. N. Railway at 8th class at R. R. and 6th class at C. R. The following special rates are in force :—

Sulphuric acid—

Shalimar and *viâ* to Nagpur and Itwari, Rs. 1-14-4 or ('52 per cent. per maund.)

2. *Hydrochloric acid.*— } Listed under dangerous goods, charged over
3. *Nitric acid.*— } B. N. Railways at 10th class at R. R. and 9th class at C. R. as per General Classification of goods. The following special rates are in force :—

Hydrochloric acid—

Shalimar and *viâ* to Nagpur and Itawari, Rs. 1-14-4 or ('52 per cent. per maund).

Nitric acid.—Same rate as above.

4. *Magnesium sulphate or epsom salt.*—Charged over B. N. Railway at 4th class at R. R. as per General Classification of goods. No special rates are in force.

5. *Ferrous sulphate (copperas).*—Provided for in the General Classification of goods as copperas and charged at 1st class rate at R. R. No special rates are in force.

6. *Aluminium sulphate.*—Charged over B. N. Railway at 1st class rate at R. R. as per General Classification of goods. No special rates are in force.

7. *Sodium sulphate.*—Charged over B. N. Railway at 3rd class rate at R. R. and 2nd class rate at O. R. No special rates are in force.

8. *Zinc chloride.*—Listed under dangerous goods—charged over B. N. Railway at 4th class rate at R. R. as per General Classification of goods. No special rates are in force except from Tatanagar to Shalimar, to *viâ* Gomoh and to all stations, Bombay to Ambernath both inclusive (*viâ* Nagpur). These reduced rates are, however, being specifically applicable to zinc dross and flux skimmings *only*.

9. *Copper sulphate.*—Charged over B. N. Railway at 4th class rate at R. R. as per General Classification of goods. No special rates are in force.

10. *Glauber's salt or sodium sulphate.*—Classified 3rd class at R. R. and 2nd class at O. R. but charged over B. N. Railway at C/K schedule or W/300, L, the basis of which is :—

	Pie per md. per mile.
For the first and up to 150 miles	·380
For extra distances above 150 miles but not exceeding 250 miles to be added to the charge for 150 miles	·250
For extra distances above 250 miles but not exceeding 400 miles to be added to the charge for 250 miles	·125
For extra distances above 400 miles to be added to the charge for 400 miles	·115
Plus an extra charge of 4 pies per maund	

11. *Potash aluminium.*—Not provided for in the General Classification of goods.

(b) *Raw materials.*

12. *Sulphur.*—Raw material for sulphuric acid—charged over B. N. Railway at 3rd class at R. R. and 1st class at O. R., in minimum consignment of 300 maunds as per General Classification of goods. No special rates are in force.

13. *Sodium chloride or common salt.*—Raw material for hydrochloric acid—charged classified 1st class at R. R., but charged over B. N. Railway at C/H schedule, O. R., the basis of which is:—

	Pie per md. per mile.
For the first and up to 300 miles	·380
For extra distances above 300 miles but not exceeding 700 miles to be added to the charge for 300 miles .	·130
For extra distances above 700 miles to be added to the charge for 700 miles	·100

Plus extra charge:

Up to 600 miles, 8 pies per manud.

601 miles and beyond, 4 pies per maund.

Numerous special rates are in force.

14. *Sulphuric acid.*—Raw material for:—

Hydrochloric acid,
Nitric acid,
Magnesium sulphate,
Ferrous sulphate,
Aluminium sulphate,
Copper sulphate,
Potash alum.

For rates charged over this Railway see item 1.

15. *Potassium nitrate (nitre or saltpetre).*—Raw material for nitric acid—Listed under dangerous goods—classified 2nd class at R. R., charged over B. N. Ry., for manure purposes only at C/FF schedule in wagon loads, O. R., C. C., L, the basis of which is 1/10th pie per maund per mile (minimum rate) *plus* terminals and at C/N schedule in small lots, the basis of which is:—

	Pie per md. per mile.
For the first and up to 75 miles	·333
For extra distances above 75 miles but not exceeding 150 miles to be added to the charge for 75 miles .	·200
For extra distances above 150 miles but not exceeding 300 miles to be added to the charge for 150 miles	·170
For extra distances above 300 miles but not exceeding 400 miles to be added to the charge for 300 miles .	·125
For extra distances above 400 miles to be added to the charge for 400 miles	·100

16. *Sodium nitrate (chili saltpetre).*—Raw material for nitric acid, listed under dangerous goods, classified 2nd class at R. R., charged over B. N. Railway for manurial purposes at the same scales as shown in item 15.

The only special rate in force over B. N. Railway is :—

Sodium nitrate—

Shalimar and *viâ*, etc., to *viâ* Nagpur (for traffic to stations Bhusaval and beyond on the G. I. P. Railway and *viâ*)—Rs. 0-14-3, C/300 ('24 per cent.) per maund.

17. *Magnesite.*—Raw material for magnesium sulphate, charged over B. N. Railway at 1st class at R. R. No special rates are in force.

18. *Scrap iron.*—Raw material for ferrous sulphate, classified 1st class at R. R., but charged over B. N. Railway at C/K schedule, C. R., C. C. L, the basis of which is shown in item 10. The following special rates are in force :—

Scrap iron—

Tatanagar to—

viâ Jubbulpore—Rs. 0-12-6 ('25 per cent.) per maund.

viâ Nagpur (for traffic to stations Bhusaval and beyond on the G. I. P. Railway and *viâ*—Rs. 0-15-3 ('33 per cent.) per maund.

Kidderpore Docks—Rs. 0-4-0, or W/400, L. ('25 per cent. *ex:* Ferry and D. T.) per maund.

viâ East Dock Junction (for traffic to Ichhapur)—Rs. 0-4-0 or, W/400, L. '26 per cent. *ex:* Ferry and haulage) per maund.

Bisco—Rs. 0-3-0 or, W/400, L. ('29 per cent.) per maund.

viâ Asansol (for traffic to Kumardubi siding)—Rs. 0-2-10 or, W/400, L. ('29 per cent.) per maund.

viâ Nagpur (for traffic to Bombay)—Rs. 0-8-0 or, CC, L. ('17 per cent.) per maund.

Cuttack to—

Kidderpore Docks—Rs. 0-5-0 or, CC, L. ('20 per cent. *ex:* Ferry and D. T.) per maund.

viâ Asansol (for traffic to Kumardubi siding)—Rs. 0-5-9 or, CC, L. ('22 per cent.) per maund.

19. *Bauxite.*—Raw material for aluminium sulphate, charged over B. N. Railway at 1st class rate at R. R. as per General Classification of goods. The following special rates to Kidderpore Docks for export overseas are in force :—

Bauxite—

Katni-Murwara to—

Shalimar—Rs. 10-0-0 ('11 per cent.) per ton.

Kidderpore Docks—Rs. 10-0-0 ('10 per cent. *ex:* D. T.) per ton.

viâ East Dock Junction—Rs. 10-0-0 ('10 per cent. *ex:* Ferry) per ton.

Lohardaga to Kidderpore Docks (introduced from 1st January 1929)—Rs. 5-2-0 ('10 per cent *ex:* transhipment charge and D. T.) per ton.

20. *Sodium sulphate or salt cake.*—Raw material for sodium sulphide. As for rates charged over this Railway—see item 10.

21. *Coal.*—Raw material for sodium sulphide. Reduced rates for coal at coal scale rates.

22. *Zinc.*—Raw material for zinc chloride. Zinc (ingots, sheets or slabs) is charged over B. N. Railway at 2nd class R. R. as per General Classification of goods. No special rates are quoted.

23. *Hydrochloric acid.*—Raw maverial for zinc chloride. For rates charged over this railway, see item 2.

24. *Copper.*—Raw material for copper sulphate. Copper (ingots, sheets or slabs) is charged over B. N. Railway, at 4th class at R. R. and 2nd class at O. R. No reduced rates are quoted.

25. *Alunite or alum stone.*—Raw material for potash alum. Not provided for in the General Classification of goods.

(2) *Letter No. C4792/21/360, dated 6th March, 1929, from the Bengal Nagpur Railway Company, Limited.*

In compliance with the President's request to me to-day I have the honour to note below the numbers of cast iron sleepers which have been or will be placed in the road on the B. N. Railway during the years shown against each:—

1928-29	220,000
1929-30	100,000
1930-31	110,000

These sleepers are supplied to the Railway by the Bengal Iron Company, and Messrs. Burn & Co. None are cast by the Railway.

I also enclose a copy of our freight rate agreement with Messrs. The Tata Iron and Steel Company.

APPENDIX.

MEMORANDUM OF AGREEMENT MADE the 28th day of August one thousand nine hundred and nine between the Tata Iron and Steel Company, Limited, a Company incorporated under the Indian Companies Acts 1882 to 1895 and having their registered office at Bombay (hereinafter called the Steel Company) of the one part and the Bengal Nagpur Railway Company, Limited, (hereafter called the Railway) of the other part whereby it is agreed as follows:—

1. Subject to the conditions contained in clause 3 and clause 4 (2) hereof—

   (*a*) Raw materials from any station on the Railway to Kalimati for the manufacture of Iron and Steel of all kinds at the works there situated;

   (*b*) Materials of all kinds and plant required for initial construction of the works from any station on the Railway to Kalimati provided always that such plant can be loaded on existing wagons of the Railway;

   (*c*) Finished products and bye-products of coking ovens sent from Kalimati to Calcutta for shipment;

will be carried by the Railway at a charge for carriage of one-fifteenth pie per maund per mile exclusive of ferry charges and transhipment charges where transhipment between gauges is necessary and which excluded charges are to be fixed in addition.

2. All manufactured articles despatched by rail from the works except those specified as (*c*) in clause I will be carried at the minimum rate sanctioned on the first of January one thousand nine hundred and five by the Government of India for each class of articles as specified in the Goods Tariff of the Railway in force on the first of January one thousand nine hundred and five or at such lower rate as may be introduced by the Railway from time to time for carriage of such articles for the public.

3. The rates to be conceded under clauses 1 and 2 will only be given subject to the following conditions:—

   (*a*) That the materials and goods of all kinds are carried at owner's risk.

   (*b*) That the ton mileage on which freight has to be paid of material and goods of all kinds carried by the Railway for the Steel Company to or from the works in any one calendar year shall

not be less than thirty millions subject to the exception in clause 3, sub-clause (*d*).

(*c*) That the minimum distance for any consignment on which the charge shall be calculated at the reduced rate shall be fifty miles.

(*d*) That the charges levied by the Railway at the reduced rates shall be calculated on the full marked carrying capacity of any wagon used and that the loading and unloading of wagons with freight for distance three hundred miles and under shall be done by or at the expense of the Steel Company. The Steel Company may have the option of being charged at tariff rates instead of the reduced rates for consignments of any weight or for any distance and in cases where such option is exercised the consignments so carried in any year will not be included in the total of thirty millions ton miles as per clause 3 (*b*) hereof.

(*e*) That all Railway works required for the service of the Steel Company within the boundaries of the Steel Company's premises shall be carried out by or at the cost of the Steel Company and that the Engines and Rolling Stock of the Railway shall not be required to enter upon any lines the property of the Steel Company until such lines have been certified by the Chief Engineer of the Railway as safe and adequate for the Engines and Rolling stock to be employed thereon.

(*f*) That material and goods of all kinds offered for despatch by rail to and from the works shall be carried in whatever class of wagon is most convenient to the Railway except that the Wagons used for the carriage of iron ore from Gurumasini to the works at Kalimati will be Hopper bottom Wagons of not less than twenty-three tons carrying capacity and will be provided by the Railway. Whenever possible the Railway will carry coal required for the works in dump wagons of their K. C. or K. E. Class.

4. (1) In the first instance rates will in all cases be charged at Tariff rates and at the end of every Calendar year a rebate will be payable to the Steel Company of the difference between Tariff rates and the rates mentioned in clauses 1 and 2 subject to the conditions contained in clause 3 and to a minimum traffic of thirty millions ton miles a year having been carried. A proportional rebate will be given every six months final adjustment being made at the end of each year.

(2) To cover the period of construction and development of the works the rebate will during the first five years from first July one thousand nine hundred and eight be payable to the Steel Company at the end of every half-year irrespective of the conditions regarding annual minimum in Clause 3 (*b*) subject to its being afterwards ascertained at the end of such five years that the total carried at reduced rates during that period shall have amounted to thirty millions ton miles. By whatsoever amount the total ton mileage during this period may have fallen short of thirty millions ton miles, the railway shall be repaid by the Steel Company the difference between one-fifteenth pie per maund per mile and the minimum tariff rate. For instance if during the period above mentioned the Steel Company had only provided the Railway with a total of twenty-five millions ton miles at the reduced rates, the amount payable by the Steel Company as an adjustment would be the full minimum tariff rate as referred to in Clause 2 *minus* one-fifteenth pie per maund per mile on five millions ton miles.

5. Traffic will be made over or taken over in the exchange sidings to be provided by the Railway at Kalimati. The Steel Company will do their own shunting from those exchange sidings to the works, but in the case of a breakdown of locomotives belonging to the Steel Company the Railway

will temporarily do shunting for them at a charge of Rupees Eight per hour, with a minimum of Rupees Fifty a day. The running charge of Rupees one and annas eight per engine mile to be paid by the Steel Company to the Railway for bringing an engine from the nearest shed of the Railway to the works.

6. *Free time for loading and unloading.*—From the time a wagon is made over to the Steel Company in the exchange sidings at Kalimati to the time of its return forty-eight hours will be allowed free: beyond that time demurrage will accrue under the rules laid down in paragraphs 115 and 116 of the Railway Goods Tariff, Part I of 1907, subject to such revision as may from time to time be made in the above rules and such demurrage shall be paid by the Steel Company to the Railway. In the case of a loaded wagon made over to the Steel Company and returned loaded a further free time of twenty-four hours or seventy-two hours in all will be allowed.

7. *Damages to Stock.*—The Steel Company will pay for all damages done to the stock of the Railway while in their charge.

8. *Supply of Wagons.*—The Railway will spare no effort to meet the Wagon requirements of the Steel Company but no preferential claim for wagons can be accorded to the Steel Company.

9. The Railway will construct subject to the approval of the Government of India a branch Railway from the ore mines at Gurumasini to a suitable point on the existing Railway line.

10. This agreement as above set forth shall continue to first July one thousand nine hundred and thirty-three and then be subject to consideration and revision as to terms of renewal and if then renewed shall be similarly subject to consideration and revision at the end of each ten years.

11. In any case of difference of opinion between the two parties the Steel Company and the Railway as to the construction of any part of this Contract or as to its application to any particular case or in reference to any matter arising thereunder either party shall be entitled to call for an Arbitration to be held in Calcutta and to be conducted in the usual manner of a reference to the Arbitration of two Arbitrators under the terms of the Indian Arbitration Act, 1889, save that the notice by one party to the other to appoint an Arbitrator shall be a notice of eight weeks and that the Arbitrators shall appoint an Umpire before entering upon their reference.

IN WITNESS WHEREOF the Steel Company and the Railway have caused their respective common seals to be hereunto affixed the day and year first above written.

The common seal of the Tata Iron and Steel Company, Limited, was hereunto affixed pursuant to the authority of the Directors of the Company in the presence of— TATA SONS & CO., Agents.

Witness—

VITHALDAS D. THACKERSEY.
NAROTTAM MORARJUPTOMDAS.
K. S. ANJAR,
Navsari Buildings,
Fort Bombay.

Signed by the Bengal-Nagpur Railway Company, Limited, through their Attorney G. C. Godfrey, duly constituted under Power of Attorney, dated 24th December 1908, in the presence of— G. C. GODFREY.

PALLISTER YOUNG,
Personal Assistant to the Agent,
B. N. Railway.

(3) *Letter No. RA-47/281, dated 14th March, 1929, from the Bengal Nagpur Railway Company, Limited.*

As requested by the President of the Tariff Board, I enclose herewith a Memorandum, in duplicate, comparing existing rates for certain Acids, Chemicals and Raw Materials between Calcutta and Bombay and between certain other points with rates based at ·10 pie per maund per mile.

Enclosure.

Memorandum in regard to rates comparing existing rates for certain Chemicals and Acids and Raw Materials with rates based at ·10 pie per maund per mile.

NOTE.—The existing rates include terminals where leviable. The rates shown below the existing rates at ·10 pie per maund per mile are exclusive of any terminals.

(A) ACIDS AND CHEMICALS.

1. SULPHURIC ACID—

Shalimar to Bombay—Bombay to Shalimar (*viâ* Nagpur), 1,221 miles. B. N. 703 miles, G. I. P. 518 miles.

	Amount per Maund.	Per Maund per mile basis.
	Rs. A. P.	
Existing—		
At 6th class (adjusted) over B. N. (Actual Weight, O. R., L.)	2 7 1	·67
At 4th class over G. I. P. *(W/300, O. R., L.)	1 11 5	·62
Total .	4 2 6	·65
At ·10 pie—		
B. N.	0 5 10	·10
G. I. P.	0 4 4	·10
Total .	0 10 2	·10

* NOTE.—W/300 means that the rate applies to a minimum weight for charge on 300 mds. per wagon used.

2. } HYDROCHLORIC ACID AND NITRIC ACID—
3. }

Shalimar to Bombay—Bombay to Shalimar (*viâ* Nagpur), 1,221 miles. B. N. 703 miles, G. I. P. 518 miles.

Existing—			
At 9th class (adjusted) over B. N. (Actual Weight, O. R., L.)	3	9 3	·98
At 9th class over G. I. P. (Actual Weight, O. R., L.)	3	6 8	1·25
Total .	6	15 11	1·10

	Amount per Maund. Rs. A. P.	Per Maund per mile basis.
At ·10 pie—		
B. N.	0 5 10	·10
G. I. P.	0 4 4	·10
Total	0 10 2	·10

4. Magnesium Sulphate or Epsom Salt—

Bombay to Shalimar (*viâ* Nagpur), 1,221 miles. G. I. P. 518 miles, B. N. 703 miles

Existing—		
At 4th class over G. I. P. (Actual Weight, R. R.)	1 11 5	·62
At 4th class (adjusted) over B. N. (Actual Weight, R. R.)	1 14 0	·51
Total	3 9 5	·56
At ·10 pie—		
G. I. P.	0 4 4	·10
B. N.	0 5 10	·10
Total	0 10 2	·10

5. Ferrous Sulphate (Copperas)—

Bombay to Shalimar (*viâ* Nagpur), 1,221 miles. G. I. P. 518 miles, B. N. 703 miles.

Existing—		
At 1st class over G. I. P. (Actual Weight, R. R.)	1 1 1	·38
At 1st class (adjusted) over B. N. (Actual Weight, R. R.)	1 2 7	·32
Total	2 3 8	·35
At ·10 pie—		
G. I. P.	0 4 4	·10
B. N.	0 5 10	·10
Total	0 10 2	·10

6. Aluminium Sulphate—

Bombay to Shalimar (*viâ* Nagpur), 1,221 miles. G. I. P. 518 miles, B. N. 703 miles.

Existing—		
At 1st class over G. I. P. (Actual Weight, R. R.)	1 1 1	·38
At 1st class (adjusted) over B. N. (Actual Weight, R. R.)	1 2 7	·32
Total	2 3 8	·35

	Amount per Maund.	Per Maund per mile basis.
	Rs. A. P.	
At ·10 pie—		
G. I. P.	0 4 4	·10
B. N.	0 5 10	·10
Total .	0 10 2	·10

7. Sodium Sulphide—

Bombay to Shalimar (*viâ* Nagpur), 1,221 miles. G. I. P. 518 miles, B. N. 703 miles.

Existing—		
At 2nd class over G. I. P. (Actual Weight, O. R.)	1 2 10	·42
At 2nd class (adjusted) over B. N. (Actual Weight, O. R.)	1 4 4	·35
Total .	2 7 2	·38
At ·10 pie—		
G. I. P.	0 4 4	·10
B. N.	0 5 10	·10
Total .	0 10 2	·10

8. Zinc Chloride—

Bombay to Shalimar (*viâ* Nagpur), 1,221 miles. G. I. P. 518 miles, B. N. 703 miles.

Existing—		
At 4th class over G. I. P. (Actual Weight, R. R.)	1 11 5	·62
At 4th class (adjusted) over B. N. (Actual Weight, R. R.)	1 14 0	·51
Total .	3 9 5	·56
At ·10 pie—		
G. I. P.	0 4 4	·10
B. N.	0 5 10	·10
Total .	0 10 2	·10

8(*a*). Flux Skimmings—

Tatanagar to Bombay (*viâ* Nagpur), 1,068 miles. B. N. 550 miles, G. I. P. 518 miles.

Existing—		
At Special rate over B. N. (C. C.,* O. R., L.)	0 8 3	·18
At Special rate over G. I. P. (C. C.,* O. R., L.)	0 7 9	
Total .	1 0 0	

* Note.—C. C. means that the rate applies to a minimum weight for charge on the carrying capacity of the wagon used.

	Amount per Maund.	Per Maund per mile basis.
	Rs. A. P.	
At ·10 pie—		
B. N.	0 4 7	·10
G. I. P.	0 4 4	·10
Total .	0 8 11	·10

9. Copper Sulphate—

Bombay to Shalimar (*viâ* Nagpur), 1,221 miles. G. I. P. 518 miles, B. N. 703 miles.

Existing—		
At 4th class over G. I. P. (Actual Weight, R. R.)	1 11 5	·62
At 4th class (adjusted) over B. N. (Actual Weight, R. R.)	1 14 0	·51
Total .	3 9 5	·56
At ·10 pie—		
G. I. P.	0 4 4	·10
B. N.	0 5 10	·10
Total .	0 10 2	·10

10. Glauber's Salt or Sodium Sulphate—

Bombay to Shalimar (*viâ* Nagpur), 1,221 miles. G. I. P. 518 miles, B. N. 703 miles.

Existing—		
At 2nd class over G. I. P. (Actual Weight, O. R.)	1 2 10	·42
At C/K Schedule over B. N. (W/300,* O. R., L.)	10 11 8	·20
Total .	1 14 6	·30
At ·10 pie—		
G. I. P.	0 4 4	·10
B. N.	0 5 10	·10
Total .	0 10 2	·10

* Note.—W/300 means that the rate applies to a minimum weight for charges on 300 maunds per wagon used.

11. Potash Alum.—Not provided for in the General Classification of Goods.

(B) RAW MATERIALS.

12. SULPHUR—

Bombay to Shalimar (*viâ* Nagpur), 1,221 miles. G. I. P. 518 miles, B. N. 703 miles.

	Amount per Maund.	Per Maund per mile basis.
	Rs. A. P.	
Existing—		
At 1st class over G. I. P. (C/300,* O. R.)	1 1 1	·38
At 1st class (adjusted) over B. N. (C/300,* C. R.)	1 2 7	·32
Total .	2 3 8	·35
At ·10 pie—		
G. I. P.	0 4 4	·10
B. N.	0 5 10	·10
Total .	0 10 2	·10

* NOTE.—C/300 means that the rate applies to a minimum consignment of 300 maunds.

13. SODIUM CHLORIDE OR COMMON SALT—

Bombay to Shalimar (*viâ* Nagpur), 1,221 miles. G. I. P. 518 miles, B. N. 703 miles.

Existing—		
At K schedule over G. I. P. (W/400, L.)	0 14 2	·33
At C/H schedule over B. N. (Actual Weight, O. R.)	0 14 2	·24
Total .	1 12 4	·28
At ·10 pie—		
G. I. P.	0 4 4	·10
B. N.	0 5 10	·10
Total .	0 10 2	·10

Naupada to Shalimar, 435 miles.

Existing—		
At C/H schedule rate over B. N. (on Actual Weight, O. R.)	0 11 8	·32
At ·10 pie	0 3 8	·10

Ganjam to Shalimar, 354 miles.

Existing—		
At Special rate over B. N. (W/400,* O. R., L.)	0 4 2	·14
At ·10 pie	0 2 11	·10

* NOTE.—W/400 means that the rate applies to a minimum weight for charge on 400 maunds per wagon used.

14. SULPHURIC ACID.—*Vide* item (1).

15. Potassium Nitrate (Nitre, Saltpetre)—

Bombay to Shalimar (*viâ* Nagpur), 1,221 miles. G. I. P. 518 miles, B. N. 703 miles.

(*When not for use as manure.*)

	Amount per Maund. Rs. A. P.	Per Maund per mile basis.
Existing—		
At 2nd class rate over G. I. P. (Actual Weight, R. R.)	1 2 10	·42
At 2nd class (adjusted) over B. N. (Actual Weight, R. R.)	1 4 4	·35
Total .	2 7 2	·38

(*When despatched for manure purposes.*)

(In wagon loads.)

Existing—		
At C/FF schedule over G. I. P. (W/270,* O. R., L.)	0 4 5	·10
At C/FF schedule over B. N. (C. C., C. R., L.)	0 6 6	·10
Total .	0 10 11	·10
(In small lots.)		
At C/FF schedule over G. I. P. (Actual Weight, O.R.)	0 5 0	·10
At C/N schedule over B. N. (Actual Weight, O. R.)	0 9 0	·14
Total .	0 14 0	·14
At ·10 pie—		
G. I. P.	0 4 4	·10
B. N.	0 5 10	·10
Total .	0 10 2	·10

* Note.—W/270 means that the rate applies to a minimum weight for charge on 270 maunds per wagon used.

16. Sodium Nitrate (Chili Saltpetre)—

(*When not used for manure purposes.*)

Shalimar to Bombay (*viâ* Nagpur), 1,221 miles. B. N. 703 miles, G. I. P. 518 miles.

Existing—		
At Special rate over B. N. (C/300*) . .	0 14 3	·24
At 2nd class over G. I. P. (Actual Weight, R. R.)	1 2 10	·42
Total .	2 1 1	·33

* Note.—C/300 means that the rate applies to a minimum consignment of 300 maunds.

Bombay to Shalimar (*viâ* Nagpur), 1,221 miles. G. I. P. 518 miles, B. N. 703 miles.

	Amount per Maund.	Per Maund per mile basis.
	Rs. A. P.	
Existing—		
At 2nd class over G. I. P. (Actual Weight, R. R.)	1 2 10	·42
At 2nd class (adjusted) over B. N. (Actual Weight, R. R.)	1 4 4	·35
Total	2 7 2	·38
At ·10 pie—		
G. I. P.	0 4 4	·10
B. N.	0 5 10	·10
Total	0 10 2	·10

(*When used for manure purposes, same rates as shown in item 15.*)

17. Magnesite—

Bombay to Shalimar, 1,221 miles. G. I. P. 518 miles, B. N. 703 miles.

Existing—		
At 1st class over G. I. P. (Actual Weight, R. R.)	1 1 1	·38
At 1st class (adjusted) over B. N. (Actual Weight, R. R.)	1 2 7	·32
Total	2 3 8	·35
At ·10 pie—		
G. I. P.	0 4 4	·10
B. N.	0 5 10	·10
Total	0 10 2	·10

18. Scrap Iron—

Bombay to Shalimar (*viâ* Nagpur), 1,221 miles. G. I. P. 518 miles, B. N. 703 miles.

Existing—		
At C/O schedule over G. I. P. (C. C.,* O. R., L.)	0 7 7	·18
At C/K schedule over B. N. (C. C., O. R., L.)	0 11 8	·20
Total	1 3 3	·19
At ·10 pie—		
G. I. P.	0 4 4	·10
B. N.	0 5 10	·10
Total	0 10 2	·10

* Note.—C. C. means that the rate applies to a minimum weight for charge on the carrying capacity of the wagon used.

19. BAUXITE—

Kanti-Merwara to Shalimar, 642 miles.

	Amount per Ton.	Per Maund per mile basis.
Existing—	Rs. A. P.	
At special rate over B. N. (V. V., O. R., L.)	10 0 0	
	Per md. 0 5 11	·11
At ·10 pie	0 5 4	·10

20. SODIUM SULPHATE OR SALT CAKE.—Rates same as shown in item 10.

21. COAL—

Bhaga (Jherria) to Bombay, 1,151 miles .	12 6 0		·070
	(*a*) 0 6 8	Per md.	
Bhaga (Jherriah) to Shalimar, 173* miles .	4 8 6		·162
	0 2 4	Per md.	

* This is the mileage from Jherriah to Howrah over the E. I. Ry. which is the shortest route, and the same rate is applied by the B. N. Ry. route.

(*a*) This rate will come into force from a future date.

22. ZINC—

Bombay to Shalimar (*viâ* Nagpur), 1,221 miles. G. I. P. 518 miles, B. N. 703 miles.

Existing—	Per md.	
At 2nd class over G. I. P. (Actual Weight, R. R.)	1 2 10	·42
At 2nd class (adjusted) over B. N. (Actual Weight, R. R.)	1 4 4	·35
Total .	2 7 2	·38
At ·10 pie—		
G. I. P.	0 4 4	·10
B. N.	0 5 10	·10
Total .	0 10 2	·10

23. HYDROCHLORIC ACID.—Rate same as shown in items 2 and 3.

24. COPPER—

Bombay to Shalimar (*viâ* Nagpur), 1,221 miles. G. I. P. 518 miles, B. N. 703 miles.

Existing—	Per ton.	
At 2nd class over G. I. P. (Actual Weight, O. R.)	1 2 10	·42
At 2nd class (adjusted) over B. N. (Actual Weight, O. R.)	1 4 4	·35
Total .	2 7 2	·38

	Amount per Ton.	Per Maund per mile basis.
At ·10 pie—	Rs. A. P.	
G. I. P.	0 4 4	·10
B. N.	0 5 10	·10
Total .	0 10 2	·10

25. ALUNITE, OR ALUM STONE.—Not provided for in the General Classification of Goods.

26. LIMESTONE—

Birmitrapur to Shalimar, 274 miles.

Existing—

At C/Q schedule over B. N. (W/400,* O. R., L.)	0 4 2	·18
At ·10 pie	0 2 3	·10

* NOTE.—W/400 means that the rate applies to a minimum weight for charge on 400 maunds per wagon used.

Birmitrapur to Bombay (*vid* Nagpur), 979 miles. B. N. 461 miles, G. I. P. 518 miles.

Existing—

At C/Q schedule over B. N. (W/400,* O. R., L.)	0 6 2	·16
At C/O schedule over G. I. P. (O. C., O. R., L.)	0 7 7	·18
Total .	0 13 9	·17
At ·10 pie—		
G. I. P.	0 4 4	·10
B. N.	0 3 10	·10
Total .	0 8 2	·10

* NOTE.—W/400 means that the rate applies to a minimum weight for charge on 400 maunds per wagon used.

— ——

(4) *Letter No. R. A. 47/281, dated the 20th March, 1929, from the Bengal Nagpur Railway.*

Re *Rates for bones, oil-cake and oil-seeds over the B. N. Railway.*

As requested by the President of the Tariff Board. I enclose herewith a memorandum in duplicate, comparing existing rates for bones, oil-cake and oil-seeds between Shalimar and Bombay with rates based at ·10 pie per maund per mile.

Memorandum in regard to rates comparing existing rates for bones, oil-cakes and oil-seeds from Shalimar to Bombay with rates based at ·10 pie per maund per mile.

Note.—The existing rates include terminals where leviable. The rates shewn below the existing rates at ·10 pie per maund per mile are exclusive of any terminals.

	Amount per md.			Per md. per mile basis.
(1) *Bones*—				
Shalimar to Bombay (*viâ* Nagpur), 1,221 miles. B. N. 703 miles, G. I. P. 518 miles.				
	Rs.	A.	P.	
Existing—				
At C/N schedule over B. N. (W/300*, O. R., L)	0	9	0	·15
At C/M schedule over G. I. P. (W/300, O. R., L.)	0	8	7	·20
TOTAL .	1	1	7	·17
At ·10 pie—				
B. N.	0	5	10	·10
G. I. P.	0	4	4	·10
TOTAL .	0	10	2	·10

**Note.*—W/300 means that the rate applies to a minimum weight for charge on 300 maunds per wagon used.

(2) *Oil-cake*—

Shalimar to Bombay (*viâ* Nagpur), 1,221 miles. B. N. 703 miles, G. I. P. 518 miles.

(*In wagon loads.*)

	Rs.	A.	P.	
Existing—				
At C/FF schedule over B. N. *(CC. OR. L) .	0	6	6	·10
At C/FF schedule over G. I. P. (W/300, OR. L)	0	4	5	·10
TOTAL .	0	10	11	·10
(*In small lots.*)				
At C/N schedule over B. N. (actual weight, O.R.)	0	9	0	·15
At C/FF schedule over G. I. P. (actual weight, O. R.)	0	5	0	·10
TOTAL .	0	14	0	·14

	Amount per md. Rs. A. P.	Per md. per mile basis.
At ·10 pie—		
B. N.	0 5 10	·10
G. I. P.	0 4 4	·10
TOTAL .	0 10 2	·10

* *Note.*—CC. means that the rate applies to a minimum weight for charge on the carrying capacity of the wagon used.

(3) *Oil-seeds*—

Shalimar to Bombay (*viâ* Nagpur), 1,221 miles. B. N. 703 miles, G. I. P. 518 miles.

(*In wagon loads.*)

	Rs. A. P.	
Existing—		
At special rate over B. N. (W/400*, O. R.)	0 7 2	·12
At special rate over G. I. P. (W/400, O. R.)	0 5 4	·12
TOTAL .	0 12 6	·12
(*In small lots.*)		
At special rate over B. N. (actual weight, O. R.)	0 9 6	·16
At special rate over G. I. P. (actual weight, O. R.)	0 7 0	·16
TOTAL .	1 0 6	·16
At ·10 pie—		
B. N.	0 5 10	·10
G. I. P.	0 4 4	·10
TOTAL .	0 10 2	·10

* *Note.*—W/400 means that the rate applies to a minimum weight for charge on 400 maunds per wagon used.

Havero Trading Company, Limited.

(1) *Letter No. 804, dated the 14th November, 1928, from the Tariff Board, to Messrs. Havero Trading Company, Limited, Bombay.*

I am directed to say that the Indian Tariff Board is now engaged in making enquiries into the question of granting protection to the manufacturers of heavy chemicals in India and has received representations from some of them alleging that the operations of the I. G. Farbenindustrie Aktiengesellschaft Frankfurt in the Indian market have had a very adverse effect on the Indian manufacturers. A copy of these is enclosed herewith for your information. As the Board has been informed that you are the selling agents in India of the I. G. Farbenindustrie Aktiengesellschaft Frankfurt, it is anxious to afford you an opportunity to state how far such allegations are well founded. It would also be of assistance to the Board if you could furnish any information about the prices of the chemicals imported by you, and about any other matter mentioned in the terms of reference, a copy of which is herewith enclosed.

2. I am therefore to enquire whether it would be convenient for you to depute a representative to tender oral evidence before the Board at 11 A.M. on the 30th November, 1928, in the office of the Board in Sir Cowasji Jehangir Building, Bombay. I am also to ask that a note embodying the information asked for (with six spare copies) may be sent to the Board's office at least 3 days before the date of oral examination.

An early reply is solicited.

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(2) *Letter dated the 16th November, 1928, from the Havero Trading Co., Ltd.*

We beg to acknowledge receipt of your letter No. 804 of the 15th instant which crossed with ours of the 14th instant addressed to Sir Padamjee Ginwala and in reply we beg to repeat that unlike The Dharamsi Morarjee Chemical Company and The Eastern Chemical Company, we are mere importers and not manufacturers. We are, therefore, quite unable at present to answer the questions with any degree of correctness. As we have already stated we have reported to the various manufacturers we are representing and no sooner their replies are to hand any information received will be at your disposal. In view of the fact that there are about half-a-dozen different concerns to be approached we do not think that we shall be in a position to give you any useful information as early as the 30th instant. If you wish us however to depute a representative of our firm on that date to confirm the above statement we shall be pleased to do so but are afraid that this is all we can do for the present.

We, however, may add already to-day that the statements made by both manufacturers' representatives examined so far alleging that:

The I. G. F. A. is controlling the entire heavy chemical trade of Germany and even of the whole continent are absolutely untrue.

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(3) *Letter No. 263, dated the 26th March, 1929, from the Tariff Board, to Messrs. Havero Trading Company, Limited, Bombay.*

I am directed to state that it has been alleged in evidence before the Tariff Board that you have recently sold Glauber's Salts containing 98 per cent. sodium sulphate (anhydrous) at Rs. 4-14-0 a cwt. delivered at the mill, in or near Bombay, and to enquire whether this is correct.

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(4) *Letter, dated 26th March, 1929, from Messrs. Havero Trading Company, Limited, Bombay.*

We are in receipt of your letter No. 263 of date, in reply to which we beg to inform you that the information received by you regarding our having sold Anhydrous Glauber's Salt at the rate of Rs. 4-14-0 per cwt. free mill delivery, is correct.

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(5) *Letter, dated the 27th March, 1929, from the Havero Trading Company, Limited, Bombay.*

In continuation of our letters of the 7th February and 26th instant, we have now heard from our Rotterdam Head Office and beg to say as follows:—

1. Our Rotterdam friends desire us, in the first place, to emphasize that they are not manufacturers of chemicals but Traders in such goods; also that they are not Agents of Manufacturers in the sense that the manufacturers have any control over them, or that they are in a position to impose contractorial obligations on them. They are representatives of manufacturers of chemicals merely in this sense that they have arrangements under which all the manufacturers' imports into India must be done through us (Sole Importing Rights). They buy in Germany, Holland and U. S. A., etc., and sell in India through us as best they can.

2. Our Home friends therefore regret that they are not in a position to supply data concerning costs of production and methods of manufacture. We are offering here below a few observations regarding—

(1) Sulphuric Acid,
(2) Nitric Acid,
(3) Hydrochloric Acid,
(4) Glauber Salt (Sodium Sulphate),
(5) Copperas (Sulphate of Iron),
(6) Soda Ash (calc.),
(7) Copper Sulphate,
(8) Zinc Chloride,
(9) Sodium Sulphide (Conc.),

but it must be understood these remarks are based on the experience of our Home friends as merchants, and they must not be regarded as expressions of opinion by the manufacturers. We are making an exception with regard to Magnesium Sulphate by attaching copy of a letter received from Messrs. Chemikalien Aktiengesellschaft, Berlin, which speaks for itself. We may add that we are expecting from the same firm another letter, which will deal with Magnesium Chloride. Before dealing with the above 9 lines *seriatim*, our Home friends desire us to offer a few general observations.

3. Our Home Office has been at some pains to check up the prices submitted to your Board by the Indian manufacturers in their representations. Our friends regret they have been unable to come to any definite conclusions for the following reasons:—

(*a*) The Indian manufacturers omit to state whether the prices they refer to are to be understood *ex*-Works or f.o.b. shipping port. Where the former is the case, it is indispensable to know whether transport from the Works to shipping ports is possible by water, or transport by rail only comes into consideration.

(*b*) No details are given as to packing; for instance, whether the quotations given include single or double bags; whether, and if so, under what terms "empties" can be returned.

(*c*) No indications are given concerning quantities; when dealing with staples, the quantity contracted for at one time is of material importance, and of course, the quantity that may be shipped at one time is equally so.

(*d*) As to c.i.f. prices, our Home friends observe that it is impossible to compare one year with another, because the freight rates charged by the various shipping companies varied considerably since 1923.

(*e*) So far as prices are concerned, which fall into the period of the German Currency Inflation, no reliance can be placed on them, because during that time, prices fluctuated violently every hour. Prices during that period depended not only on the actual exchange of the hour, but, to an even larger extent, on the view contracting parties took as to the possible further development of the inflation.

(*f*) The question of rebates, which plays such an important part in the Chemical trade, has been entirely ignored by the Indian manufacturers.

4. We think your Board will agree with the conclusion of our Head Office, *viz.*, that, under such circumstances, the prices submitted by the Indian manufacturers are meaningless.

5. But even if the Indian manufacturers had proved, which they have not, that, at a definite period, the selling prices in the manufacturing countries were above those obtaining in the important countries, it would not follow that there was systematic dumping on the part of the manufac-

turers. As a rule, Continental manufacturers of Chemicals sell their goods to exporting houses at shipping ports on f.o.b. terms, cash against documents. So far as the manufacturers are concerned, the transaction generally ends there. Now, it is a well known fact that all primary markets are always above the secondary markets; for instance, tin, rubber, pepper, etc., can always be got cheaper in London and in New York than they can be purchased at the same time in Singapore. If it were otherwise, the lot of the exporter would indeed be a happy one. The explanation is, of course, speculation. An importer in Bombay may have good reasons to part with a lot of Sodium Sulphide "spot Bombay" at Rs. 120 per ton and to contract to buy, at the same time, for shipment from Hamburg in two to three months' time at the equivalent of Rs. 130 per ton. Such an importer is not dumping; he is merely adjusting his books. A contributory factor of no small importance which keeps prices in India low is the well known fact that, in India, the general tendency is for cheapness, and very little regard is paid to quality, whilst in Europe, consumers are, as a rule, ready to pay a small premium for uniformly good quality.

6. Indian manufacturers refer repeatedly to the operations of the "German Chemical Trust" and its enormous capital. They are trying to convey the impression that the whole chemical industry of Germany is in the hands of the I. G. Farbenindustrie Aktiengesellschaft, and that the whole of capital of this concern is being utilised to dump heavy chemicals on the Indian market. It will, therefore, not be out of place to put matters into their true perspective.

7. The I. G. Farbenindustrie Aktiengesellschaft, Frankfurt a/Main, is no doubt the biggest single entity in the chemical industry on the Continent. It may further be admitted that so far as Dyes and Pharmaceuticals are concerned, it is the leading concern on the Continent, but by no means the only important one. But so far as Heavy Chemicals are concerned (which alone form the subject of the present enquiry), the I. G. Farbenindustrie Aktiengesellschaft does not, by any means, occupy the position Indian manufacturers try to ascribe to it. There exists in Germany a very great number of entirely independent and important concerns, which specialise in the manufacture of heavy chemicals. Indeed it has been estimated that the total production of heavy chemicals by the I. G. Farbenindustrie Aktiengesellschaft in Germany is considerably below one-third of the total German production. Its Indian business in these lines, as will be shown hereafter, is really insignificant.

8. To cite the capital of the I. G. Farbenindustrie Aktiengesellschaft in support of the Indian argument, is another fallacy. The I. G. Farbenindustrie Aktiengesellschaft's capital is preponderatingly devoted to the manufacture of products that do not come under the present enquiry.

9. Our Head Office expressly desires us to say that they have no desire to express any opinion on the question whether it is feasible to establish a chemical industry in India. The object of this letter is to submit to your Board—in compliance with their request—such facts within our friends' knowledge that may be helpful to them to arrive at a conclusion.

10. (*a*) In the opinion of our Home friends, the question of natural resources is of secondary importance for the establishment of a Chemical Industry. Success or failure depends, in the first place, on the processes applied. Natural resources, however rich, can never make up for antiquated processes. In this respect, the instance cited by the Chemikalien Aktiengesellschaft, Berlin, in the appended letter is illuminative, and such instances could no doubt be multiplied *ad libertum*.

(*b*) The modern manufacture of chemicals is quasi-automatic. The higher cost of European manual labour, therefore, hardly comes into consideration at all. The principle problem of a chemical manufacturer is to make the fullest use of his automatic or semi-automatic plant. And up to a point, the bigger the plant, the lower the cost per unit. This is the chief reason why the chemical industry, more than any other industry, forms itself into large combine. The object of these large combines is not dump-

ing but rationalisation. Smaller manufacturers in Europe and America are in as bad a plight as their confrères in India. Nobody is enamoured with these large combines, but people cannot resist economic forces.

(*c*) We may be pardoned for re-stating the common place, that the modern chemical industry is the child of modern research and technique. In no country can a chemical industry hope to hold its own, unless it has the continued support from scientific research workers and progressive engineers; indeed, a chemical industry requires the full backing of all the resources of a progressive country.

(*d*) A modern chemical work has to allow for the fact that its plants will become obsolete within ten years It can only hope to write off these costly plants if, during that short period, it can make the fullest possible use of them. A chemical industry with a limited outlet cannot hope to write off its capital outlay during useful time. This danger is, of course, inherent to any modern industry, but not to the same extent as in the chemical business.

11. There are quite a number of chemicals that are not being manufactured in this sense that they form the object of any manufacturing process. They are merely the residues (by-products) obtained during the course of certain manufacturing processes. Such by-products, very often, have to be allowed to run to waste until some use for them is discovered, and even then, the supply generally largely exceeds the demand. The selling price, in all such cases, is not determined by the cost of production, but by the cost of packing and freight. A manufacturer who attempts to produce such by-products as the main article of his manufacture, is really in a hopeless position from the beginning.

12. The position of India is peculiar in this way that its industrial centres are lying thousands of miles apart and that they are mostly ports. Whilst it is, therefore, possible for the foreign importer to put down a given quantity of goods for the same price at any of the Indian major ports, the Indian manufacturer would have to establish units at each of them to be competitive. Even if the present railway rates were reduced by half, this initial handicap would still prevail.

13. The Indian manufacturers try to convey the impression that there is a deliberate attempt on the part of the "big chemical trusts" in Europe to throttle the nascent Indian industry. As a matter of fact, the various manufacturers fix the prices f.o.b. shipping ports and do not pay any attention to destinations. According to the chemical press, the German Chemical Trade in 1928, exclusive of dyes, represents a value of £24,000,000 out of which India took rather less than £400,000 or less than 2 per cent. It is difficult to believe that a seller will allow his prices to be influenced by a customer who absorbs less than 2 per cent. of his production.

14. (*i*) *Sulphuric Acid*—(*a*) *Commercial Sulphuric Acid.*—The whole of Germany's enormous production (nearly two million tons) is practically speaking consumed in the country itself. As a result, the prices ruling in Germany are usually above those obtaining in Belgium and Holland. The quantities that can be freed by Germany for export purposes are entirely negligible. For the uninitiated it is impossible to compare the German inland prices with the export prices, principally for the reason that the whole business in technical Sulphuric Acid is done in Germany by means of special Tanker Wagons, which means, that the consumer is only paying the goods and nothing at all for the packing; these Tanker Wagons when emptied, are always being returned to the factory. At present, the price in Germany is a little more than R.M. 4 per 100 kilos or say about £2 per ton; the export price varies between £5 to £6 per ton, f.o.b. packed in iron drums of about ½ a ton each. Dutch and Belgian manufacturers do a very large business both in their own countries and abroad. This enables them to make the fullest use of their very modern equipments. This line offers a typical example of quasi-automatic manufacture requiring very little but highly skilled labour.

(*b*) *Chemically pure Sulphuric Acid.*—Only very small quantities go from Germany to India. The exporters of these articles are not the I. G. Farbenindustrie Aktiengesellschaft but the makers of fine chemicals.

(*ii*) *Nitric Acid.*—We imported this line (which is of I. G. manufacture) for the first time in February, 1928. The stuff can be purchased in Germany, exclusive of packing, at £11 to £12 per ton. In India the selling price is more than 150 per cent. higher, due to the very expensive packing that is necessary and to the fact that freight is five to six times more than on ordinary chemicals.

(*iii*) *Hydrochloric Acid.*—So far as the commercial quality is concerned, this is, in the main, a by-product (residue), of which there is an enormous consumption in Germany. As in the case of Sulphuric Acid, the stuff is being transported in Germany in special Tanker Wagons; the price is £2 to £2-10-0 per ton, no packing being necessary. The c.i.f. Indian Port price is not less than £30 per ton. This enormous difference is explained by the fact that the goods have to be packed in special flasks. The freight is not less than sh. 100 per unit and the insurance premium is unusually high. Under such conditions, there can, of course, be no question of dumping. The I. G. Farbenindustrie Aktiengesellschaft has, so far only, sent one small consignment to India as a sample.

As far as chemically pure goods are concerned, these are being sold in very small quantities by manufacturers of fine chemicals.

(*v*) *Glauber Salt* (*Sulphate of Soda*).—Germany is in a position to produce Sodium Sulphate at exceptionally low prices, as it has the advantage of cheap Sulphuric Acid and of the other necessary ingredients. Several lakhs of tons of Sodium Sulphate are manufactured in Germany every year, whilst in India, hardly a thousand tons per year are produced, which are exclusively of the crystallised variety. This variety contains only about 44 per cent. of NA_2 SO_4, which renders the importation from these distant countries uneconomical. As far as calcinated stuff is concerned, this is of very small significance to India, as it is only required by certain industries, such as glass-manufacturers. Our own share of this business in the year 1928 amounted to 25 tons only.

(*vi*) *Sulphate of Iron.*—Since the cessation of inflation in Germany, the export of goods of German origin has entirely ceased. It is quite possible that consignments reach India through German Exporting Houses but the goods, in every case, are of English, Belgian and French origin. Our share during the last two years did not exceed 5 tons, with a total maximum value of £30. The I. G. is not a manufacturer of Sulphate of Iron.

(*vii*) *Soda Ash.*—So far as our knowledge goes, crystallised soda is not being exported to India, as this would mean waste in freight (crystallised soda contains about 60 per cent. water). On the other hand, it is common knowledge that large quantities of calcinated Soda Ash are imported into India. Your Board is already aware that this business is almost exclusively in the hands of the Imperial Chemical Industries, Limited. We, therefore, do not propose to deal with this article.

(*viii*) *Copper Sulphate.*—The total Indian imports amount to 800/900 tons per annum. During the last two years (1927-28), we imported about 20/25 tons per annum; the balance of the business is in the hands of English manufacturers. It is, however, quite possible that during the inflation in Germany, lots were sold in India below the German inland prices. This was the result of speculation in exchange, and not the result of dumping. As a matter of fact, the German prices have risen from £25 c.i.f. per ton in 1925 to £30 to £31 per ton c.i.f. at this date. The prices are subject to fluctuations, because they are greatly influenced by the following factors:—

(*a*) the London price for Electrolytic Copper,
(*b*) the price of Sulphuric Acid,
(*c*) seasonable demand.

The demand is keenest during January/May, but falls off during the second half-year, a fact which encourages speculation.

(*ix*) *Zinc Chloride.*—The Indian demand is only for the fused stuff 98/100 per cent. fine, and was chiefly satisfied by Germany. English, French and Belgian manufacturers have quite recently started to participate successfully in this line as well. The I. G. Farbenindustrie Aktiengesellschaft is taking an interest in the business since six months only. The Indian consumption is about 130 tons per month; the Indian industry has so far only been capable of producing 5/6 tons per month. It is a fact that the price of Zinc Chloride receded considerably during the last few years. This is, in the first place, due to the improvement in technical equipment of the producing works. Contributory factors were the cheaper prices of Scrap and for Hydrochloric Acid. Zinc Chloride is also largely consumed in Germany; when comparing prices, one must bear in mind that in Germany Zinc Chloride in powder form is chiefly being used, whilst the exported goods are of the fused variety. This accounts for a difference of £1 per ton. In other words, goods for export purposes can be offered 4/5 per cent. cheaper.

(*x*) *Sodium Sulphide.*—The chief competitors for this business are Germany and England. In Germany, there are five factories which are now under joint management. In England the business is done by the Imperial Chemical Industries, Limited. During recent years, the price for this article has declined continuously. The reasons for this decline are:—

(*a*) there are in England very large stocks of Glauber Salt which have to be worked off;

(*b*) the cost of production has been considerably reduced by a new process.

A contributory factor is the Japanese competition; but the Japanese stuff is generally considered to be of inferior quality. On the Continent prices have receded in sympathy, and here the Belgian competition is of considerable importance. The importation of this article into Germany is duty free; it is, therefore, quite impossible for German manufacturers to obtain in Germany prices above the world quotation. Goods of Indian manufacture have not so far been offered for sale.

Enclosure.

COPY.

Berlin W, 35, 19th February, 1929.

From

Messrs. Chemikalien Aktiengesellschaft,
Schoeneberger Ufer 13,
Berlin W, 35.

To

Messrs. Havero Trading Co., Ltd.,
P. O. Box 37,
Bombay.

DEAR SIRS,

Re PROTECTION TO INDIAN MANUFACTURERS OF HEAVY CHEMICALS—EPSOM SALT.

By your Hamburg branch we duly received your information and the report regarding the application of the Eastern Chemical Company, Bombay, for protection. Please note the following for your guidance if you, again, give evidence before the Tariff Board.

To begin, we beg to remark that we may be allowed to speak in the name of all German Epsom Salt manufacturers as we have the largest output in Epsom Salt of all German factories.

As a principle, the prices for "German Epsom Salt commercial" for all foreign countries have been uniformly fixed f.o.b. German shipping-port and are all based on the same figure "f.o.r. factory for home-consumption". Therefore *one cannot speak at all of "dumping in Epsom Salt"*. The reduction of the price within different periods is only a consequence of

the heavy competition between the German factories. As long as each factory sold and supplied Epsom Salt independent from the others with regard to the price, it could not be formed a distinct price-level. Just during the last year, efforts have been made to increase and to stabilisate the price and these efforts have shown results, this being a proof, in our opinion, that it is not intended in any case to force the Indian Industry out of the market. We only go our usual way in manufacturing Epsom Salt and selling it at a *fair* market-price *where it has a demand*. Our competition in Epsom Salt against the Indian industry is a fair one and the difference in the current prices of the Indian market for the Indian and the German product is resulting from the fact that the manufacturing process, as used by the Eastern Chemical Company, to make Epsom Salt from Magnesite and Sulphuric Acid, is a very uneconomic one. This process is uneconomic not only when used by Indian factories, but also when used in Europe. For instance, in Itály the Epsom Salt is produced in the same way and cannot stand against the German fair competition although Italy has own sulphur mines and sulphuric acid factories and cheap electric power. Some time ago, the same manufacturing process has been used in the United Kingdom but this uneconomic production was stopped in order to supply the sizing-material " Epsom Salt " to the English textile-industry from the cheapest source, namely Germany. The cheap value of the German stuff is declared by the fact that it is a natural product being made from Kieserite by solution, purification and crystallisation. Even at the higher costs for ordinary labour in Germany, Epsom Salt can be manufactured and supplied at cheaper rates from Germany as all functions, such as purifying, drying, filling and weighing and closing the bags and loading, is done by machines and as the goods are despatched per river-barge and not per rail to shipping-port.

We, further, may give the following remarks regarding the answer of Messrs. Eastern Chemical Company to the questionnaire of the Board:—

8. (*a*) As they state that their Epsom Salt is superior in quality we think that then the Indian product has a higher value and a cheaper price for the German Salt is quite natural.

10. The Eastern Chemical Company is—with their own words—" at a disadvantage where the crystallization processes are concerned ". " *During the hotter months* of the year the latter are naturally delayed, and *the output of marketable salts is less* and costs consequently higher." It will be understood from this that, during the hotter months of the year, the demand of the Indian market will probably not be covered entirely while shipments from Germany can be effected throughout the year without any interruption in such a proportion that the *whole* demand will be satisfied.

13 and 14. The Eastern Chemical Company has an annual requirement of 800 tons of Magnesite if the plant is working to its full capacity and for the production of one ton of Epsom Salt 8 cwts. of Magnesite are required. From this, follows, that with 800 tons Magnesite the yearly production in Epsom Salt of the Eastern Chemical Company amounts to 2,000 tons, but the yearly consumption of Epsom Salt in British India is considerably higher than 2,000 tons. In *1927* there have been shipped about *3,200 tons* from Germany to Indian ports and in 1928 about 2,100 tons although there were heavy troubles and a strike for about 6 months in the textile-industry during 1928 so that the 2,100 tons from 1928 cannot be taken as a basis for the yearly consumption. The latter can be taken as *3,500-4,000 tons* and will increase in the proportion as the Indian Textile-industry will extend. The German manufacturers can cover the whole present and every future demand in Epsom Salt.

We still beg to point out that the I. G. Farbenindustrie A. G., Frankfurt a.M. has nothing to do with the business in Epsom Salt. They do not manufacture at all Epsom Salt and the Epsom Salt plants are working quite separately from the I. G. All German manufacturers of Epsom Salt are quite independent from the I. G. in financial, technical and commercial regards.

We are prepared to give you any informations you should further require.

Yours very truly,
Chemikalien-Aktiengesellschaft,

(Sd.)

Messrs. Brunner, Mond and Company (India), Limited.

(1) *Letter No. 803, dated the 14th November, 1928, from the Tariff Board, to Messrs. Brunner, Mond and Company, (India), Limited, Bombay.*

I am directed to say that the Indian Tariff Board is now engaged in making enquiries into the question of granting protection to the manufacturers of heavy chemicals in India and has received representations from some of them alleging that the operations of the Imperial Chemical Industries, Limited, in the Indian market have had a very adverse effect on the Indian manufacturers. A copy of these is enclosed herewith for your information. As the Board has been informed that you are the representatives in India of the Imperial Chemical Industries, it is anxious to afford you an opportunity to state how far such allegations are well founded. It would also be of assistance to the Board if you could furnish any information about the prices of the chemicals imported by you and about any other matter mentioned in the terms of reference, a copy of which is herewith enclosed.

2. I am therefore to enquire whether it would be convenient for you to depute a representative to tender oral evidence before the Board at 11 A.M. on the 29th November, 1928, in the office of the Board in Sir Cowasji Jehangir Building, Bombay. I am also to ask that a note embodying the information asked for (with six copies) may be sent to the Board's office at least three days before the date of oral examination.

An early reply is solicited.

(2) *Letter dated the 8th December, 1928 from Messrs. Brunner, Mond & co. (India), Ltd.*

Our Bombay Office have passed on to us your letter No. 803, dated the 14th November, 1928, with enclosures, consisting of extracts from the replies of Messrs. Dharamsey Morarji Chemical Company, Limited, to the official questionnaire issued by your Board in connection with the Chemical Enquiry and of the complete reply of Messrs. The Eastern Chemical Company, Limited, thereto.

It was not our intention to take any part in this enquiry, as we felt that an Importing and Selling Company, such as ours is at present, occupies an invidious position in endeavouring to oppose the grant of protection to manufacturers in this country, seeing that the ultimate issue lies between the ability of such manufacturers to meet the demands of consumers as regards quantity, quality and time of delivery and the ability of the consumers to pay the enhanced price which the manufacturers naturally expect to result from protection. Having regard to these views, as soon as the Government of India announced in July last its intention to refer to the Tariff Board the application for protection in respect of certain chemicals, we addressed a letter to the principal consumers of chemicals and associations of manufacturers throughout India, of which the following is an extract:—

> "As consumers of one or more of the above mentioned chemicals (those mentioned by the original applicants for protection) you will readily understand that your interests will be affected adversely or favourably, according to whether the Tariff Board recommend the enhancement or removal of the existing duties, and in order that the Tariff Board may have as much information as possible to assist them in their deliberations, we would advise you to lay your views before them and give them what

details you consider necessary concerning your business and the effect which an increase or decrease in the duties referred to is likely to have thereon ".

We now consider that it would be impolitic for us not to accept your invitation to appear before the Board with a view to stating how far certain allegations made by the applicants for protection to the effect that the operations of Imperial Chemical Industries, Limited, have had an adverse effect on the Indian manufacturers, are well founded and in the meantime we have pleasure in furnishing you with the following information:—

In the first place we might explain that we are a Private Limited Company, registered in India, and that the majority of our shares are held by Brunner, Mond & Co., Ltd., who are one of the constituent Companies of Imperial Chemical Industries, Limited. Our principal functions at present consist of importing and selling chemical products which we purchase mainly from Imperial Chemical Industries, Limited. It is quite possible that at a later date, when the off-take of certain chemicals in India justifies such a step and an exhausting enquiry has proved that the requisite raw materials are economically available in sufficient quantities, in fact that the project has a reasonable assurance of success from its inception, we may establish a factory or factories in India. In a matter like this we should invite the expert technical advice of Imperial Chemical Industries, Limited, and if the project came to fruition we should certainly give Indian capital an opportunity of participating in the scheme.

Turning to the " replies to questionnaire " received by you from Dharamsey Morarji Chemical Company, Limited, we should like to call your attention to the following misstatements:—

A. 48 (B) and (C). " Some of the producers of Sulphate of ammonia even in India had perforce to join this great combination (I. C. I.) for fear of being throttled ".

As a branch of the British Sulphate of ammonia Federation was formed in India in 1924, when practically the whole of the Indian producers of Sulphate of ammonia agreed to co-operate with the Association, it is obvious that Imperial Chemical Industries, Limited, which only came into existence towards the end of 1926 could not have had anything to do with the negotiations.

A. 48 (*b*) and (*c*). " The principal object with which this combination (I. C. I.) was incorporated was to minimise the internal competition in the United Kingdom ".

The formation of Imperial Chemical Industries Limited was purely a defensive measure against similar combines which had been formed in the United States and Germany. The fusion of interests was a sound proposition from all points of view, as the industries which the merging companies represented were intimately associated with each other.

A. 49—*re* " Dumping ":—

Of all the products referred to in this paragraph, Sodium Sulphide is the only one which has been shipped to India by Imperial Chemical Industries, who have informed us that in the opinion of their experts 10,000 tons per annum is the minimum for economical production. The imports into India in 1927-28 were only 2,400 tons. They also consider that as 25 cwts. of Salt Cake are necessary to produce 1 ton of Sodium Sulphide, the small market in India for Hydrochloric Acid makes the manufacture of Salt Cake uneconomical. There is practically no sale of Salt Cake itself in India.

We ourselves have from time to time imported quantities of the other products mentioned; *viz.*:—Potash Alum, Alumina Sulphate, Copper Sulphate, Copperas, Zinc Chloride, and Epsom Salts, but our purchases have been made through a merchant firm in Great Britain who have to buy in the open market. We have had no dealings in Sulphuric, Nitric and Hydrochloric Acid and were under the impression that the Indian manufacturers had the market to themselves. In 1922, when we were the Agents of the United Alkali Company, Limited, we asked them to indicate their lowest price for

Sulphuric Acid c.i.f. Calcutta and they quoted 5*d.* per lb. in cases each containing 2×42 lb. jars, which was the standard packing at that time. They pointed out that the actual cost of the Acid had little to do with the price, as it was made up principally of the cost of packages and the freight. As the locally made article was less than half of the c.i.f. price quoted, to which duty and charges had still to be added, we did not pursue the matter further. In February last we had occasion to ask the price of Sulphuric Acid in Calcutta and we ascertained that it could be obtained from local manufacturers at 1 anna per lb. less 25 per cent. packed in 2½ gallon returnable jars.

The Dharamsey Morarji Chemical Company, Limited, have instanced the increase in the imports of Copper Sulphate as proof of dumping, whereas, had they made enquiries, they would have learnt that the enhanced import figures could be accounted for by the increased use of this article for the spraying of rubber trees. This is proved by the official statistics which show that the increased imports were confined to Burma and the Madras Presidency, the figures for the remaining statistical division having declined.

As regards to the Eastern Chemical Company's replies to the questionnaire, we find that in answer to question 43, they have cited the case of Caustic Soda as "an example of the manner in which the English combine is in a position, should it desire, to force them out of the market altogether," but they omitted to explain that they undertook the manufacture of Caustic Soda from Brunner Mond & Co.'s Soda Ash during the War when the export of Caustic Soda from Great Britain was prohibited except under licence. The quantities so exported were limited, hence the price in this country was unnaturally high, but Indian consumers did not suffer thereby as we explained to them how to produce Caustic lye from Soda Ash, supplies of which were available at reasonable rates. We are however interested to note that they do not seek protection in the case of Caustic Soda.

In their reply to question 48 (*c*) they appear to hold Imperial Chemical Industries equally responsible with the German combine for their inability to manufacture and sell Epsom Salts at a profit and for the unremunerative position of their three principal Acids, but we have already informed you that Imperial Chemical Industries have not in any way been associated with the sale of these products in India.

We think the above remarks will suffice to prove to you that the difficulties of the chemical manufacturers in Bombay are not attributable to the operations of Imperial Chemical Industries Limited or ourselves and if it is possible, having regard to the fact that we are a private Company, for us to furnish you with further information when we tender oral evidence on the 13th instant we shall be pleased to do so.

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(3) *Letter dated the 13th December 1928, from Messrs. Brunner, Mond & Co. (India), Ltd.*

With reference to the request made during this morning's hearing by the President for information regarding the c.i.f. price of certain chemicals in which we have been dealing but which are not manufactured by Imperial Chemical Industries, we have pleasure in giving you the following particulars:—

	Per ton c.i.f. Bombay.		
	£	s.	d.
Epsom Salts	3	17	0
Potash Alum	8	12	6
Sulphate of Alumina	6	13	9
Zinc Chloride	18	10	0
Copper Sulphate	28	5	0
Glauber Salt	4	0	0

The above represent the actual prices last paid by us for purchases of the products mentioned.

Imperial Chemical Industries, Limited, Calcutta.

(1) *Made over by Mr. Hutchinson, on 12th March, 1929.*

	Per acre.	No. of plots.	Increase.
PADDY.			
Madras—			Per cent.
	Lbs.		
Sulphate of Ammonia . . .	80	20	13
	Cwt.		
Super	1		
Hyderabad—			
	Lbs.		
Sulphate of Ammonia . .	80	23	34
	Cwt.		
Super	1		
Mysore—			
	Lbs.		
Sulphate of Ammonia . . .	56	4	54
Super	168		
Bombay—			
	Lbs.		
Sulphate of Ammonia . . .	300	1	79
Super	600		
POTATO.			
Bombay—			
	Lbs.		
Sulphate of potash . . .	150	6	59
Super	112		
Sulphate of Ammonia . . .	120		
Sulphate of potash . . .	150	6	40
Super	112		
Nitrate of soda	170		
Mysore—			
	Baskets.		
F. Y. M.	100	2	50
	Lbs.		
Sulphate of Ammonia . . .	150		
Super	360		
Sulphate of potash . . .	55		
COTTON.			
Bombay—			
	Lbs.		
Sulphate of Ammonia . .	70	1	71 Average.
Super	112		
Sulphate of Ammonia . .	112	1	
Super	56		
Sulphate of Ammonia . . .	80	1	
Super	100		

	Per acre	No. of plots.	Increase. Per cent.
Tobacco.			
Bombay—			
	Lbs.		
Sulphate of potash	150	6	48
Super	112		
Nitrate of soda	285		
Wheat.			
Bombay—			
	Lbs.		
Sulphate of Ammonia	56	6	
Super	112		
Sulphate of Ammonia	56	1	56 Average.
Super	56		
Sulphate of Ammonia	50	1	
Super	100		
F. Y. M.	35,000	1	
Sulphate of Ammonia	112		
Super	224		
F. Y. M.	15,000	1	
Sulphate of Ammonia	56		
Super	112		
F. Y. M.	15,000	1	
Sulphate of Ammonia	112		41 Average of 7 plots.
Super	112		
F. Y. M.	20,000	1	
Sulphate of Ammonia	56		
Super	112		
F. Y. M.	60,000	1	
Sulphate of Ammonia	56		
Super	112		
F. Y. M.	25,600	1	
Sulphate of Ammonia	56		
Super	112		
F. Y. M.	5,600	1	
Sulphate of Ammonia	60		
Super	112		
Ragi.			
Madras—			
	Cartloads.		
F. Y. M.	3	2	43
	Lbs.		
Sulphate of Ammonia	80		
Super	112		
Groundnut.			
	Lbs.		
Sulphate of Ammonia	40	3	73
Super	112		

	Per acre.	No. of plots.	Increase.
TURMERIC.			
Madras—	Lbs.		
Sulphate of Ammonia	160	1	Here though there is no increase, the profit over control is due to the high cost of F. Y. M.
Super	224		
ONIONS.			
Bombay—	Lbs.		Per cent.
F. Y. M.	22,400	1	26
Sulphate of Ammonia	140		
Super	112		
CHILLIES.			
Bombay—	Lbs.		
Sulphate of Ammonia	120	1	98
Super	240		
	Lbs.		
Madras—			
Indigo refuse	13,333	1	84 Average of 4 plots.
Sulphate of Ammonia	240		
Super	224		
F. Y. M.	36,000	1	
Sulphate of Ammonia	160		
Super	160		
F. Y. M.	26,000	1	
Indigo seeth	8,000		
Sulphate of Ammonia	160		
Super	224		
	Cartloads.		
F. Y. M.	60	1	
	Lbs.		
Neem cake	750		
Sulphate of Ammonia	120		
Super	120		
	Lbs.		
Mysore—			
F. Y. M.	2,000	1	25
Sulphate of Ammonia	52		
Super	156		
CABBAGE.			
Bombay—	Lbs.		
Sulphate of Ammonia	150	2	67
Super	224		
F. Y. M.	17,000	1	117 Average of 2 plots.
Sulphate of Ammonia	150		
Super	224		
F. Y. M.	40,000	1	
Sulphate of Ammonia	150		
Super	224		

(2) *Letter dated the 16th March, 1929, from Imperial Chemical Industries, Limited.*

In accordance with the request of your Chairman on the 9th instant, we have pleasure in enclosing particulars of the prices of and rates of freight on Sulphate of Ammonia, Superphosphate and Compound Fertilisers.

Enclosure No. 1.

PRICES OF SULPHATE OF AMMONIA AND SUPERPHOSPHATE (18/20 PER CENT.).

F.O.B. prices—

Sulphate of Ammonia, 2 cwts. single bags, f.o.b. U. K. Port, £10-6-6 per ton.

Superphosphate, 2 cwts. double bags, f.o.b. Dutch Port, £2-13-3 per ton.

F.O.R. Calcutta prices—

Sulphate of Ammonia, 2 cwts. single bags, f.o.r. Calcutta, Rs. 156 per ton.

Superphosphate, 2 cwts. double bags, f.o.r. Calcutta, Rs. 65-70 per ton.

The price of Sulphate of Ammonia for all main Indian ports is the same, but that for Superphosphate varies. The present rate for the latter f.o.r. Madras is Rs. 80 per ton, 1 cwt. double bags. The reason for the variation in the price of Superphosphate is that if kept for stock purposes an allowance of Rs. 10 to Rs. 15 per ton, according to the packing, must be made for re-bagging. If we are able, as we some times are in Calcutta, to rail Superphosphate up-country straight from the ship to a definite order we can sell at as low as Rs. 59 per ton, f.o.r.

The analysis of the Superphosphate quoted is 18-20 per cent. water soluble P_2O_5.

Enclosure No. 2.

RATES OF FREIGHT FROM EUROPE TO INDIA.

Sulphate of Ammonia.—From U. K. Port to—

Calcutta, Bombay, Karachi, £1-5-0 per ton.

Madras, £1-7-6 per ton.

Cochin, Tuticorin, £1-10-0 per ton.

Rangoon, £1-15-0 per ton.

Superphosphate.—The rate of freight for Superphosphate from Holland to the foregoing Indian ports is Sh. 2-6 per ton less for each port.

Compound Fertilisers.—Analyses and Prices, f.o.r. Calcutta—

Leunaphos (20 per cent. Nitrogen and 20 per cent. P_2O_5) 220 lbs. double bags, Rs. 215 per ton.

Diamonphos (21 per cent. Nitrogen and 53·4 per cent. P_2O_5) 220 lbs. double bags, Rs. 320 per ton.

*Ammophos 20-20 (16·45 per cent. Nitrogen and 20 per cent. P_2O_5) 100 lbs. single bags, Rs. 215 per ton.

*Ammophos 13-48 (10·7 per cent. Nitrogen and 48 per cent. P_2O_5) 100 lb. single bags, 250 per ton.

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* Prices obtained from Messrs. Shaw Wallace & Co. The nitrogen contents in the two grades of Ammophos is calculated in terms of Ammonia, but for the purpose of comparison the analyses have been reduced to percentages of pure nitrogen, as given in Leunaphos and Diammonphos.

Enclosure No. 3.

COMPARATIVE COSTS OF COMPOUND FERTILISERS *vs.* SULPHATE OF AMMONIA AND SUPERPHOSPHATE.

The most simple comparison to make is between Leunaphos *vs.* Sulphate of Ammonia and superphosphate, as the Nitrogen and Phosphoric acid contents in each are the same.

One ton of Leunaphos costing Rs. 215 is equivalent to one ton of Sulphate of Ammonia + one ton of Superphosphate, the joint cost of which is = Rs. 230. The price of Superphosphate has been put at Rs. 70 per ton, the lowest figure possible for general purposes. All prices are f.o.r. ports and it will be realised that the railway freight on Leunaphos is exactly half that of the Sulphate of Ammonia and Superphosphate.

Below are further comparative values:—

Compound fertiliser	Cost per ton f.o.r. Calcutta.	Approximate cost of equivalent value in S/A and Super f.o.r. Calcutta.
	Rs.	Rs.
Leunaphos	215	230
Diammonphos . . .	320	353-8
Ammophos 20/20 . . .	215	202
Ammophos 13/48 . . .	250	256

For the sake of easy working the price of Sulphate of Ammonia has been put at Rs. 160 per ton instead of Rs. 156 f.o.r. Indian ports.

A unit of nitrogen has been taken at Rs. 8 and a unit of phosphoric acid at Rs. 3-8-0.

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(3) *Letter dated the 23rd April, 1929, from Messrs. Imperial Chemical Industries (India), Limited, to the Secretary, Tariff Board.*

We acknowledge receipt of your telegram of the 22nd instant as hereunder:—

> " Reference your letter 16th March kindly wire how price Leunaphos two hundred fifteen Calcutta is made up stop please state separately f.o.b. price freight landing importers' commission and other charges—Tarboard "

and confirm our reply of to-day's date as follows:—

> " Your telegram twentysecond Leunaphos f.o.b. price fourteen pounds sterling freight Calcutta twenty-five shillings landing and godown charges seven rupees eight annas importers' commission three per cent. stop no other charges—Impkemix ".

which is self-explanatory.

With regard to your letter No. 341 of the 17th instant, we had not intended replying to it until we had obtained from Messrs. Shaw Wallace and Company the information asked for in the first paragraph. Messrs. Shaw Wallace and Company are Agents for the Indian producers of the British Sulphate of Ammonia Federation, Limited, and we ourselves are unable to answer the questions that you have raised in this connection.

As regards the second paragraph of your letter, German fertilisers are shipped to India from the ports of Rotterdam, Hamburg and Bremen. In the case of Leunaphos, re-bagging is not ordinarily necessary.

The Burma Corporation, Limited, Rangoon.

(1) *Letter No. 863, dated the 30th November 1928, from the Tariff Board, to the Burma Corporation, Limited, Rangoon.*

The Tariff Board is at present enquiring into the claim of the Indian Chemical industry for protection and in this connection it is of great importance to ascertain how far the raw materials required for the manufacture of acids and heavy chemicals are available in India. The Board understands that the possibility of manufacturing sulphuric acid from zinc blende raised in Burma was investigated by your Corporation and that a proposal to instal a plant for the purpose at Jamshedpur had been for some time under consideration. I am directed to ask whether you will be good enough to furnish the Board with a detailed report on the subject, specially with reference to the following points :—

(1) Quantity of zinc blende available in Burma and the estimated annual supply.

(2) Amount of sulphuric acid which, if conditions were favourable, might be produced from a given quantity of zinc blende.

(3) Description of the process of manufacture which was under contemplation.

(4) Reasons for abandoning the proposal (kindly state how far the difficulties were purely technical and how far a matter of costs, marketing, etc.).

(5) How zinc blende is now disposed of.

(6) Other materials available in Burma from which the manufacture of sulphuric acid may be considered.

2. I am to invite your attention to the proposal now under consideration by the Tariff Board that a bounty should be granted in respect of the manufacture of sulphuric acid in India and to state that the Board will be glad to receive your opinion on the proposal.

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(2) *Letter dated the 22nd December, 1928, from the Burma Corporation, Limited, Rangoon.*

We are in receipt of your letter of 30th November, No. 863, and in reply, have to advise that, included in the affairs taken over by this Corporation from the Burma Mines, Limited, in 1919, was a project to erect a Zinc Smelting Works at Jamshedpur at which it was intended to manufacture Sulphuric Acid as a bye-product from the sulphur gases evolved in roasting the zinc concentrate.

We understand that the proposal emanated as a "war" project in discussion with, if not at the instance of, the Indian Munitions Board, over which Sir Thomas Holland presided, and that the intention was that the Government would render financial assistance towards the capital cost of the scheme and assist in the disposal of the main products from the plant beyond those required for local consumption in the works of Messrs. Tata and the secondary industries established by them at Jamshedpur.

The financial arrangements originally contemplated for the erection of the works failed to eventuate and, in the year 1920, having regard to the great cost of completing the works, the Corporation sought advice as to whether, in view of the changed conditions, the project was likely to be of a profitable nature.

Amongst other things, it was advised that—

(*a*) a suitable quality of zinc concentrate was not then being produced by the mine and, owing to the complex nature of the ore, might not be produced for several years, which was actually the case;

(*b*) the capital cost of the plant would be altogether out of proportion to the cost of similar plants in other parts of the world owing to the very high cost of steel work purchased in America and furnace material in India at boom prices;

(*c*) the location of the plant with respect to raw material from Burma and markets for finished products was very unsuitable, entailing heavy transport charges on all commodities used and produced;

(*d*) as far as could be ascertained, high class fireclays and bricks suitable for use in spelter furnaces were not procurable locally, and the risk of using an unknown clay for the manufacture of retorts was one which could not be contemplated. The special bricks for the spelter furnaces and retort clays would require, as a consequence, to be imported probably from Belgium which would make their cost prohibitive;

(*e*) the stamina of the labour available in India made it extremely doubtful whether it would be able to withstand the arduous conditions of work on the spelter furnaces and carry out its duties in an efficient manner with the exacting regularity of daily attendance which the process requires, particularly under the trying climatic conditions which prevail at Jamshedpur for the greater part of the year.

In view of the advice received and the breakdown in the financial arrangements before mentioned, which also affected the disposal of products, the Corporation decided to abandon the project and, in doing so, incurred a very heavy financial loss.

In reply to the points specially requested, we submit the following: —

(1) Our annual production of zinc concentrate at present is about 60,000 tons, as far as we know, it is the only production in the Province and we are not aware of any other possible source of supply.

(2) One ton of good quality zinc concentrate will produce approximately one ton of chamber acid or its equivalent.

(3) Hand-rabbled Delplace roasting furnaces. Chamber Acid Plant. Modern type high temperature Distillation Spelter Furnaces.

(4) Enumerated above. We are firmly of opinion that no project for the manufacture of Sulphuric Acid from zinc concentrate can hope to succeed as a commercial proposition except as an adjunct to a spelter plant in which its roasting is a necessary and important stage in the process.

(5) To European Smelters.

(6) None as far as we know.

Our interest in the manufacture of Sulphuric Acid is confined to its production as a bye-product in the manufacture of spelter from zinc concentrate, and recent further investigations into the possibilities of establishing a Zinc Smelting works in India have not enabled us to regard such as proposal as a commercial project.

Bombay Millowners' Association.

Letter dated the 8th December, 1928.

In accordance with your request I send you herewith six copies of the Report of the Technical Advisory Sub-Committee of the Bombay Millowners' Association, which report was accepted by the Committee on behalf of the Association's Members.

This I tendered in evidence on the 7th instant.

(COPY.)

No. of 19

THE MILLOWNERS' ASSOCIATION.

Bombay, the 17th November, 1928.

REPORT OF THE TECHNICAL ADVISORY SUB-COMMITTEE.

Subject:—Protection for Chemicals.

To the Committee.

In pursuance of a resolution adopted at a meeting of the Committee held on 20th August, 1928, the Technical Advisory Sub-Committee was requested to consider and report on the advisability of the Association supporting the application for protection made by Messrs. The Eastern Chemical Company and the Dharamsi Morarji Chemical Company in regard to the following chemicals:—

Sulphuric Acid.
Hydrochloric Acid.
Nitric Acid.
Magnesium Sulphate.
Ferrors Sulphate.
Potash Alum.
Aluminium Sulphate.
Sodium Sulphide.
Zinc Chloride.
Copper Sulphate and Glauber's Salt.

The Committee will also remember that, in making our report, we were requested to consider (1) whether the conditions governing the grant of protection as laid down in paragraph 97 of the Report of the Indian Fiscal Commission are satisfied in each case, and (2) to what extent if any, and in respect of what articles or class or description of articles, protection should be afforded, and how its recommendations, if any, will affect the industries using these articles.

We have carefully considered the main terms of reference, and are satisfied that, though the grant of protection by the imposition of protective duties to those chemicals specifically mentioned in the application will, to a certain extent, increase the cost of manufacture, such an increase will, in our opinion, only be negligible in view of the fact that the cost of such chemicals used in the industry is very small. In our opinion, therefore, the Committee should support the application for protection made by the Chemical Companies concerned, provided, of course, that the conditions laid down in paragraph 97 of the Report of the Indian Fiscal Commission are satisfied.

From the information at our disposal, we are not in a position to judge whether the industry applying for protection completely fulfils all the three conditions laid down in the Indian Fiscal Commission's Report, but we are of opinion that the development of chemical industries in India will ultimately confer certain advantages to certain indigenous industries using these chemicals.

Messrs. Shaw Wallace & Co

(1) *Letter dated the 6th December, 1928.*

SULPHATE OF AMMONIA.

We are in receipt of your letter No. 864, dated 29th/30th November 1928, and in reply thereto would give you the following information:—

Quantity of Sulphate of Ammonia produced in India during the last 5 years.

	Tons.
1924	12,555
1925	13,340
1926	14,555
1927	13,451
1928 (up to October)	12,657
	66,558

Quantity of Sulphate of Ammonia imported into India during the last 5 years.

	Tons.
1923-24	765
1924-25	200
1925-26	4,724
1926-27	1,680
1927-28 October	13,034
	20,403

In reply to the last paragraph of your letter, we can only say that the position as regards the increased consumption of Sulphate of Ammonia in India is portrayed by the imports over and above the quantities produced in India.

(2) *Note made by the President, regarding the cost of imported fertilisers at an informal interview with Mr. N. M. Vaughan, representing Messrs. Shaw Wallace and Company, in Bombay, on the 10th April, 1929.*

	£	s.	d.
Cost of superphosphate f.o.b. Dutch port	2	13	6
Freight	1	2	6
	3	16	0
= Rs.	51	0	0
Loss in weight (2 per cent.)	1	0	0
Landing charges, etc.	5	0	0
Rebagging charges	7	8	0
Importers' commission	7	8	0
Sub-agency charges	5	0	0
TOTAL	77	0	0

Cost of sulphate of ammonia includes in addition to c.i.f.—

(*i*) landing charges, etc., of Rs. 5 per ton;

(*ii*) importers' commission (Indo-Agri.) at 2½ per cent.

(*N.B.*—In the case of superphosphate and Ammophos, this commission is Rs. 7-8-0.)

In the case of Up-country sales—

(*iii*) sub-agency charges of Rs. 5 per ton,

(*iv*) freight,

(*v*) rebagging charges (where necessary).

(*N.B.*—Superphosphate would require rebagging.)

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(3) *Telegram No. 371, dated 6th May, 1929, from the Tariff Board, to Messrs. Shaw Wallace & Co., Agents, British Sulphate of Ammonia Federation, Limited.*

Please wire quantity of sulphate of ammonia produced in India in calendar year 1928, and average market price for last five years.

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(4) *Telegram dated 7th May, 1929, from Sulphammon (British Sulphate of Ammonia Federation, Limited), to the Tariff Board.*

Sulphate ammonia reference your telegram 6th May, total Indian members production, 1928, amounted to 15,082 tons. Average market price per ton acid quality 1924 Rs. 186, 1925 Rs. 177, neutral quality, 1926 Rs. 180, 1927 Rs. 174, 1928 Rs. 160, f.o.r. main ports.

Indian Merchants' Chamber, Bombay.

(1) *Letter dated the 28th November 1928, from Kapilram H. Vakil, Esquire, of the Okha Salt Works, Limited, to the Tariff Board.*

With reference to the request of the President for German Chemical Prices, I beg to give below the prices ruling in October 1928, which I have been able to obtain for you.

	Marks per 100 Kilogram.
Potash Alub Cryst., Meal	16¼
Potash Alum Cryst., Lump	16¾
Glauber's Salt Calc.	8½
Glauber's Salt Cryst.	4·30
Epsom Salt	4
Green Vitriol	5½
Magnesium Chloride	9
Aluminium Sulphate, 14—15 per cent.	11¼
Aluminium Sulphate, 17—18 per cent.	13

I regret I cannot get German authoritative quotations for the rest of the chemicals mentioned in the Resolution No. 199-T. (8).

The above quotations are for Chemicals sold in the open market in Germany, Hamburg, irrespective of their destination for inland or overland use.

(2) *Letter dated the 5th December 1928, from Mr. Kapilram H. Vakil, of the Okha Salt Works, Ltd.*

With reference to the President's request for a description of Sulphuric Acid plant, using gypsum as its raw material, I beg to give the following references:—

Chemical and Metallurgical Engineering, Volume 24, No. 9, March 2nd, 1921, page 391.

These Works at Oppau, Germany, were visited by me and I have seen very carefully the process that is carried out there.

A fuller description of the process and the plant will be available also from a description of the Sulphuric Acid plant belonging to Friedr D— Barger & Co., by W. J. Muller.

An article appears in Zeitung fur angewandte chemie 39,169-174.

V. Srinivasan, Esq., Madras.

Letter dated 18th July, 1928.

I desire to communicate to the Board the urgent necessity for bringing down the existing rates for acids and chemicals, especially in our railway rates. Acids that are of utmost necessity in the two important indigenous industries of Southern India, *i.e.*, dyeing and tanning, at least may be placed on the same level as kerosene oil which is classified under 4 R. R. and 2 O. R. as the existing classifications, *i.e.*, 8 and 6 are very much higher. Further uniform rates for any distance may be charged from Madras to all places up the metropolis. Further other chemicals manufactured in India should also be given better concessions in the rates. I give below my two letters that appeared in *The Hindu*, dated 19th and 24th April, 1928, in support of this and request you to place this before the Board and get a favourable consideration. I shall be quite willing to substantiate my statement orally if called upon to do so.

RAILWAY FREIGHT AND MEDICINES.

SIR,

It is indeed surprising to find very heavy freight rate being charged for medicines on Indian Railways. No argument is necessary to emphasise the fact that medicines are really more useful and are almost daily needed by all classes of people—rich and poor alike. But yet they are not given any concession and on the other hand they are charged at the highest rate allowed under the Railway Tariff rates. The Board have made eight classifications for general goods besides two more classifications for acids and explosives. The charges vary from ·38 pies per maund to 1·04 ps. per maund. Even the toilet requisites are grouped under class 6, *i.e.*, charged at 83 ps., while medicine are charged at 1·04 ps., which is nearly thrice that for rice or twice that for all other foodstuffs or half as much as that for biscuits, tinned provisions, etc. But this may not affect very much if the medicines are consumed at the place of production or even carried for short distances. It is seen from the Government import manifesto that nearly two crores worth of medicines are imported into India every year and it is also quite likely that at least half as much is manufactured within the Empire. And now all these quantities are carried from place to place throughout the length and breadth of this vast empire. Here it is worth while to note that nearly 23 people die every minute and it might be safely taken that at least 100 people suffer from some disease or other every minute. From this it can be seen what a great number of our people have to resort to medicines almost every minute. The absence of any chemist representative in any corporate

body may be reason for such difference of treatment regarding medicines and the few medical men in the councils are completely indifferent to the difficulties experienced by this class of business.

There is a provision in the classification that country drugs are charged at half rates, *i.e.*, under class 4. But the Railway authirities have put a curious interpretation that country drugs mean only herbs and roots and not their finished products. In the absence of clear definition for these, they are giving their own meanings and are always eager to get the maximum rate possible.

Now I appeal through the medium of your valuable paper to our sympathisers to make all possible efforts to remove such existing anomalies in the freight rate and this help the millions of consumers of medicines.

MADRAS;

V. SRINIVASAN.

RAILWAY FREIGHTS—MEDICINES.

SIR,

In continuation of my letter in the column of your paper which appeared on Thursday (19th) last, I desire to bring home to the minds of your readers that the present classification of goods for purposes of assessing rates on Indian Railways needs a thorough revision and the existing variations must be removed as early as possible. The very object for which such differences exist in rates, is completely overlooked in most of the cases. Things that are daily needed by all classes of people ought to be carried cheaper, besides raw products to places of manufacture and finished goods from such places of production must be given cheaper rates.

This is very rarely observed except in raw products that are exported from this country and in articles like biscuits aerated waters, boots, ale and beer, spirits and wines, preserves, periodicals and magazines, etc., that are consumed by the fortunate few; while local productions like piecegoods with lace or useful products like books, athletic appliances, medicines, surgical instrument are denied the advantages of cheaper conveyance charges. Some of the goods like ale and beer, lard, hair oil, preserves, piecegoods in bales are allowed a further concession of two classes cheaper if booked at owners risk. I think from the above facts the need for revision is quite apparent. I appeal through the columns of your valuable paper to the authorities concerned to take up the question and give this an early consideration.

V. SRINIVASAN.

Mr. A. N. Peston Jamas, M.A., B.Sc., Ahmedabad.

Letter dated the 21st January, 1929.

RATE ON BAUXITE ORE FROM BELGAUM TO AMBERNATH AND MATUNGA

I am interested as a mine owner to see my *Bauxite ore* being sold in the Chemical Factories. The main difficulty is the Railway Rate, inspite of my having ore of less Ferric contents for its use in the manufacture of *Alum Alum-cake*, etc.

The reduced freight from Belgaum to Ambernath is *Rs. 12* per ton over a distance of just over 300 miles (transhipment to be done at Poona). Whilst the freight on the Kapadvanj Bauxite (Killick-Nixon & Co.'s) from Kapadvanj to Bombay Harbour is *Rs. 5* or under over the same distance (transhipment at Kadiad, Bombay, Baroda and Central India). This

Bauxite is used for purification of Crude Oil by the Anglo-Persian Oil Company at Abadan.

I had asked the Dharamsi Morarji Chemical Company to place this fact before your Board and if they have done, I am certain it will have a place in your inquiry as to see for yourself that the Madras and Southern-Mahratta Railway and the Great Indian Peninsula Railway are not prepared to bring the rates to a parity with the Bombay, Baroda and Central India Railway.

Alum to the extent of *9,000 tons is imported* into India *plus* a certain amount of alum-cake, etc. To keep in competition Indian Bauxite should be sold cheap at Ambernath and Matunga, which I cannot do inspite of the high quality of the Ore. The quantity of Bauxite which can be used may be 3,000 tons per year. The main cause is the Railway Rates.

My actual cost on Belgaum Station is—

Mining	Re. 1 per ton.
Transport	Rs. 4 to Rs. 3 per ton.
Royalty	Re. 1 per ton.
Staff	4 annas.
Ground Rent at Station . .	4 ,,
Loading into Wagons . .	6 ,,
Extras	2 ,,

Rs. 7 or Rs. 6 per ton.

Cost at Ambernath—
Add—Rs. 12 per ton.

Total Rs. 18 per ton.

Of course on a steady demand of 2,000 or 3,000 tons per year it may be possible to reduce my transport charges by one rupee or one rupee eight annas in case I employ lorries and if they are allowed to be plied by the Belgaum Cantonment Board and Municipality. Total distance is 8 miles.

Therefore the main question is the Rates. In the light of the evidence before your Board tendered by the Railways your Board can see through the difference meted out to us and to Messrs. Killick-Nixon & Co. by the Bombay, Baroda and Central India Railway.

I forget to add that my figures mentioned above do not contain any portion for my own profit.

My ore contains—

58 per cent. average *Alumina.*
4 per cent. Maximum *Ferric Oxide.*
1 per cent. average *Silica.*

Your Board will therefore see that such ore available in India cannot be utilised locally for the manufacture of alum, etc., and therefore foreign stuff has to be imported.

Letter No. 116—117, dated 6th February, 1929, from the Tariff Board, to the Great Indian Peninsula Railway, and the Madras and Southern Mahratta Railway, Co., Ltd.

I am directed to forward the enclosed copy of a letter from A. N. Peston James, M.A., B.Sc., regarding the railway freight on Bauxite Ore from Belgaum to Ambernath and to say that the Board would be glad to be favoured with an expression of your views on the reasons for the very large difference in the rates from Belgaum to Ambernath and those from Kapadvanj to Bombay.

Madras and Southern Mahratta Railway Co., Limited.

Letter No. T/2410, dated the 11th March, 1929.

RATE FOR BAUXITE ORE FROM BELGAUM TO AMBERNATH.

With reference to your letter No. 117, dated the 6th February, 1929, and its enclosures, regarding the Railway freight on Bauxite Ore, from Belgaum to Ambernath, I have the honour to enclose a memo. showing the mileages and the maund mile rates as well as the ordinary Tariff rates for purposes of comparison. It will be seen therefrom that the ordinary through rate from Kapadvanj to Bombay, 316 miles is As. 7·2 per maund or Rs. 12-3-1 per ton working out to ·272 pie per maund per mile on the through distance.

The Bombay, Baroda and Central India Railway have quoted from Kapadvanj to Bombay, a special rate of As. 4·8 per maund and Rs. 7-15 per ton or a reduction of Rs. 4-4-1 per ton. This works out on the through distance to a rate of ·177 pie per maund per mile or a reduction of about 35 per cent.

The ordinary rate from Belgaum to Ambernath, a distance of 329 miles, was As. 11·8 or Rs. 19-13-7 per ton which worked out to ·426 pie per maund per mile on the through distance. This rate was first reduced to As. 9·9 per maund, and subsequently to As. 6·11 per maund or Rs. 11-12-3 per ton, or a reduction of Rs. 8-1-4 per ton. This rate is still in force and works out to ·252 pie per maund per mile or a reduction of 41 per cent. on the ordinary rate.

No traffic has, however, been carried at the present rate of As. 6·11 per maund, and the Great Indian Peninsula Railway have been asked to say if they are prepared to agree to quote a rate of As. 4·11 per maund on the through distance or Rs. 8-5-10 per ton. This rate works out approximately to the same maund mile rate as the Kapadvanj-Bombay rate.

On hearing from the Great Indian Peninsula Railway a further communication will follow.

BAUXITE ORE (AS ORES COMMON NOC) L.

Belgaum to Ambernath viâ *Poona.*

Miles.	Ordinary Tariff Rate.			Special reduced rate.		
	Per maund.	Per maund per mile.	Per ton.	Per maund.	Per maund per mile.	Per ton.
	Rs. A. P.	Pie.	Rs. A. P.	Rs. A. P.	Pie.	Rs. A. P.
245 M. S. M. 1st .	0 8 5	·412	14 5 1	0 4 8	·229	7 15 0
84 G. I. P. 1st .	0 3 3	·464	5 8 6	0 2 3	·321	3 13 3
329 .	0 11 8	·426	19 13 7	0 6 11	·252	11 12 3

BAUXITE ORE (AS ORES COMMON NOC) L.

Kapadvanj to Bombay viâ Nadiad.

Miles.	Ordinary Tariff Rate.			Special Reduced Rate.		
	Per maund.	Per maund per mile.	Per ton.	Per maund.	Per maund per mile.	Per ton.
	Rs. A. P.	Pie.	Rs. A. P.	Rs. A. P.	Pie.	Rs. A. P.
37 Guz. Rys. 1st .	0 2 1	·676	3 8 9	*0 1 1	·351	1 13 6
379 B. B. & C. I Sch. c/o.	0 5 1	·219	8 10 4	0 3 7	·154	6 1 6
316	0 7 2	·272	12 3 1	0 4 8	·177	7 15 0

*Rs. 30-8-0 per wagon of 16 tons.

Great Indian Peninsula Railway.

Letter No. 13389-H/217, dated the 4th June, 1929.

Re FREIGHT ON BAUXITE FROM BELGAUM TO AMBERNATH.

Your letter No. 116 of 6th February 1929.

I beg to state that the rates from Kapadvanj to Ambernath are as follows:—

	Rate per maund. Rs. A. P.
Kapadvanj to Bombay	0 4 8
Bombay to Ambernath	0 2 5
TOTAL .	0 7 1
Belgaum to *viâ* Poona	0 4 8
Viâ Poona to Ambernath	0 2 3
TOTAL .	0 6 11

2. The correct freight per ton from Kapadvanj to Bombay is, therefore, Rs. 8 and not Rs. 5 as stated in the enclosure to your letter.

3. We are not aware of the reasons that led the Bombay, Baroda and Central India Railway to quote a rate so much below the class rate (1st class). The rate from Belgaum to Ambernath is fixed on the same basis as other rates on the Great Indian Peninsula Railway which have been found suitable for the traffic.

4. The only argument advanced for the reduction of the Belgaum-Ambernath rate is that the distance is similar to that between Kapadvanj and Bombay, but it by no means follows that operating conditions are similar.

Messrs. Boeman and Karain Limited, Calcutta.

Letter No. I/376, dated the 28th February, 1929.

INCREASE OF DUTY ON RED LEAD DRY IMPORTED INTO THIS COUNTRY BY PAINT MANUFACTURERS.

We have read the memorandum submitted to you by Messrs. D. Waldie and Company, Limited, and as Red Lead is one of the products, which vitally affects our industry, and as protection for this particular product is demanded by Messrs. D. Waldie and Company, we must at once lodge our emphatic protest against such protection being granted to Messrs. D. Waldie and Company.

Our reasons for protesting against this claim are as follows:

(1) Messrs. D. Waldie and Company have so far not manufactured red dry having a lead peroxide content of 33-34 per cent. The maximum Pbo_2 contents of the Indian Red lead has never exceeded 25-27 per cent.

(2) This kind of red lead is not at all economical in use. Careful investigations have proved that a red lead having a PbO_2 content of less than 32 per cent., gives 25 per cent. less bulk of paint manufactured, owing to its very low oil absorbing properties. Further a red lead of less than 32 per cent. PbO_2 contents, is not fit for the manufacture of paints, as the paint so made rapidly settles hard at the bottom of the keg, and the paint becomes absolutely unfit for any further use.

(3) We would not object to duty being increased on the ordinary setting quality of red lead imported into this country similar to what Messrs. D. Waldie and Company are manufacturing, as we firmly believe that red lead of this type is of no economic value to this country.

(4) The duty if granted would prevent large consumers like the Government, Public and other Corporate Bodies, using the refined non-setting quality of red lead paint manufactured by us, and as Messrs. D. Waldie and Company are not in a position to manufacture this improved quality of red lead dry, their claim for protection cannot be entertained.

(5) The position of our industry is such that we have to import most of our pigments and colours from foreign countries, and the present duty of 15 per cent. *ad valorem* is already affecting our industry to a considerable extent, and we are not in a position to compete successfully with the imported paints or enamels. If duty is increased on red lead or any other dry colours, a corresponding increase of 45 per cent. on the duties must be made on the imported paints or enamels.

(6) If contrary to this protest protection is granted to Messrs. D. Waldie and Company on red lead dry, and no alternative increase of duty is fixed on the imported paint, most of the large consumers will be compelled to import the ready made paint from England and the Continent, and the protection granted will not help the Indian manufacturers of red lead at all.

(7) Further this protection might place large paint manufacturers in this country absolutely in the hands of monopolist, and as the present manufacturers of dry red lead are not in a position to supply a suitable grade of red lead to the paint manufacturers of this country, the protection, if granted, will only help to pay a little more dividend to the share-holders of the Company seeking this protection at the expense and cost of the paint manufacturers and large consumers, like the railways, port trusts, public and other large industrial corporations.

(8) We are further of opinion that in view of all the raw materials being available in this country, it should be possible for Messrs. D. Waldie and Company to manufacture an ordinary grade of red lead dry at much more economical prices than the imported article.

Given equal prices for the raw materials and equal abilities in management, the foreign exporter is at the following disadvantages:—

(1) He has to pay about £3 per ton on freight.

(2) He has to pay his local agents at least 5 per cent. commission.

(3) He has to bear an additional 20 per cent. on duty, clearing, landing, river due, transport, and other charges, and if in spite of all these expenses the local manufacturer is not in a position to compete, we could only suggest that recosting and profits should be reascertained before protection is granted.

Letter No. 194, dated the 2nd March, 1929, from the Tariff Board, to Messrs. D. Waldie and Company, Limited, Konnagar.

I am directed to forward the enclosed copy of a letter from Messrs. Boeman and Karain, Limited, protesting against the proposal to increase the duty on Red Lead dry imported into India, and to say that the Tariff Board would be glad to be favoured with an expression of your opinion on the contents of this letter, especially the allegation that Indian red lead is not suitable for the manufacture of high grade paints.

Messrs. D. Waldie & Co., Ltd.

Letter dated the 10th March, 1929.

With further reference to your No. 194 of the 2nd instant enclosing copy of letter No. 1/376, dated 28th February, 1929, from Messrs. Boeman and Karain, we have the following observations to make on their remarks.

1. This is correct. This Company has so far not made non-setting Red Lead for sale. What we manufacture at the moment is Red Lead to conform to the specification of the Indian Stores Department for Red Lead.

The I. S. D. specification for Red Lead is given under, compared to Waldie's average.

	I. S. D.	Waldie.
	Per cent.	Per cent.
Peroxide of Lead	25·1	26/27
Fineness (percentage remaining on sieve of 40,000 holes per sqr. inch).	1·5	0·2
Insoluble (in nitro-oxalic acid) . .	0·5	0·4
Soluble (in water)	0·3	0·1

The I. S. D. specification is based on the British standard specification of which we enclose a copy.

2. Assuming for the sake of argument, that the "Classic" type of Red Lead is not so economical in use as the new non-setting variety of Red Lead we would observe—

(*a*) Red Lead is not used on the grounds of "economy in use", but to protect those structures and buildings, such as bridges, whose cost may run into crores of rupees, and whose life is liable to be shortened very considerably by rust.

Were "economy in use" the chief desideratum in a paint, engineers would no doubt prefer iron oxide or Barytes or one of the many cheaper paints on the market.

(*b*) For more than 100 years Red Lead has been used as the paint as a first coat iron, and it has been known that however hard it may become with age it becomes neither brittle nor scales off.

A case is on record where two paintings of Red Lead, of three coats each, have preserved a structure for 45/50 years free from rust.

The tests of the United States and other Navies, merchant marines, and of many Railways have shown that Red Lead was superior to all other paints for protecting iron, and Red Lead has been used by Engineers all over the world for preserving valuable structures for a century, and has been standardised by Government after Government during that period.

The Red Lead on which this great reputation has been built up, is the "Classic" or setting type of Red Lead; and this good repute is not due to easy brushing powers or economy in use, but to its rust preventing properties.

The British Standard specification of which we enclose a copy is for the "Classic" or setting variety.

(c) The difference in the behaviour of these varieties is believed to be due to the percentage of litharge in the classic variety, which forms a definite chemical compound with the oil, and to this, the remarkable properties of the Classic Red Lead are attributable.

This renders the classic variety unfit for mixing with oil and selling as a mixed paint, as it remains liquid only for about 14 days, long enough however for ordinary purposes when it is mixed "on the job".

As a consequence paint manufacturers are making great efforts to introduce the non-setting type as they can make the extra profit on this as a paint by saving the Engineer the trouble of mixing his paint "on the job". Another advantage which accrues to some paint makers is that they can mix the non-setting with other pigments, and sell their mixture under a patent name.

(d) The chemical reason for the effectiveness of the Classic type, is as stated due to the percentage of litharge present.

A considerable amount of research work has recently been done to determine in what lies the excellence of Red Lead of the Classic variety as a protective coat for the iron, and the chemical reactions have now been established to be as follows:—

(1) Oxidation of the Linseed oil linoxyn.

(2) Neutralisation of the free acid by the lead pigment.

(3) Hydrolysis of the Linseed oil by the lead, compound, affording glycerol and lead linoleate.

(4) Reaction between the *litharge and glycerol* rapidly to form the solid compound C_3H_5 (O. PbOH) 30.

(5) Neutralisation by the lead compound of the mono or diglycerides present or formed in the drying process.

(6) Neutralisation of the Acetic Acid or Formic Acid formed in the drying process.

The particular reactions relevant to the superiority of the "Classic" Red Lead are No. 3, showing the formation of glycerol, and No. 4 showing the immediate reaction between the litharge and glycerol.

The presence of the hygroscopic glycerol so formed unless neutralised, constitutes a danger to the effectiveness of the "Antirust" properties unless a considerable proportion of litharge is present, because lead peroxide and minimum react not at all or only very slowly with the glycerol and leave it, being insoluble in the oil but soluble in water to weaken the paint film through which the moisture and CO_2 from the air may gain access to the metallic surface which it is sought to protect, and start the destructive oxidation of the iron.

In this the glycerol must play a double part, as owing to its hygroscopic nature it attracts moisture in the initial stages, until it is itself washed out by rain.

(*f*) A practical proof of the correctness of the theoretical considerations set out above is strikingly illustrated by the fact that the Engineers of the Metropolitan Board of Water and Sewers in the State of Massachusets, United States of America, actually stipulate that for the Red Lead paint for the interior of stand-pipes and conduits, *about 10 per cent. of* litharge shall be added to it in order to make a surface which will stand up to the exacting conditions obtaining in such situations.

(3) In view of the history of the Classic type of Red Lead for the last century it is, we submit, incorrect to state that its manufacture is of no economic value to India.

In this connection we would state that we have sold many thousands of tons of Railways and Engineers in India and to paint makers of repute such as Messrs. Jenson and Nicolson, who we understand have the largest and most up-to-date paint works in India to-day. That Company alone has purchased over two thousands tons of Red Lead from us in recent years.

We therefore submit that the case for non-setting as being equal to the Classic type is nonproven, in as much as the new avariety has not yet stood the test which time alone can give, and which the next 20 years should discover.

We think that, where large and expensive structures are at risk, Engineers will for many years prefer to take a certainty rather than a chance.

Thus for instance if we consider the case of a bridge costing say 1½ crores of rupees and containing 18,000 to 20,000 tons of structural steel, the cost at to-day's prices of 3 coats of Red Lead of the Classic variety would be approximately 1 lac of rupees, more or less, say 0·6 per cent. of the value of the bridge an expenditure occurring once in 15 to 20 years. This is approximately 0·04 per cent. per annum on the value of the bridge; surely a small premium to pay for the safety of the structure and as a guarantee against cost of replacement.

The "economy in use" possibly to be gained by painting with the "nonproven" or non-setting" variety, amounting to 20 per cent. of 0·04 per cent. per annum on the value of the structure, will we submit, not tempt Engineers, until, as before mentioned, the test of time has definitely placed the non-setting on the same basis as the Classic.

In the meantime there is no doubt a demand for the "non-setting" Red Lead mixed as a paint for structures of less importance than the instance cited above, or where owing to local circumstances it may not be feasible to mix the paint on the job.

We note that Messrs. Boeman and Karain state that our claim for protection cannot be entertained.

5. We regret we are unable to understand the reason given for a 45 per cent. protection on paints containing Red Lead, as the Linseed oil the chief other ingredient, is indigenous to India as also is Turpentine.

6. We presume that if protection were to be granted to Red Lead it would include Red Lead dry as well as Red Lead ground in oil, this would appear to dispose of the argument contained in this paragraph.

7. Any protection would place purchasers of Red Lead in the position of being able to purchase more favourably in India, but the imported article would, we presume, not to be debarred; there would therefore be no question of monopoly.

8. We note Messrs. Boeman and Karain's remarks but have no comment, since the matters dealt with are all, we think, within the terms of reference of the Tariff Board.

We would finally add that to meet the demand for the non-setting we have already installed plant for producing it, and hope shortly to be in a position to place it on the market as soon as this plant can be got into working order.

If protection is granted we should certainly produce the non-setting variety to meet the requirements of the market and of paint makers at the earliest possible moment.

Letter No. 214, dated the 8th March, 1929, from the Tariff Board, to the Superintendent, Government Test House, Alipore.

I am directed to forward a copy of the correspondence noted below, and to request that the Tariff Board may be favoured with an expression of your opinion regarding the suitability of Indian red lead for the manufacture of high grade paints:—

(1) Letter from Messrs. Boeman and Karain, Ltd., No. 1/376, dated the 28th February, 1929.

(2) Letter to Messrs. D. Waldie & Co., Ltd., No. 194, dated the 2nd March, 1929.

(3) Letter from Messrs. D. Waldie & Co., Ltd., No. 1046/8102, dated the 5th March, 1929.

Government Test House, Alipore.

Letter No. 12731, dated the 11th March, 1929, from the Superintendent, Government Test House, Calcutta.

Subject:—RED LEAD.

Reference your letter No. 214, dated 8th March 1929.

Two varieties of red lead appear on the market:—

(1) Ordinary red lead, the traditional product, yielding on analysis usually about 25 per cent. to 28 per cent. of lead peroxide.

(2) Non-setting red lead, a modern product, yielding on analysis generally 32 per cent. or more of lead peroxide.

As the theoritical yield of lead peroxide is nearly 35 per cent. (*i.e.*, in the case of a chemically pure red lead) the difference between the two qualities is a question of purity. Non-setting red lead is considerably purer than the ordinary variety. Owing to its greater purity this variety of red lead can be used for making ready mixed paints. Ordinary red lead cannot normally be used in this way since it sets hard in a short time. Ordinary red lead is always mixed with oil immediately before use.

The claims of Messrs. Boeman and Karain and of Messrs. D. Waldie and Company are both in their respective ways correct. The only variety of red lead of use to a paint manufacturer is non-setting red lead. On the other hand ordinary red lead is in frequent use for painting structural steel. There is no evidence that this variety of red lead is in protective qualities in any way inferior to non-setting red lead. On the contrary, what is required is evidence that non-setting red lead is equal to ordinary red lead. The reputation of red lead is based on the experience of generations of engineers who have used red lead of the ordinary variety and it is too early to say whether the non-setting red lead is equally useful. Non-setting red lead on its side has the considerable practical advantage that it can be used in the ready mixed form and stored in this form without hardening. It has also greater spreading powers.

I am therefore of the opinion that both varieties of red lead are commercially valuable. Both are in considerable demand and I am not at all inclined to support Messrs. Boeman and Karain's suggestion that ordinary red lead has no economic value in this country.

It is correct that Messrs. D. Waldie and Company have up to the present only manufactured ordinary red lead.

If a protective duty were placed on ordinary red lead only, I doubt whether the industry would be materially benefited. The result would presumably be a decrease in the imports of ordinary red lead balanced by an increase in the imports of non-setting red lead. If a protective duty were placed on all dry red lead, Indian paint makers, as distinct from the red lead makers, would be harmed since they require non-setting red lead as a raw material.

Protection to the Indian red lead industry would therefore seem to imply a duty not only an ordinary red lead but on non-setting red lead and on all paints and enamels containing red lead.