The Chemical Age

A Weekly Journal Devoted to Industrial and Engineering Chemistry

VOL. XXVIII. January 21, 1933 No. 708

Notes and Comments

Boots' Drug Deal Hitch

ON Thursday of last week it was officially announced that negotiations had been completed for the purchase by British interests of the £1,125,000 shares in Boots Pure Drug Co., held by the United Drug Co. of America at a market value of some £8,000,000 odd. While THE CHEMICAL AGE was being printed, however, the deal was suspended on account of the intervention of the Treasury, and it has since been stated that the transaction is remaining in abeyance on account of the embargo on issues entailing the export of capital abroad. The circumstances of the proposed transaction were unique in that the object was the acquisition by British investors of the controlling interest in an old established British enterprise, and the objection raised by the Treasury has been the subject of widespread comment during the past week. It appears to have been the intention of the British purchasers of the shares to make a new issue to the public of some four million 5s. shares, and although in these circumstances the re-sale of the shares would not have been technically a foreign issue, the Treasury's interpretation was that the matter would have been at variance with the embargo on "foreign issues," i.*e.*, issues on behalf of borrowers domiciled outside the Empire or issues the proceeds of which would be remitted directly or indirectly to countries outside the Empire."

It is questionable whether Britain would not have been better off in the long run with the constantly accruing financial results of its native control of a profit-earning asset than with the immediate retention of the capital payment involved. The proceeds of British enterprise, however, are still to go abroad. Commenting on the Treasury's attitude, the "Financial News" says: "In some quarters it is held that technical exchange difficulties had probably less to do with the Treasury attitude than 'high politics.' The Treasury objection, it is argued, was less a matter of some £7,000,000 leaving the country than an objection to its leaving at a time when America is being told that Britain cannot pay any more War Debt. Even this tactical objection, it is thought, should not cause the Government to force British nationals into the crying off from a perfectly legal bargain."

Overseas Trade in 1932

WITH the issue of the Board of Trade returns for December we are able to review the trend of Britain's overseas trade during 1932 in its proper perspective. Taking the figures as a whole, there was an improvement in the country's visible trade balance of £121,895,000, the excess of imports over exports falling from £408,976,000 to £287,081,000. The improvement was due entirely to a reduction of imports, for the aggregate exports, instead of showing an increase, revealed a further slight decrease of £25,483,000. Imports were reduced from £862,175,000 to £703,133,000. They were restricted by two powerful factors, the tariff and the depreciation of sterling, which made foreign goods more expensive to buy, especially from gold countries.

It should be noted that a depreciation of one-third in the value of the pound increases the cost of imports not by 33⅓ per cent. but by 50 per cent. The two factors in combination were so large that they could not fail to make an impression upon the trade balance. Exports of British goods gained by the depreciation in the pound, since British goods were cheaper for gold currency countries to buy by the amount of the depreciation. Consequently the drop in exports of British goods was only from £389,164,000 to £365,138,000. Re-exports show in proportion a much heavier fall—namely, from £64,035,000 to £50,914,000. The re-export trade would suffer inconvenience to some extent from the tariff, while, of course, it would receive no advantage from the depreciated pound, since the re-exported goods would cost 50 per cent. more to import with a 33⅓ per cent. depreciation in the pound.

Improved Chemical Situation

COMPARED with other industries, the chemical industry fared moderately well during the past year, although the volume of trade represented by the figures was not so great as might have been hoped. In examining the figures prepared by the Board of Trade, it has to be borne in mind that statistics may be used to prove almost anything. We have to take the figures as we find them and draw our own conclusions. As we interpret them the chemical manufacturers of this country have exported just under £360,000 worth more products during the past twelve months than they did in 1931, and this country purchased about 4¼ million pounds' worth less chemicals from abroad than in the preceding year. To what extent the British manufacturer benefited by supplying chemical products at home to make good that decrease in imports there is no evidence to show, but allowing for the general depression in trade and the consequent shrinkage in the demand for chemicals, it is safe to assume that at least a part of the difference has been met by increased business on the part of the home manufacturer.

The chemical trade balance was decidedly better than in 1931. Imports in December, at £875,495, showed a decrease of £337,458 from the figure for

December, 1931, and a decrease of £261,737 from December, 1930. The imports for the twelve months totalled £9,578,482, a decrease of £4,263,188 compared with 1931 and a decrease of £3,992,906 on 1930. Exports in the last month of the year totalled £1,477,994, showing a welcome increase of £155,435 on the corresponding month of 1931, but a decrease of £41,430 on December, 1930. The full year's exports amounted to £17,377,524, representing an increase of £359,685 on the total for 1931. This encouraging result, however, was still £4,580,952 short of the total in 1930. Analysing the returns for the three years we find that the balance of chemical exports over imports in 1932 was £7,799,042, or £588,046 short of the balance of £8,387,088 recorded two years ago. In 1931, however, the balance had dropped by £5,210,919 to the low figure of £3,176,169, so that the latest return represents a recovery of some £4,622,873 on the year. We venture to hope that this year the industry will not only wipe out the deficiency as compared with 1930, but will show a substantial improvement on the year's turnover.

Coke Oven Gas in Chemical Industry

THE paper given by Mon. J. E. Osterrieth before the Institute of Fuel, as reported on pp. 45-47, merits a great deal more attention than its modest title would ordinarily attract. The post-war expansions of the synthetic ammonia industry took advantage of surplus coke oven gas as a cheap source of hydrogen, which is recovered by one or the other of the well-known liquefaction processes. It was soon realised that the residual gas had a higher intrinsic value than corresponded to its calorific power so that a new branch of the synthetic chemical industry developed, of which evidence is given in Mon. Osterrieth's paper.

The efforts of Belgian and French research have already produced a considerable number of compounds, but the range of products obtainable is almost unlimited owing to the flexibility of plant and processes. Those who belittle the success achieved in this direction probably forget that the "chemist" is a wizard, who adjusts himself quickly to changes of conditions and markets. Has it not been said that the organic dye industry catering for human needs in peace time is a potential arsenal immediately available in time of war? It is too early to gauge fully the potentialities of the relatively young industry of organic synthesis which is being built up on coke oven gas as the raw material. If no other outlet can be found for it, it has a relatively low price, which as stated in the discussion on the paper, is only equal to twice that of solid fuel on the thermal basis. Alcohols, like their derivatives, are used in many branches of industry and can command also a place among fuels, although it would seem that products of the "Censine" synthesis of Franz Fischer are more promising in this particular sphere, as the whole gamut of aliphatic compounds can be produced by a variation of operating conditions and the selection of suitable catalysts. It is, of course, difficult to foresee the extent to which this combination of chemical and fuel industry is likely to develop. One thing, however, seems certain; it would provide a relief for those in the coke oven industry, who seek a profitable disposal of their surplus gas. Although operations at coking plants in France and Belgium are not of small magnitude,—the liquefaction plant at the Société Belge de l'Asote deals with 350,000 cu. ft. of coke oven gas per hour—they are not of such dimensions that the possibilities of developing chemical plant in conjunction with moderately sized coking plants of 1,000 tons daily capacity is precluded. Naturally, it is not suggested that new synthetic ammonia plants should be created, when the world is already suffering from over-production, but hydrogen is useful for other purposes and if cheaply produced may assist in establishing hydrogenation processes on a sound economic basis, apart from supplying the initial material for the synthesis of organic compounds.

Events in Chile

FOLLOWING upon the liquidation of Cosach, an important statement regarding the re-organisation of Chile's nitrate policy, has been made by Señor Ross, the Chilean Finance Minister. The Anglo-Chilean and Lautaro companies, it is announced, will be able to continue independently, each company being responsible for its own debts and receiving what is due to it. The Chilean Government, for their part, will sponsor a national company which all other companies will be at liberty to enter for co-operation in the production of nitrate, and the shares will be apportioned on the basis of participation in the old Cosach concern. Old debts incurred by Cosach, however, are to be annulled. A second national company, also sponsored by the Chilean Government, will devote its activities exclusively to trading in nitrate, and will acquire nitrate from the first mentioned company at the "industrial cost" figure.

The profits of the trading company are to be equally divided between the State and the producers. Companies unwilling to enter this arrangement will have to pay export duties, but the Chilean Government will refuse to permit further exportation of nitrate for the benefit of third parties to pay debts contracted by a private company. So much for the present complications. It is reassuring to learn from Señor Ross that all Cosach bonds sold in London, New York and other centres (whose proceeds were received by the Chilean Government and Cosach) will be completely free of risk and investors' rights will be amply respected. A statement to this effect has since been confirmed by the Chilean Ambassador in London, following upon an inquiry made by London issuing houses which have handled the Cosach bonds.

German Hydrogenation Industry

New Activity to follow Changes in Control

IT is reported in the "Chemiker-Zeitung," January 7, 1933, that the Dusseldorf firm of Henkel and Cie has acquired a majority interest in the Deutsche Hydrierwerke of Charlottenberg-Rodleben. This change, which has been brought about by the purchase of the large share holding of the Gesellschaft für Teeverwertung, is expected to result in increased activity in the exploitation by the soap interests of the higher fatty alcohols and their sulphonates. It is of significance that the linking-up of an important detergent manufacturing concern like Henkel and Cie with the German hydrogenation industry follows close on the heels of a similar development in the United States where the newly founded Gardinol Corporation represents a fusion of interests in the sulphonated alcohol field between Proctor and Gamble (the leading soap manufacturers) and the du Pont concern.

Organic Compounds from Coke Oven Gas

Applications of High Pressure Gas Reactions

The following extracts are taken from a paper read before the Institute of Fuel on January 11, when members of the Chemical Society, the Society of Chemical Industry, the Institution of Petroleum Technologists and the Coke Oven Managers' Association were present. The joint authors of this paper were Mon. J. W. Osterrieth, of the Societe d'Ougree-Marihaye, Belgium, and Dr. George Dechamps. Professor G. T. Morgan presided.

IN industry, high pressure gas reactions are carried out in specially designed containers, charged with a catalyst, which are enclosed in externally or internally heated tubes capable of withstanding pressures varying from 100 to 1,000 atmospheres (1,470 lb. to 14,700 lb. per sq. in.), according to the process. The gas for the synthesis has a definite composition and circulates through the reaction tubes at the required temperature and pressure. Up to this point all the different processes are similar, but differ from here in various aspects. In certain processes, the gases remaining uncombined after the reaction are recirculated with the addition of fresh gas over the catalyst. In other processes, such as that of Claude, the circulation pump can generally be dispensed with. The gaseous mixture only passes once over the same catalyst, which, however, is placed in a number of reaction tubes arranged in series with similar condensers and separators between them.

In order to avoid the use of an excessive number of reaction tubes in series, it is necessary to operate under suitable conditions and at high pressures. Consequently, the composition of the gaseous mixture must be so adjusted that all its constituents combine in the course of the synthesis and that no compressed gas is lost. For this reason the following facts must be borne in mind, when it is contemplated to use a gas rich in CO, as obtained from the hydrogen plant, for the synthesis of methanol: (1) For the synthesis a process with open circuit must be chosen, because of the nitrogen which accompanies the carbon monoxide; (2) the gas must be enriched with hydrogen, so that its composition corresponds to ($CO + 2H_2$) according to theory; (3) much of the nitrogen is needlessly compressed.

Conversion of Methane

In order to obtain a gaseous mixture with its constituents in equilibrium, the gas rich in carbon monoxide coming from the hydrogen plant must be diluted with at least three times its volume of hydrogen The mixture then consists of 8 per cent. CO; 18 per cent. N_2; 71.5 per cent. H_2 and 2.5 per cent. CH_4. From 10,000 cu. m. (350,000 cu. ft.) of coke oven gas treated 500 cu. m. (17,650 cu. ft.) of this mixture is obtained; 5,800 cu. m. (208,750 cu. ft.) of hydrogen remain for the synthesis of ammonia by the usual process. Under these conditions, about 45 kg. (99 lb.) of methyl alcohol can be produced. The efficiency of converting carbon monoxide into methyl alcohol is of the order of 80 per cent., the unconverted carbon monoxide being transformed into methane in the purifier tube, preceding those used for the synthesis of ammonia.

In order to produce methanol in greater quantities, it is possible to draw on other sources for carbon monoxide and hydrogen. The synthesis can be carried out with water gas, as practised by the Société Franco-Belge d'Ougrée at their works at Bully les Mines (France). If one starts, however, from coke oven gas, it is necessary to convert the methane, the largest constituent in this gas next to hydrogen, into carbon monoxide and hydrogen. It is well-known that when methane is exposed to high temperatures it is cracked and yields hydrogen. According to operating conditions, the carbon of the methane can be partly or totally dehydrogenated. In the first case, unsaturated and benzenoid hydrocarbons are obtained; in the second, finely divided carbon is produced, as in the production of lamp black. If hydrogen or gases for high pressure syntheses are the objective, the liberated carbon must be oxidised, with the view to forming carbon monoxide or carbon dioxide, whereby, incidentally, blockages through carbon are avoided.

Industrial Installations

The Gesellschaft für Kohlentechnik at Dortmund-Ewing has made the production of pure hydrogen its main objective, and incidentally obtains a mixture of hydrogen and nitrogen ($3H_2 + N_2$) for ammonia synthesis. The process developed by this concern converts all the methane with water vapour, any CO formed being converted into CO_2, which is removed by absorption. In practice, excess of oxygen is always necessary, and pure oxygen is used, when pure hydrogen is to be obtained. Air is employed when it is intended to produce a mixture for the ammonia synthesis. Purified coke oven gas is taken as raw material, in order to obtain mixtures richer in hydrogen.

Other companies, such as the Société Courrieres-Kulhlmann have had the synthesis of methanol in view and produce a mixture 33 per cent. CO, and 66 per cent. H_2. Here coke oven gas serves as raw material, the conversion being effected according to the equation :—

$$CH_4 + H_2O = CO + 3H_2.$$

The Société d'Ougrée-Marihaye has aimed to produce as cheaply as possible a gas which would be suitable for the successive synthesis of methanol and ammonia. At first the gas fraction rich in methane, from the hydrogen plant, was used; later purified coke oven gas was taken, so that the liquefaction could be dispensed with. At Ougrée it is necessary, however, to produce a gas of correct composition, having a carbon monoxide content of about 12 per cent. Several reasons demand this composition. In the first place, there is the desire to obtain an appreciable yield of methanol, without causing the production of ammonia to suffer; in the second place there is the fact that the higher the concentration of carbon monoxide, the lower the nitrogen content the consequently the greater the addition of oxygen to the air used. It must also be remembered that the synthesis of methanol is facilitated by a large excess of hydrogen in relation to the carbon monoxide present.

The cracking plant consists essentially of a reaction chamber made of fire-bricks, where the purified and preheated coke oven gas with a small addition of water vapour, is oxidised with superheated air charged with oxygen coming from a high temperature metal heat exchanger. As the gas still contains some methane at the outlet of the reaction chamber, it passes over a suitable catalyst when still at a high temperature, whereby the conversion is completed. After passage through the heat interchanger the gas is scrubbed and stored in a gas-holder. As a result of the catalyst employed, it is possible to reduce the reaction temperatures to about 800° C., so that heat interchangers constructed of special metal can be used, which work on a continuous cycle and eliminate completely the risk of explosion. The plant functions perfectly and works for more than 1,000 hours without requiring inspection or replacement of the catalyst.

Other Methane Derivatives

Up to the present, the conversion of CO and CH_4 into alcohol and more particularly into methyl alcohol has been considered. In actual practice, several higher alcohols (propyl and isobutyl) are produced simultaneously with methanol, but the quantity obtained does not exceed 10 per cent. of the total alcohol produced. Other syntheses can be visualised, using methane as the primary material. In laboratories, particularly in Germany, the chemical value of these gases has been studied from the point of view of producing gaseous or liquid hydrocarbons. Up to the present, however, the researches have not led to any practical application. Among the different products which have been obtained by the chemist from methane, acetylene is particularly interesting, because of its numerous practical applications and the chemical derivatives to which it leads.

The known methods for the conversion of methane into acetylene can be classed into three categories: (1) Methods employing an electric arc; (2) those using an electric discharge; and (3) purely thermal processes. The electric processes capable of industrial application must produce acetylene, with an expenditure of electric energy less than that required for the manufacture of the corresponding

amount of calcium carbide. The calcium carbide industry has been brought to such perfection that to-day one kg. of carbide consumes less than 3.5 kWh (1.5 kWh per lb.), which corresponds to 12.6 kWh per cu. m. (0.357 kWh per cu. ft.) of acetylene. The process employing an electric discharge reaches approximately this figure, but it requires a vacuum of the order of 0.05 atmosphere (0.735 lb. per sq. in.) and a complicated plant. Altogether, the superiority of the carbide process does not justify the creation of a new industry. The thermal process, on the other hand, has a claim to industrial application, and it is surprising that it has taken so long before its industrial realisation has been attained. The reason can be found in the equilibrium curves between methane and its decomposition products, which show the conversion of methane into acetylene is best carried out at temperatures ranging from 1,200° C. to 1,500° C., and that unless suitable means are adopted all the acetylene produced at these temperatures is dehydrogenated down to the stage of carbon.

Hence, two great technical difficulties have to be overcome, namely, the instantaneous production of high temperatures, and the rapid cooling of the gas after the reaction, but the Société Franco-Belge d'Ougré has solved this problem.

The gas rich in methane is preheated to a temperature of 800° C. in the presence of water vapour, before being admitted to the reaction chamber. The part played by the water vapour is that of preventing the formation of carbon, both during the pre-heating stage and the pyrolosis. The high instantaneous temperatures which are necessary for the conversion of methane into acetylene are obtained by the injection of a predetermined quantity of oxygen into the reaction chamber, where it combines with a part of the methane, forming CO_2 and CO. Under these conditions the process operates with a time contact of the order of 1/100,000 sec., so that at a temperature of about 1,600° C., a gas up to 8 per cent. of acetylene is obtained. From 35 to 40 per cent. of the methane is thus converted into acetylene, and practically the whole of the remaining methane is converted into carbon dioxide, carbon monoxide and hydrogen.

Utilisation of Gas Rich in Ethylene

More than a century ago, an English chemist, Henry Hennell, showed that olefines can be absorbed by sulphuric acid, forming esters, which can be converted into alcohols or ethers by hydrolysis. In recent years, the chemical industry has employed these reactions for the production of ethyl alcohol. The industrial application of the process has not suffered from great intrinsic difficulties. The absorption efficiency, the prevention of pitch formation, the regulation of temperatures, etc., have been the object of detailed studies by the Companie de Béthune in France, which can claim the honour for having made the process a practical proposition. The process such as it exists in practice consists of three successive operations. In the first place there is the absorption of the gas, which is compressed at 10 atmospheres (142 lb. per sq. in.), and washed in a series of towers with concentrated sulphuric acid maintained at a predetermined temperature, through a special device. The second stage is the saponification of the ethyl hydrogen sulphate. After dilution with a certain quantity of water and the separation of pitch, it is admitted to a lead-lined plate column heated with live steam. The regenerated sulphuric acid leaves the still at the bottom, whilst the alcohol vapour escapes at the top and enters the condenser after having passed a neutralising column. The third operation is the rectification of the alcohol.

In the installation erected at Ougrée (Belgium) the efficiency of the absorption of olefines exceeds 95 per cent., so that about one litre of concentrated acid is consumed per one litre of alcohol produced. After the hydrolysis of the alkyl hydrogen-sulphate, the resultant dilute acid is used in the manufacture of ammonia sulphate. The alcohol produced has a strength of more than 50° G.L., but it unfortunately contains oily impurities and appreciable quantities of isopropyl alcohol and ethers.

Synthesis of Acetone

It must be noted that it is practically impossible to completely separate isopropyl alcohol from ethyl alcohol. If pure ethyl alcohol is to be obtained, the propylene must be separated from the ethylene, before the latter is absorbed in sulphuric acid. The process started by the Société d'Ougrée Marihaye consists of the selective absorption of propylene in the first scrubbing tower, kept at a low temperature and fed with sulphuric acid already containing a definite amount of ethyl hydrogen sulphate. The alkyl hydrogen sulphates extracted from the first tower are complex products, which give on saponification, vapour rich in isopropyl alcohol. The final treatment of these vapours presents a difficult problem, because the isopropyl alcohol is still accompanied by ethyl alcohol, ether and different impurities. It occurred to the Société d'Ougrée-Marihaye to utilise these vapours for the synthesis of acetone.

This attempt has been entirely successful, owing to the discovery of poly-metal catalysts, which are particularly stable at the relatively low temperatures employed so that the products resulting from the saponification can be used without any final purification. The operation consists of a simple conversion carried out at about 400° C., in the vapour phase, the principal reaction being represented as :—

$$2CH_3.CHOH.CH_3 = 2CH_3.CO.CH_3 + H_2.$$

A certain portion of the ethyl alcohol is also converted into acetone according to the equation :—

$$2CH_3.CH_2OH + 2H_2O + CH_3.CO.CH_3 + CO_2 + 4H_2.$$

After the condensation of the vapours and the separation of the gas formed by the reaction, a liquor with a rather low acetone content is obtained, which also contains dimethyl-acetone, ether, ethyl alcohol, acetaldehyde, apart from different ketones and other substances. The distillation of these somewhat complex products would appear to be rather difficult, but is carried out in one operation, which produces direct an acetone of B.G.S. standard.

It is noteworthy that the synthesis of acetone can also be carried out with gas rich in acetylene obtained by the pyrolysis of methane, to which reference has been made

Unlimited Range of Synthetic Products

So far only organic products have been discussed which can be extracted by present day technical processes from coke oven gas, and in particular from fractions obtained in the course of the liquefaction of this gas when used for the ammonia synthesis. There are other products, of course, such as ethylene glycol, ethyl chloride, ethanolamines, etc., which up to the present, have been manufactured from other raw materials. Already, however, with basic products such as methanol, acetylene, ethyl alcohol and acetone, the field of organic synthesis becomes almost unlimited. Methanol is converted into formol (formaldehyde) and its derivatives, tri-oxy-methylene, hexamine, synthetic resins, etc. From acetylene can be produced, apart from acetone, acetaldehyde, metaldehyre, acetic acid and acetate solvents. Acetone can be rehydrogenated to isopropyl alcohol or converted into diaceto-alcohol and other solvents.

To make chemical synthesis successful, the raw material must be obtainable at a low price, and production must be on the largest scale; also large markets for the products must be found. Their use as fuels suggests itself as the most natural outlet. Alcohols have anti-detonating properties and prevent carbon deposits, characteristics which are not common to ordinary motor spirit. If synthetic alcohols cannot be produced at a price equal to that of petrol, they can still be marketed below the selling price of the latter in most countries, where there is a heavy import tax on motor spirit. Apart from the question of agricultural subsidies or the protection of a national industry, it is possible to-day to consider the use of alcohols as a means of improving motor spirit.

Points from the Discussion

The chairman (Professor G. T. Morgan), after congratulating Mon. Osterrieth, asked for information concerning the nature of the catalysts which had been used in the various chemical processes. Those concerned with the high-pressure work at the National Physical Laboratory at Teddington had had to work with pure carbon monoxide and pure hydrogen, and had used the Patart catalyst. Where the zinc chromite reagent was used, one obtained a very large conversion of carbon monoxide into methyl alcohol—about 99 per cent.—and little or no methane; but when the catalyst was mixed with another, which might be a cobalt chromite, or another catalyst containing iron, although there was a complex mixture of alcohols, including ethyl alcohol, this formation of ethyl alcohol was nearly always accompanied by considerable quantities of methane. In the experiments

described in the paper the sulphur was disposed of at the outset, but even the sulphur in the gas could be used, under certain conditions, as the basis for producing some organic products, such as thiourea and synthetic resins.

Dr. G. W. ANDERSON, who welcomed the paper as one of outstanding merit, by reason of the facts disclosed in it, said that this particular industry, which had been so highly developed in Belgium and France—apart from some work in Germany—had been shrouded in mystery, and a good deal of secrecy had been preserved. The Société Belge de l'Azote was a subsidiary undertaking of the Société d'Ougree-Marihaye, the well-known iron and steel concern, on whose premises the works were situated. During the reconstruction period after the war the iron and steel works had found themselves with a good deal of surplus blast furnace gas, and then coke oven gas, on their hands. The Société d'Ougree-Marihaye and other works in the neighbourhood of Liege had gone in for synthesis, in the first place of ammonia, and later had developed the utilisation of what the Germans called the "Restgas," *i.e.*, the residual gas remaining after separating the other fractions, which residual gas was formerly sent back to the coke ovens or steel furnaces and had had only a fuel value. The work which Mon. Osterrieth was connected turned out about 150,000 tons of ammonia sulphate, or the equivalent of 30,000 tons of ammonia per annum, but the units were sufficiently small to come within the compass of medium size coke oven batteries of, say, 60 ovens. The Société l'Air Liquide which exploited the Claude processes abroad, provided units for 5, 15 and 35 tons of ammonia per day respectively. A battery of from 60 to 100 ovens would be quite capable of running a process of synthesis, not necessarily ammonia synthesis, economically, and when one saw the compactness and smallness of the plant used for this production one would realise that the Claude process had much in its favour. He also drew attention to the method of purification adopted as final purification of the gases after compression. The gases were subjected to a pressure of 20 atmospheres, or 300 lb. per sq. in., and passed through a series of towers. The first vessel extracted benzol, the following carbon dioxide and hydrogen sulphide, then ammonia was extracted by water, scrubbing followed, and finally there was a series of drying towers in which caustic soda was used.

The Methanol Ammonia Ratio

Dr. W. R. ORMANDY asked whether it was possible to vary the methanol ammonia ratio between comparatively wide limits, but the essence of the process described in the paper was the simultaneous production, in one operation, of methanol and ammonia, and, unfortunately, both products were a drug on the market. He could not imagine what the feelings of I.C.I. would be if all the coke oven owners began to produce methanol, with a plant capacity to produce five times as much as there was a demand for. It would be necessary to convince the steelworks owners that the costs of the processes described were competitive before similar plants would be put up in this country. He, personally, was interested most in the part of the paper dealing with the conversion of ethylene, propylene and butylene into the corresponding alcohols by means of a process which he ventured to submit would shortly be an antiquated and out-of-date process, *i.e.*, the utilisation of sulphuric acid. It was a process which was, of course, economic and capable of being used in any place where it was not necessary to re-concentrate the sulphuric acid, but to venture to start a plant the object of which was to produce methanol and ethanol and the higher alcohols, and then to have to build an ammonia plant big enough to use the sulphuric acid, would not appeal to most chemical engineers. In fact, there had been evolved processes whereby these unsaturated bodies were converted catalytically in the dry state into the corresponding alcohols, the yields being sufficiently high to justify the statement that the life of the sulphuric acid processes was limited.

Mr. TAYLOR, who had been concerned with the production of alcohols from carbon monoxide and hydrogen at the Chemical Research Laboratory, Teddington, under the direction of Professor Morgan, said it gave one great confidence to hear from Mon. Osterrieth that, whatever process was worked out in this connection, there would be no lack of raw material. He was led to understand that some work had been carried out in America on the production of higher alcohols from carbon monoxide and hydrogen, and though he was not aware that higher alcohols were produced on a large scale by the company in question, he was led to understand that they could produce isobutyl alcohol and propyl alcohol economically if they wished—by which he meant economically for the purpose of solvents, and not as fuel. He asked if work had been done on the Continent on the production of these alcohols.

Dr. R. LESSING said that, knowing the reputation of the company with which Mon. Osterrieth was associated, we might fairly leave it to them to take care of the economic side of their own business. On the technical side we had to consider that the work which had been done by the Ougree Company on the Continent, by the I.C.I. in this country, and by a number of smaller concerns in other countries, had definitely shown that in a very short time it was possible to create an entirely new aspect of one particular phase of industry. All this work was started only after the war—apart from the work of the I.G. on ammonia synthesis—so that within a very short time it had been found possible to work out a technique entirely different from anything known before, and to prove that by working at high pressures it was possible to manipulate materials with the greatest ease and with greater facility than that with which it was possible to manipulate gases under ordinary pressure. Until these processes had become the vogue a great many inventors had claimed that it was of the greatest advantage for any process to be worked at little above atmosphere pressure.

Economics of the Problem

Mr. O. W. ROSKILL, discussing the economics of the problem, said that to his knowledge there were only five plants making synthetic methanol or alcohols from coke oven gas at the present time, out of a total of 40 plants making synthetic nitrogen from coke oven gas. There were two reasons for this. In the first place, by far the greater part of the world output of synthetic methanol, for instance, was made from water gas—probably between 65 and 75 per cent. It should be remembered that practically every nitrogen plant had a considerable proportion of surplus capacity, and the ease with which methanol could be produced instead of ammonia in an ordinary Haber-Bosch convertor from water gas made the latter a very favourably placed competitor of coke oven gas, since extra capital expenditure was needed for the production of methanol in a coke oven gas nitrogen plant. In the second place, the markets for these organic products were at the moment very limited. Methanol was perhaps in the best position, since the growing output of synthetic resins had maintained a strong demand for formaldehyde. But the oxidation of methanol to formaldehyde was by no means so simple a process as might appear, and considerable difficulties had been experienced in Bethune. The position as regards ethyl alcohol was often governed more by political than economic considerations. At the moment, undoubtedly, the most hopeful line lay in the manufacture of acetone and other secondary products, as was being done at Ougree, but it would be interesting to know whether the Belgian market could absorb the entire Ougree output if the plant were worked to capacity, let alone any produced by the eight other nitrogen plants. As to the use of alcohol in motor fuel mixtures, he had estimated that some 20 million gallons were used throughout the world in this way, compared with a petrol consumption over 1,000 times greater, but the compulsory mixing regulations on which the use of alcohol was based were designed to help agriculture, and in most European countries there would be no difficulty in producing alcohol up to 20 per cent. of the petrol consumption, from vegetable raw materials.

Mon. OSTERRIETH, replying to the discussion, said that the catalysts used for the synthesis of methanol at Ougree were of the chromite-zinc type; those used for the synthesis of CO and H_2 from methane were of the nickel type, activated with rare earths. The last catalysts spoken of, for acetone, were of the salt type, salts of iron and alkaline earths, which were resistant to high temperatures, and were also activated with metals of the rare earth series. He could not discuss the economic aspects of the problem extensively at this stage, but, dealing with the question as to the price of coke oven gas, he said it was found that the B.Th.U. in the gas was about twice as expensive as the B.Th.U. in coal.

Company Registrations at Somerset House

A Record Total in 1932

DURING the whole of the period from 1862 to 1931, in which limited liability companies have been registered, the number of registrations in England only once exceeded 10,000 — in the great "boom" year, 1920. Incredible as it may seem, 1932 has beaten that record, the number for the past year being 10,204, against 10,065, the figure for 1920. Immediately, one is impressed by the fact that of last year's 10,204 new companies, less than the odd 204 (ignoring "guarantee" companies) were "public" concerns, the remaining 10,000 or so being by their very constitution prohibited from offering any shares or debentures to the public.

The following figures are extracted from the annual statistical report relating to new companies registered in England during the year ended December 31, 1932, published by Jordan and Sons, Ltd., company registration agents, Chancery Lane, London, W.C.2.

Classes.	Public Companies.		Private Companies.		Totals.	
	Number Registered.*	Capital. £	Number Registered.	Capital. £	Number Registered.	Capital. £
Cement, etc. ..	—	—	85	339,365	85	339,365
Chemicals ..	7	401,100	521	6,257,989	528	6,659,089
Engineers ..	2	51,250	558	2,114,113	560	2,165,363
Glass and Pottery ..	2	325,000	74	307,710	76	632,710
Leather ..	—	—	101	399,440	101	399,440
Metals ..	3	463,000	122	936,669	125	1,401,669
Miscellaneous ..	17	208,500	282	369,505	299	578,005
Oil	—	—	72	1,310,855	72	1,310,855
Rubber ..	4	147,050	74	406,660	78	553,710
Other classes ..	220	16,260,558	8,060	39,903,732	8,280	56,164,290
Totals (for year 1932) ..	255*	17,858,458	9,949	52,346,038	10,204	70,204,496
Corresponding figures 1931	276	12,726,321	8,109	45,493,435	8,385	58,219,756
Corresponding figures 1930	328	45,800,535	8,082	57,924,827	8,410	103,725,362
Corresponding figures 1929	623	156,192,157	8,049	73,375,965	8,672	229,568,122

* In this column are included 84 "Companies Limited by Guarantee" and "Associations Not for Profit" without share capital, such companies being technically public however small the membership may be.

Embargo on New Issues

In the 1920 "boom" 1,203 companies—roughly 12 per cent. of the total number—were "public" (including "guarantee" companies). In 1932, only 255—about 2½ per cent.—belonged to that category. In 1920 the total capital of all the companies registered reached the stupendous amount of £568,894,382, and roughly three-fifths of this (£337,352,389) was attributable to "public" concerns; but in 1932 the total was only £70,204,496, of which only about a quarter (£17,858,458) represented "public" companies. It is here that the figures for 1932 reflect the commercial poverty, the lack of confidence, and the lack of opportunity (for there was practically an embargo on new issues) which characterised the year. The registration of *public* companies (apart from reconstructions) has been almost "stagnant."

Comparing the figures with 1931, we find the total number of companies up by 1,819, and the total capital up by £11,984,740. Public companies show a decrease of 21 in number, but an increase of £5,132,137 in capital. Private companies show increases in both directions (1,840 in number and £6,852,603 in capital). The tabular statement gives the totals for 1930 and 1929. In those two years also the number of registrations was over 8,000, but in 1930 the capital totalled about 103¾ millions, and in 1929, 229½ millions.

The investment, finance and banks groups shows the highest aggregate nominal capital among the groups in the tabular statement. The total (£10,229,593) shows a big increase over that for 1931 (£5,319,749), but this is due to three companies with exceptionally large capitals. Shipping companies (the second group in point of capital) also show a large increase on the previous year, the amount being £7,203,500, compared with £1,396,900 in 1931. This increase is solely due to the registration of the "Royal Mail" and "Elder Dempster" concerns, with capitals of £4,000,000 and £2,500,000 respectively, both being reconstructions.

The next largest group capital, "Chemicals, £6,659,089," owes its big jump from the previous year's total (£1,190,845) to the £4,992,900 of the I.C.I. (Explosives), Ltd. An interesting company in this group is Wright, Layman and Umney (1932), Ltd. (£340,000, public).

Only seven companies were incorporated during the year with capitals of £1,000,000 and upwards, four of these being "private." The details are:—

*Robert Fleming and Co., Ltd. ... £1,005,000 (Investment)
*Philip Hill and Partners, Ltd. ... £1,000,000 (Investment)
*I.C.I. (Explosives), Ltd. ... ... £4,992,900 (Chemicals)
British Tin Investment Corporation, Ltd. ... ... £1,250,000 (Investment)
Royal Mail Lines, Ltd. ... ... £4,000,000 (Shipping)
Elder Dempster Lines, Ltd. ... £2,500,000 (Shipping)
*Mosul Oil Fields, Ltd. ... ... £1,000,000 (Oil)

* Private Company.

Two 1932 companies have penny shares. The first object mentioned in the memorandum of association of a certain pharmacy company is to carry on the business of alchemists. The promoters of "Hale's not Dale's, Ltd.," evidently do not intend to leave the avoidance of confusion in titles to the tender mercies of the registrar. The title of Captain Davis' Anti-Dora Campaign, Ltd., sufficiently indicates its militant object. Fen Research, Ltd., is formed to explore any locality for the recovery of articles to be found therein, and sugggests that treasure hunts are not to be confined to the ocean bed and uninhabited islands.

Forest Products Research

Improved Facilities for Tests on Timber

THE Report of the Forest Products Research Board for 1931, issued by the Department of Scientific and Industrial Research (H.M. Stationery Office, price 3s. 6d. net), refers to the improved facilities available for large scale investigations into dry rot and the death watch beetle made posible by the completion of the new experimental building erected at the laboratory at Princes Risborough. The report refers to the difficulties encountered in carrying out satisfactory tests of the efficiency of various insecticides intended to destroy the death watch beetle. A difficult problem which has not yet ben solved is that of determining the effect of an insecticide intended to destroy insects living at various depths within the timber. Owing to the possibility of selecting samples of wood known to contain living insects it has been possible to carry out tests of insecticides on death watch beetles themselves. The future development of accurate and reliable laboratory tests of insecticides for use against wood-boring insects depends not only on the provision of standard material, but also upon information on the penetration of liquids and gases into timber and upon chemical studies of insecticides suitable for the control of wood-boring insects.

This report also describes improvements in the design of seasoning kilns, new apparatus for the determination of humidity in the kilns, and a method of employing the photo-electric cell in the study of the wood structure by using it to measure the percentage of empty space in the intersecties of a timber, due to its cell structure. Apparatus is also described which determines the gloss of a machined surface by measuring the amount of light scattered or reflected from it. Another instrument measures the finish on a surface by recording the frictional resistance experienced by dragging a standard metal plate over the surface.

During the year 689 specimens of structural timber were tested, while 3,470 test pieces cut from a material free from knots, etc., were submitted to almost every conceivable mechanical test. Tests on physical properties, etc., numbered over 9,500. A total of 4,800 specimens treated in various ways with eight wood preservatives, including low temperature tar and its distillates, have been exposed for test and are being kept under constant observation.

Manufacture and Dyeing of Cotton and Rayon Materials

The Past Year's Technical Developments

COLOURED woven and knitted materials containing rayon, with or without the presence of other fibres, are now being produced to a degree of excellence not hitherto known. This excellence of production has largely been attained during the past year. In earlier times manufacturers of yarns and fabrics from the older fibres such as cotton, wool, and real silk were assured by rayon producers that rayon could only be regarded as a supplementary fibre and that in no way was it likely that rayon would displace the older fibres. The producers of a new product, however, are irresistibly obliged to exploit all its commercial possibilities to the utmost, and what product has more potential possibilities than rayon? Thus rayon is definitely taking the place of the older fibres in the manufacture of many types of textile material, and further displacement is inevitable.

The public taste in dress and other materials has been more and more standardised and stabilised in favour of rayon, in spite of the fact that all types of rayon suffer from one or other of a number of defects. If these defects could be eliminated then the consumption of rayon would increase by leaps and bounds. The general defects are lack of strength (particularly in the wet condition) and lack of resistance to creasing. Each type of rayon has its own peculiar defects. Acetate rayon is deteriorated by alkaline treatment and hot ironing, viscose rayon has somewhat too high a lustre and cannot be satisfactorily delustred, whilst cuprammonium rayon is difficult to dye satisfactorily when present in certain mixture materials.

Increase of Tensile Strength

Most rayon manufacturers realise that an increase of tensile strength can be attained by one or both of two methods. In the first, it is necessary to minimise the degradation of the cellulose during its conversion into rayon, and in the second method use is made of the fact that stretching of a rayon filament whilst in a plastic condition increases its strength. These facts apply to all types of rayon. The highest strength viscose rayons are producible by the Lilienfeld process which was " much in the news " some five years ago (British Patents 274,521 and 274,690) when it was reported that Courtaulds, Ltd., paid £250,000 for the rights to work it. This process largely depends on stretching the rayon whilst in a parchmentised plastic condition during its spinning into a bath containing a high concentration of sulphuric acid. Since the discovery of that process, a limited amount of Lilienfeld rayon has been made and used in the manufacture of fabrics which have proved durable in wear. During the past year a number of alternative stretch processes have been patented: most of these (British Patents 376,768, 379,604 and 361,760) use strong sulphuric acid coagulating baths as in the Lilienfeld process but with other modifications, and it is found necessary in certain instances to improve the otherwise poor extensibility of the stretched rayon by a special shrinkage after-treatment (British Patent 379,791). Stretch spinning processes for cellulose acetate rayon are described in British Patents 358,512, 358,501, and 370,430, and it is found possible to effect a stretching of up to 900 per cent., which is much more than is possible with viscose or cuprammonium rayon.

Degradation of cellulose raw material occurs at all stages in the manufacture of viscose rayon and one method for reducing this degradation consists of eliminating the ripening process. It is found that viscose solutions made in this manner (British Patent 362,460) have a high viscosity and yield high tensile strength rayon. In general it may be stated that rayons spun from high viscosity spinning solutions (whether viscose, cuprammonium, or acetate) have a high tensile strength. Another line of attack in connection with this strength problem is that of depositing tenacious cementing substances within the fully formed rayon. This has not yet received much investigation but recent discoveries, particularly the Tootal anti-crease process, indicate that substantial success is possible by such a method. Further support for this view is to be found in the discovery (British Patent 364,904) that the addition of 10 per cent. of rubber, in the form of latex, together with a protective colloid, such as casein or glue, to viscose solutions results in the production of a high strength rayon. It therefore remains for future research to indicate the most suitable cementing agents for this purpose.

Recently it has been discovered that liquid ammonia may play a useful part in textile treatment, and according to British Patent 374,791 it is possible to increase the strength and elasticity of viscose rayon by steeping it in liquid ammonia and then removing the ammonia by suction. Some four years ago methods were discovered (British Patents 295,488, 323,307 and 295,062) by which fabrics containing viscose or cuprammonium rayon could be satisfactorily mercerised without deleteriously affecting the rayon. These involved the use of caustic potash instead of soda, and washing the alkali-impregnated fabric with brine or boiling water instead of cold or merely warm water. W. Marshall (British Patent 363,883) now finds that it is sufficient to wash out the alkali with a 5 to 10 per cent solution of soda ash in order to preserve the rayon. This process has the advantage that the soda ash is recovered in the wash liquors and is thus converted into caustic soda in the usual causticising process applied to the recovered liquors.

The difficulty of mercerising or otherwise treating viscose and cellulose rayons with caustic alkali is that the rayon swells excessively in such treatment, so that after removal of the alkali the collapsed rayon has a much decreased tensile strength and is harsh in handle. G. Saito (J. Soc. Chem. Ind., Japan, 1931, *34*, 437) has examined the swelling and cross sections of viscose fibres and concludes that maximum swelling occurs in approximately 10 per cent caustic soda; as the alkali concentration is increased the swelling decreases rapidly. The length changes in caustic soda solutions, but it must be remembered that A. J. Hall (J. Soc. Dyers and Col., 1929, *45*, 99) has pointed out that the greatest changes occur not whilst the fibre is immersed in the alkali liquor but when it is afterwards washed and dried. In general, all investigations on this swelling of viscose rayon agree that the maximum occurs in 10 per cent caustic soda. F. Bogoiavlenski and S. Novikov (Bumazhnaya Prom., 1930, *9*, No. 7, 23) have found that maximum solubility of the cellulose in bleached poplar pulp also occurs in 8 to 12 per cent caustic soda or potash.

Action of Caustic Soda

The action of caustic soda on cotton in the presence of oxygen is of importance in the manufacture of viscose rayon for, in an early stage of the manufacture, the alkali-cellulose is aged by exposure for two or three days at room temperature to air. Under these conditions it suffers partial degradation so that it can the more readily be converted into cellulose xanthate by treatment with carbon disulphide. Ageing is essentially a process of oxidation and this has now been fully investigated by G. F. Davidson (J. Text. Inst., 1932, *23*, 95T). Davidson finds further support for the theory of Birtwell and others (J. Text. Inst., 1930, *28*, 85T) that the oxidation of cellulose consists of several consecutive reactions in so far as he has found that the rate of absorption of oxygen by cellulose in contact with alkali increases for some time and then becomes practically constant. The rate of absorption varies with the concentration of alkali, there being a rapid increase from 2.5 to 5.0 N. NaOH and a less rapid increase up to 10 N. NaOH. The presence of iron much assists the oxidation process; other metals such as copper and nickel are less effective. Pre-alkali-treated cotton oxidises more rapidly than does ordinary cotton. Davidson's investigations are likely to have application in the kiering and mercerising of cotton goods as well as in the manufacture of viscose rayon.

In the past G. E. Holden (J. Soc. Dyers and Col., 1929, *45*, 205) has shown that the surface of cotton fabrics may be oxidised excessively in singeing, and recently he has returned to this aspect of the preparation of cotton fabrics for dyeing. Holden now finds that in singeing (J. Soc. Dyers and Col., 1932, *48*, 253) the surface of a cotton fabric may become coated with a superficial layer of oxycellulose and that in subsequent processing this layer may be unevenly rubbed by off friction between the fabric and the various machines and guiding devices through which it passes in scouring and bleaching Since oxycellulose has scarcely any affinity for direct cotton dyes, it is obvious that those parts in which the oxycellulose has been removed by the rubbing, regain their original affinity

for direct dyes whilst the remainder of the fabric tends to resist dyeing. In this manner streaky dyeing can occasionally be accounted for. Holden recommends that such defective fabric should be dyed with Janus dyes since these have partly basic and partly direct dyeing characteristics, and as is well known, whereas direct dyes are resisted by oxycellulose this same substance strongly attracts basic colours. It may also be noted that rubbing of cotton fabrics against the side of a kier may, according to W.F.A. Ermen (J. Soc. Dyers and Col., 1932, *48*, 254) lead to subsequent uneven dyeing.

Novel Printing Methods

The colouring of cotton and rayon materials is of considerable importance and during the past year substantial progress has been made in perfecting available processes. Colouring is effected by either dyeing or printing processes and it would seem that more novel methods have been developed in printing than in dyeing. H. Bradenburger (Kunstseide, 1932, *14*, 261) has dealt with the best methods for dyeing in solid shades almost all types of rayon and rayon mixture fabrics and his articles are worth the attention of all practical dyers. In particular, Brandenburger gives lists of various dyes which can be applied under specified circumstances, that is, hot or boiling, with or without the presence of soap, etc., so that he indicates how the most satisfactory dyeing can be secured on most types of material in demand to-day. C. M. Whittaker (J. Soc. Dyers and Col., 1932, *48*, 27) has described some difficulties experienced in the dyeing of viscose yarn, especially with fast to light colours such as the Chlorantine LL dyes. In this connection Whittaker has developed a new test for determining whether or not a direct dye is likely to dye unequal grades of viscose rayon evenly. It consists essentially of dyeing together, over a series of increasing temperatures, two types of viscose yarn each of 150 denier but one containing 36 filaments and the other 21. These dyes, which cover up irregularities in viscose easily, give deepest shades on the 150/36 yarn at low temperatures and deepest shades on the 150/21 yarn at high temperatures: the lower the temperature at which this changeover occurs the more level dyeing is the dyestuff.

In printing, several new processes have been devised for cellulose acetate rayon. The essential difficulty in printing acetate rayon is that it does not readily absorb aqueous solutions, and thus impregnation with a printing colour or assistant is somewhat slow. To overcome this it is convenient to include in the printing paste organic substances which have a swelling or solvent action on the rayon. According to British Patent 375,313 it is satisfactory to use a solvent which is readily volatile so that during the preliminary drying this solvent is removed, thereby leaving the rayon in a very absorbent condition; suitable solvents include ethyl lactate, methyl and ethyl glycol mono-acetates, and dibutyl tartrate. A typical printing paste using this process consists of :—

S.R.A. dye	10 to 40 parts.
Thio-di-glycol	60 to 80 ,,
Ethyl lactate	200 to 600 ,,
Gum Arabic solution (50 per cent.) ...	400 to 600 ,,
Water	160

The slow absorptive powers of acetate rayon also require the necessity of prolonged steaming in order to fix discharge colours and under these conditions there is a tendency for the discharging agent to diffuse beyond the printing parts and so cause them to be surrounded by a coloured halo. This defect may be overcome by a method described in British Patent 369,572. Discharging agents are usually of an oxidising or reducing character. Thus after printing the discharge paste and steaming for a short period to allow its action to be completed, the fabric is further overprinted with a solution of a substance of opposite character to the discharging agent. When the discharging paste is an oxidant then the overprinting solution should be of a reducing character, and vice-versa. Solutions of sodium perborate and sodium bisulphite are suitable substances for use in overprinting when the discharge paste is reducing (stannous chloride) and oxidising (sodium chlorate) respectively.

Swelling Agents

Ethanolamine is a useful swelling agent for use in printing acetate rayon (British Patent 351,056) and is especially useful in printing with the water-insoluble dyes derived from nitro substituted diphenylamines (British Patent 222,001). This substance is a weak alkali which has no definite solvent action on cellulose acetate and is therefore quite safe to use. A novel overlap method for printing acetate rayon fabrics is described in British Patent 376,334, in which discharge pastes containing different discharging agents coloured with suitable resistant dyes are printed on a coloured ground so that they overlap. In this manner it is possible to secure coloured discharges not only on a coloured ground but also simultaneously on a previously printed coloured discharge. Two types of discharging agents suitable for use in different discharge pastes are stannous chloride and zinc formaldehyde sulphoxylate.

Fast colour resists may be obtained by first printing acetate rayon fabric with a paste containing an aromatic nitro compound (nitrobenzene-meta-sulphonic or nitro-toluene-sulphonic acid) and a suitable colour and thickening, then steaming, and further overprinting with a vat dye paste; the vat dye is resisted by those parts printed with the aromatic nitro compound (British Patent 376,331). From a communication by W. Taussig (Textilber., 1932, *13*, 482) it appears that viscose rayon has an affinity for certain acid colours such that they can be used satisfactorily for printing this type of rayon. Taussig gives a list of 17 suitable acid dyes; the shades obtained by printing have quite good fastness to soaping and rubbing. It is claimed that a green shade of exceptional brightness on viscose rayon can be secured by first mordanting with Katanol ON and then dyeing with a mixture of Alkali Fast Green 10G or 3G and Brilliant Indocyan G in the presence of acetic acid.

Hitherto the printing or dyeing of a velveteen fabric consisting of an acetate rayon pile with a cotton backing has required two separate operations—the dyeing of the cotton and the dyeing of the acetate rayon. The process may now be simplified (British Patent 365,132) by the ingenious use of an alkaline solution of viscose or other type of regenerated cellulose as described by G. E. Holden (J. Soc. Dyers and Col., 1931, *47*, 222). Viscose rayon is dissolved in an 8 to 12 per cent. solution of caustic soda or potash and then printed over the acetate pile surface of the velveteen fabric. This has the effect of partially hydrolysing the acetate rayon without impairing its lustre so that dyeing in solid shades in one operation can then be carried out using direct cotton dyes.

Hollow Viscose Rayon

The partial success which has attended the production of hollow viscose rayon (Celta rayon is the best known variety) has probably inspired the similar attempts which are now being made to produce a similar type of acetate rayon. Hollow viscose rayon is manufactured by first aerating a viscose solution before spinning or adding to it substances which react in the spinning bath to liberate carbon dioxide in the freshly coagulated filaments, but this method does not appear to be well adapted to the production of hollow acetate rayon. According to British Patent 372,835 a voluminous or hollow acetate rayon is formed by spinning a solution of cellulose acetate in the usual solvent (acetone) but also containing a special coagulant (for example, a hydrocarbon of boiling point not less than 60 C. and which is higher than that of the solvent) and applying this coagulant also to the filaments immediately after their extrusion from the spinning jet maintained at a temperature less than the boiling point of the coagulant but higher than that of the solvent. In this manner filaments are produced containing residual coagulant which after removal leaves a hollow filament. Somewhat similar processes are described in British Patent 377,712. Hollow acetate rayon may be produced by spinning the acetate solution through tapered spinnerettes of special dimensions (British Patent 353,041), the amount of taper being regulated by the viscosity of the solution.

The advantages of hollow acetate rayon are that it has greater warmth and gives greater cover (on account of its lower density) when used in woven and knitted fabrics. In the case of viscose rayons the densities or ordinary and hollow types are approximately 1.50 and 1.35 respectively. But it appears possible to produce hollow acetate rayons having much less density. H. Schupp (Kunstseide 1931, *13*, 424) describes such a hollow acetate rayon having a density of only 0.80 and having a tensile strength of about 1.2 to 1.3 grams per denier. The rayon described by Schupp has been prepared on a large scale by a Kohorn process which forms

the subject of British Patent 314,534. In this process a spinning solution of cellulose acetate in acetone is employed but to this is added about 30 per cent. of a suitable precipitant so that as each filament issues from the spinnerette it immediately become covered with a thick but elastic skin and further evaporation of the acetone from the interior of the filament results in a stretching of this skin whereby a lumen or hollow core is formed. The addition of the precipitant must be adjusted to ensure the formation of this elastic skin, otherwise no lumen would be formed. The following is an example of the composition of a spinning solution which yields hollow acetate rayon :—

Cellulose acetate	1.0 kg.
Acetone	4.0 litres.
Alocohol	0.5 ,,
Benzene	0.5 ,,

The advantage of such a process is that it can be carried out at the ordinary spinning temperature (about 65° C.). Further the lustre of the rayon is diminished roughly in proportion to the size of the lumen, and during the past two years low lustre rayon has been in universal demand.

Uncreasable Products

An event of importance last year was the announcement by Tootal, Broadhurst, Lee and Co., Ltd., that they had reached a successful conclusion to several years' effort to discover a process for making cotton and rayon materials non-creasable. The process consists of forming suitable formaldehyde resins (British Patents 291,473 and 291,474) within the fibres, such resins being cheap, colourless, and of a very stable character so that they resist prolonged washing. Not only does such treatment make the textile material (the process is not applicable to acetate rayon or animal fibres) non-creasable but it confers greater strength. Viscose rayon, which has been rendered non-creasable, has a higher strength in both wet and dry states, so that it is much more durable when made into garments and dress goods.

A number of methods for raising the safe ironing temperature of acetate rayon materials have been devised. These involve a limited amount of saponification of the rayon (British Patent 369,586) which may be followed by loading with tin or other salts (British Patents 372,129 and 374,049) Such treatment changes of dyeing properties of the rayon but it has the advantage of increasing the safe ironing temperature from about 200 C. to 180 to 200 C.

During the past year rayon has been largely used in the production of many types of crepe fabric and for this purpose it appears to be especially suitable. There is a tendency to use acetate rayon in such materials on account of its soft handle and delustring properties, but since this type of rayon cannot satisfactorily be made into crepe yarns having a high degree of twist, it becomes necessary to use cotton or viscose twist yarns to obtain the crepe effect. The popularity of crepe materials seems to be increasing so that this year should witness a further expansion in the use of rayon for woven fabrics.

Chilean Trade in Nitrate and Copper

The Result of Bad Business Policies

ECONOMICS chaos, lost international credit, and reduced foreign commerce is the keynote of a report on "Economic Conditions in Chile," which comes from the Department of Overseas Trade (H.M. Stationery Office, price 1s. 6d. net). The dominating position of nitrate and copper in the Chilean export trade serves to illustrate the fact that Chile's chief difficulty has been the lack of variety in the products available for disposal abroad. Nitrate (including iodine) and copper have accounted for uwards of 80 per cent. of all exports for the last thirty years. The relation between the two products has varied during this period, the tendency being for copper to increase its proportion at the expense of nitrate. Thus in the period 1900 to 1913 nitrate accounted for 75 per cent. of exports and copper only 5 per cent. By the period 1920-1931, however, copper had risen to 25 per cent. and nitrate fell to 55 per cent. Before the world war the export of copper remained practically stationary, the figures for 1900 being 54,000,000 pesos* and those for 1913 46,000,000 pesos. In later years, however, production was greatly increased owing to the advent of American producers into the field with modern mechanical methods, and the figures rose to 283,000,000 pesos in 1920, subsequently reaching the record figure of 926,000,000 pesos in 1929. The violence of the reaction from the boom may be gauged from the fact that the figures fell to 444,000,000 pesos in 1930, thence to 307,000,000 pesos in 1931 and for the first six months of 1932 they only amounted to 78,000,000 pesos.

Little Prospect of an Early Reaction

The course of nitrate during the same period has been extremely erratic with very unfavourable basic conditions. The average value of exportations during the period 1900-1913 was 641,000,000 pesos and for 1920 to 1931 905,000,000 pesos with a maximum in 1920 of 1,582,000,000 pesos. By 1926, however, the figure had fallen to 710,000,000 pesos but rose again in 1929 to 966,000,000 pesos. In 1930 a drop to 584,000,000 pesos occurred and a further fall in 1931 to 359,000,000 pesos; while for the first six months of 1932 the figure is only 47,000,000 pesos. With such a disastrous falling off in the two supporting items in the export trade a collapse was inevitable.

The downward trend visible in the export statistics for the first six months of 1932 has not yet been arrested. There is, indeed, very little prospect of an early reaction. Stocks of nitrate and copper are both excessively high and production is being maintained at a low level. Nitrate is faced with a thousand troubles, political complications and the competition of synthetic nitrogen compounds, while the recent import duty imposed by the United States on copper, and the possibility of a duty on non-Empire copper entering the United Kingdom, make the copper situation very unpromising.

It does not appear probable that any completely compensatory alternatives to copper and nitrate can be developed, and unless there is an early revival in world trade leading to an increased demand for these two vital products, the standard of living in Chile is likely to be appreciably affected. Already imports are confined to absolute essentials and many articles normally indispensable for the ordinary amenities of life have either disappeared from the market entirely or are standing at prohibitive prices.

As to nitrate, there have been few controversial questions in the history of Chile as bitter as that involving the present status of the industry. It will be recollected that the gigantic combine known as "Cosach," comprising a partnership between the Chilean Government and the majority of the nitrate companies, was legally constituted on March 21, 1931, with the huge capital of £75,000,000. The history of its constitution is well-known and much was expected of it in re-establishing the Chilean nitrate industry in its competitive fight with its synthetic rival. Yet within a short period of its constitution this immense structure faces a drastic reorganisation, and the question has become one of sharp controversy. It is clear that the financial structure of the company was based upon expectations which have since failed to materialise, but if these were too optimistic, it must be admitted that no one could have foreseen the unparelleled depths to which world trade would sink in the present depression.

* During the years 1925-30 the peso was approximately equal to 6d. When Great Britain abandoned the gold standard, a new exchange rate was established, 16.5 pesos being equal to one United States dollar.

HEAVY oils and asphalt predominate in the petroleum recently derived from borings at Zisterdorfer in Austria. Cracking treatment yields up to 12 per cent. of motor spirit. By distilling off only 1 per cent. of the ingredients of the crude oil, the latter is converted into a high grade lubricating oil suitable for railway wagon axle lubrication. The asphalt residue is exceptionally tough and adhesive, and may find application as a road dressing.

Development of the Pharmaceutical Industry in India

Its Chief Difficulties Reviewed

WRITING in a recent issue of "Current Science," Dr. M. C. Tummin Katti, of the Indian Institute of Science, Bangalore, said that during the last few years in India the demand for Indian-made goods has been gaining considerable ground. Consequently, a number of new industries have sprung up recently; some of which like textiles, soaps and a few others have advanced far enough that India can meet her own demands for the products of these industries, while the pharmaceutical industry, in spite of the plentiful source of a number of raw materials, is still in an infant state. Statistics for the past five years show that India imports annually drugs and medicines (excluding chemicals) worth about £1,500,000. In dealing with the development of the various aspects of the industry, it is essential in the first place to discuss some of the serious difficulties which this infant industry in India is facing to-day.

The excise regulations form one of the serious difficulties in the way of the development of the Indian industry. Hindrance to the free movement of alcoholic preparations in interprovincial trade and paucity of reliable crude materials are others. Although crude vegetable drugs are available in plenty, there are no reliable dealers who can supply the manufacturers regularly with medicinal herbs of the proper quality. This is partly due to the ignorance of the people who collect the drugs without taking any special care to avoid the decomposition or the destruction of active principles; and partly to the general tendency to adulterate such drugs.

In addition to these, lack of cheap transportation facilities, excessive tariff on the import of crude drugs not available in India and the absence of scientific research along pharmaceutical lines are among the other factors which hinder the development of the industry in the country.

Manufacture of Tinctures

Most of the Indian pharmaceutical houses are confining their activities to the manufacture of spirituous galenicals, such as tinctures, extracts, etc., partly on account of the comparative simplicity of the machinery and the process of manufacture and partly on account of the availability of almost all the raw materials in this country. With a little more sympathetic attitude on the part of the excise department and an earnest attempt on the part of the growers and collectors of crude vegetable drugs to supply materials of proper quality there seems to be no difficulty in the development of this part of the industry.

With regard to biological substances, such as, vaccines, sera and glandular products the most important requirement for their manufacture is the availability of sufficient raw material of suitable quality. The large number of slaughter houses will provide raw material at present wasted, and although they are successfully manufacturing biological products, it is a matter of doubt whether these will eventually be able to compete successfully with American or European manufacturers.

Except for the manufacture of quinine in the Government factories at the Nilgiris and Darjeeling and in one or two private factories, not much manufacturing is done in India along the line of preparing active principles from crude vegetable drugs. India is the principal source and in some cases the only source of many crude vegetable materials from which active principles like alkaloids and glucosides are manufactured. If the excise regulations are liberalised many products like santonin, strychnine, berberine, caffeine and atropine and many essential and fixed oil medicinal preparations can be easily and economically manufactured in India.

Since the world war organic chemistry has made tremendous progress in the domain of synthetic medicinal compounds. The manufacture of such substances in India at the present state of her industrial position is, however, confronted with many difficulties. The most serious of such difficulties is the lack of a well-established chemical industry in the country, and this branch of the industry cannot very well succeed unless a general all-round development of the chemical industry takes place in the country.

Cultivation and collection of drugs has not received as much attention as it deserves; there has been too much relying on the natural resources of the country. In order to make India self-sufficient and to apply raw materials of known and good quality to manufacturers, it is essential and desirable that cultivation of medicinal plants is thought of more seriously. India possesses varying clamatic conditions. It is, therefore, possible that medicinal plants which are not growing within her boundaries may be made to do so. Thus cultivation applies not only to such plants but also to those growing wildly in a scattered condition. In the case of the latter it more often happens that the cost of collection and transportation becomes extremely heavy when we consider the high railway freight charges in the country. Attempts are now being made by the Government of Kashmir to cultivate some important drugs.

The Greatest Difficulties

The pharmaceutical industry, like many of the highly technical industries, requires the help of men of scientific attainments and expert knowledge. A large number of vegetable drugs used medicinally in India still await chemical and pharmacological examination on modern lines and some of these at least, on careful study, may prove very good substitutes for the foreign costly drugs imported now. Methods of preservation of various galenicals under the Indian climate conditions will have to be worked out. Processes for the isolation or extraction of active principles from the drugs already investigated will have to be devised. Optimum conditions will have to be found out for the successful cultivation of many drugs now growing wildly or acclimatised.

One of the serious difficulties in the way of a healthy growth of pharmaceutical industry in India is the problem of gross adulteration of crude and finished medicinal substances. This situation has become so acute that the Government of India appointed a Drugs Inquiry Committee, which published a report in October, 1931. The committee recommended certain ways and means of combating this evil of adulteration. Among many important suggestions, recommendations were made for the enactment of a Drugs and Pharmacy Act and in order to enforce the provisions of such an Act, the compilation of a standard authority like the Indian Pharmacopœia. Delicate methods for the isolation, identification and estimation of various adulterants will have to be devised.

Considering the situation of the industry as a whole, in spite of the serious handicaps an infant industry has to undergoo, there is still wide scope for its development in India. There are enough raw materials available; a large portion of the machinery can be manufactured in India; there are certainly scientifically trained young men who are willing to undertake the work if sufficient encouragement is given. There are not many insurmountable difficulties. On the other hand there is everything in favour of such an enterprise. The consumer will be enabled to get really potent preparations probably at less cost. Finally an opportunity will be provided for harnessing the Indian talent for chemical and biological research.

Japanese Nitrogen Supplies

Large Increase in 1932

JAPANESE production of sulphate of ammonia during the first six months of 1932 is reported as 341,000 tons, an increase of 107,000 tons over the same period of 1931. Imports during the same period amounted to 115,340 tons, showing a decrease of 16,548 tons. Stocks on hand at the end of July were estimated at 356,000 tons. Manufacturers are hopeful of retaining the present prices, believing that imports will be small during the remainder of the year, due to exchange and the policy of the Government to curtail imports. Producers of cyanamide have kept prices low in the endeavour to persuade consumers to use more of this particular product. Production during the first half of 1932 was 67,000 tons, an increase of 6,000 tons over the same period in 1931.

Sheffield University

New Equipment for the Metallurgical Department

NEW equipment for the Department of Metallurgy in the University of Sheffield includes plant for the purpose of heat-treatment, which is to consist of two electrically-heated furnaces, the temperatures of which are automatically controlled, one of them being for the purpose of annealing and the other for high temperature work, such as hardening of high-speed alloys. Both are equipped with a gas curtain in order to assist in the prevention of oxidation within the furnace. Two large surface-combustion gas furnaces have been ordered, for annealing and high-speed hardening respectively, along with a crucible furnace of the same pattern. This new equipment, along with the older types at present in the department, will provide a battery of furnaces which will illustrate the differences produced under varying conditions of heating as well as serving for general heat treatment.

Indian Chemical Imports

Quarterly Statistical Summary

A SURVEY of the import trade of India, during the six months ended September 30, 1932, as prepared by H.M. Trade Commissioner at Calcutta, has just been published by the Department of Overseas Trade (Ref. No. C.4044). During this period the value of the imports increased as compared with the corresponding period of 1931 by £3,750,000 or 7 per cent. and amounted to £53,250,000 and the total exports, including re-exports, fell by £10,950,000 or 20 per cent. to £46,500,000. The exports of Indian merchandise showed a decrease of £11,250,000 or 20 per cent. and re-exports also decreased by £7,650 or 41 per cent. The grand total of imports, exports and re-exports amounted to £99,750,000, as against £108,000,000, a decrease of £8,250,000 or 8 per cent.

The trade in chemicals continues to expand, the imports in 1932 amounting to £1,057,500, as compared with £1,001,250 in 1931. Details of the countries of origin are not available, but the principal items included under this heading are as follows:—

	1931.	1932.
Acids	£26,250	£30,000
Bleaching powder	£33,750	£43,120
Carbide of calcium	£31,870	£28,120
Disinfectants	£31,870	£22,500
Potassium chlorate	£18,750	£39,370
Sodium bicarbonate	£31,890	£26,250
Sodium carbonate	£270,000	£273,750
Caustic soda	£127,500	£133,120
Sulphur (brimstone)	£61,870	£71,250

Trade in drugs and medicines decreased from £660,000 to £622,500. The principal items which are included under this heading are as follows:—

	1931.	1932.
Camphor	£90,000	£90,000
Proprietary and patent medicines	£142,500	£133,120
Quinine salts	£90,000	£88,000
Saccharine	£7,500	£9,370

The revised classification of dyes obtained from coal tar has been introduced in the Seaborne Trade Returns of India from April 1, 1932, with the result that it is not possible to give comparative statistics. The total imports of dyes obtained from coal tar had increased from 7.6 million lb. valued at £864,375 to 8.1 million lb. valued at £967,500. Details of the countries of origin are not available.

The total trade in paints and colours at £249,370 was of the same value as in 1931. The United Kingdom share was increased slightly from £151,870 to £153,750 and that of Japan from £13,120 to £24,370. The imports from Germany remained constant at £33,750. The increase in the imports of the United Kingdom and Japan were offset by reductions in the imports from the United States from £11,250 to £9,370, and from "other countries" from £37,500 to £28,120.

There has been a further decline in the soap trade from 174,191 cwt. valued at £384,370 to 164,980 cwt. valued at £360,000. The United Kingdom share of the trade fell from 146,225 cwt. valued at £320,620 to 142,681 cwt. valued at £313,120. The different kinds of soap imported during 1932 were as follows:—Household and laundry soap, 134,627 cwt. (£208,120); toilet soap, 25,345 cwt. (£138,750); other sorts, 5,008 cwt. (£13,120); making a total of 164,980 cwt. (£360,000).

Radium Extraction in Canada

Preliminary Work on Great Bear Lake Deposits

IN a recent Canadian broadcast address, Mr. L. L. Bolton, Assistant-Deputy Minister of Mines at Ottawa, summarised some of the facts relating to Canadian Radium developments. It was in May, 1930, that Mr. Gilbert Labine, while prospecting on the shore of Great Bear Lake in the Northwest Territories, discovered the deposit from which samples were sent to Ottawa and were readily identified as pitchblende ore rich in radium. Further examination showed veins several inches wide and running along a length of over 1,400 feet. Analysis showed much of this pitchblende to contain 40 per cent. of uranium oxide, or one part of radium in ten millions.

Working upon this raw material, chemists at the Dominion Department of Mines have now succeeded in concentrating the radium from one part in ten million to one part in 100,000. This concentrate is virtually free from all other impurities except barium and represents 95 per cent. of the radium present in the original ore. It is believed that in the case of the processes used with United States ore the concentration at this point was one in one million, whilst that associated with the Belgian Congo ores is one in 200,000, with recoveries of not more than 75 per cent. of the original radium. In addition the length of time required for the production of radium-barium concentrate has been reduced from three months to two weeks. It now remains to carry the purification still further to a concentration whereby the radium-barium content may be raised to a strength suitable for medical purposes, and this is standard practice involving no great difficulty. Production of radium concentrates containing 96 and 98 per cent. radium will take three months instead of six.

Precipitating the Radioactive Fraction

In the process which is used, the pitchblende ore, previously ground to the fineness of icing sugar, is leached with hot hydrochloric acid and stirred vigorously for several hours. It is then filtered. The solution now contains the uranium and radium, as well as any other metals present. The undissolved part is thrown away. To the filtrate is added a mixture of barium chloride and sodium sulphate thereby producing a white precipitate of barium sulphate and lead chloride which contains the radium. A long period of constant stirring—from 24 to 48 hours—is required in order that complete precipitation of the radium may be obtained. This precipitate is then washed with salt brine to remove the lead chloride; the radium-barium compound is dried at a concentration of one part of radium in 100,000 it is ready for the refinery, where the purity is raised to 98 per cent. At this stage it contains about one part of radium in 100,000.

Already over 4,000 grams of this radium-barium compound has been concentrated by chemists of the Dominion Department of Mines and it is confidently expected that early this year several grams of radium from Canadian sources will be available for use in the radium emanation plant to be installed at Toronto University.

Alleged Sale of Substitute

Application for Injunction

IN the Chancery Division on Friday, Mr. Justice Luxmoore had before him a motion by Droop Aspro, Ltd., of Cannon Street, London, against Mr. Fredk. Alexander Horsenail, stated to be trading as Lee, a herbalist, of Broad Street, Canterbury, for an injunction to restrain the alleged passing off of goods as and for those of the plaintiffs.

Defendant appeared in person and gave an undertaking in the terms of the notice of motion.

Plaintiffs' allegation was that defendant exhibited in his shop window a notice announcing that his pills were a "substitute for Aspro," and that he was selling them in bottles describing them as a substitute for Aspro and plaintiffs said they were sold in competition with Aspro.

His lordship said plaintiffs could not complain of the label on the defendant's bottles. It was no infringement to put up a notice "don't buy so and so this is much better." On the evidence he had heard he should only grant an injunction to restrain passing off until the trial of the action or further notice.

Bouverie Players' Triumph

" The Eye of Siva "

THE production of the "Eye of Siva," Sax Rohmer's play, reached a high standard of perfection on January 16, 17, and 18, when presented by the Bouverie Players' Society, the dramatic section of Benn Brothers, Ltd. (proprietors THE CHEMICAL AGE), at the New Scala Theatre, London. This excellent Eastern mystery play provided the audience with a series of thrilling situations, holding them breathless at times, and demanding their keenest attention throughout the evening. Particularly impressive was the appearance of "Kali," a live leopardess, on the stage, which is quite an innovation in amateur performances, and is an indication of the ambition, courage, and excellent management of the Bouverie Players.

As on previous occasions the production was in the capable hands of Mr. H. J. Wrench, of the THE CHEMICAL AGE, who is to be congratulated upon the success of the performance. In appreciation of Mr. Wrench's work the cast presented him with a handsome clock. The three performances were given in aid of the Electrical Trades' Benevolent Institution, The Furnishing Trades' Benevolent Association and the John Been Hostel, which will benefit to the extent of about £200 each.

The cast included J. Eaton Hosking (Paul Harley), John Pearce (Norris Clay), Keon Hughes (Barton), Gordon Grieve (Bill Haversham), James MacTavish (Rama Dass), Arthur Stevens (Ah Fu), Charles Payne (Inspector Wootton), Norman Cribbens (Bird), Elsie Dennis (Mrs. Marsh), Muriel Johns (Hilda Norbury), and Angela Bamford-Smith (Chris Haversham). The stage management was in the hands of Mr. H. F. Marshall and Mr. J. Bryant. During the intervals suitable selections were given by "The Times" Orchestra. Mrs. Sax Rohmer, the wife of the author, witnessed the production.

Science and Industry

Over-production Denounced by I.C.I. Director

AT a meeting of the Birmingham and Midland Section of the Society of Chemical Industry held at Birmingham University on January 12, Dr. Alexander Fleck read a paper on " A Possible Trend of Scientific Industrial Development."

Dr. Fleck is a director of I.C.I. (General Chemicals), Ltd., and executive director of Synthetic Ammonia and Nitrates and the Cassel Cyanide Co. He holds the view that the application of science to industry has resulted in over-production, and by way of remedy contends that research work can be pursued along lines to enable the problem to be brought more readily within manageable proportions. He put forward the suggestion that by the scientific utilisation of the waste heat resources of this country we could grow oranges and cotton and other tropical products adjacent to our big electric power stations. We had, he said, quantities of low grade heat from the condensers of our turbines, or, if that was not adequate, steam was available from very efficient combustion of fuel. We had energy for the necessary light conditions. We had plenty of water. We had cheap fertilisers and plenty of carbon dioxide for the plants to assimilate. Therefore, there ought to be round high-efficiency power stations large farms for tropical fruits and produce, and in these we had the possibility of replacing large quantities of our imports of tropical products.

A still further possibility might be indicated for agricultural development coupled with the efficient combustion of coal. Was it beyond the range of science to work trees and plants on a twenty-four hour basis by giving them continuous supplies of adequate heat and suitable light? In continuous light, plants which had been experimented on had had their flowering properties upset, but the plants continued to live. If we made this possible with such plants as the cotton plant, we opened a possibility of putting the textile businesses of Lancashire in a position independent of the troubles of American exchanges.

Mr. H. W. ROWELL, the chairman, proposing a vote of thanks to Dr. Fleck said that with regard to this new idea put forward for the application of scientific energy, it seemed to him it would be a mistake to limit the unit to the British Isles. The main wealth of this country had always been derived from labour, and unless we could manufacture and export, there was very little hope of increasing our wealth. Again, to ensure continuity of manufacture, it was imperative that we should obtain a very large quantity of primary products from overseas.

Humbugging Politicians

Sir Ernest Benn and the Industrial Outlook

SPEAKING on the occasion of his election as president of the British Export Society, in succession to Sir Hugo Hirst, in London on January 17, Sir Ernest Benn said that there were evidences of more efficiency, knowledge and ability to do the job at this moment than ever before. British industry to-day was employing as many people as ever before. The unemployment problem, disastrous as it might be, simply arose from the increase in population. Since the signing of the Armistice a mere matter of fifteen years, British industry had put into the public purse in taxes and rates no less than £20,000,000,000. Instead of talking about the inefficiency of industry, and the need for new schemes, we had rather reason to be proud that we had been able to carry on as we had.

Our export business to-day was simply at the mercy of the politicians. We were humbugged about day by day because Mr. de Valera, or Mr. Hoover, or Mr. Hertzog, or one of our own statesmen had announced some new policy, some new political device which rendered ineffective all the day by day business which ordinary business men were endeavouring to do. At the bottom of the trouble was the complete misunderstanding in the political world of the purpose and nature of money. These political powers had got hold of the power over money, and they had invented, and devised, and created masses of spurious money, and it was in that way that we found difficulty in carrying on our day-by-day business. The peoples of the world, and especially the people of America, should be taught the nature and uses of money.

There was a squeamish, sentimental objection to the word repudiation, and he would be the last man to recommend the repudiation of a debt, but it must be a good debt, and the sooner we recognised the wisdom of repudiating these debts, which are not real debts and did not mean any money, which were bringing the human race to ruin, the better it would be for mankind. Upon that depended the chances of recovery.

Pease and Partners, Ltd.

Proposed Reduction of Capital

NOTICE has been given in the "London Gazette" of January 13, that a petition has been presented to the High Court of Justice for (a) the sanctioning of a scheme of arrangement proposed to be made between Pease and Partners, Ltd., and the holders of its 5 per cent. debenture stock, secured by the trust deed dated December 29, 1922, certain of its unsecured creditors and its shareholders; and (b) the confirmation of the reduction of the capital of the company from £3,000,000 to £1,500,000. The petition is directed to be heard before Mr. Justice Maugham at the Royal Courts of Justice, London, on January 23.

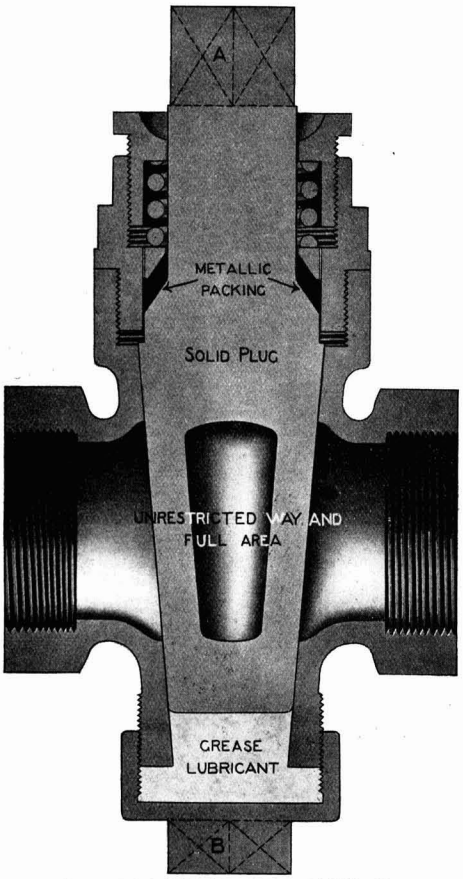
New Process for Anhydrous Aluminium Chloride

CHLORINATION of clay or bauxite with formation of anhydrous aluminium chloride proceeds exothermically when a cold mixture of carbon monoxide and chlorine is passed over the raw material at a low red heat. Hot producer gases are employed for the initial heating and the optimum temperature of 900° C. is later maintained by continuous removal of the finished product and simultaneous introduction of fresh raw material. Starting with china clay, a somewhat higher optimum temperature is indicated—1,000° to 1,050° C. Further details of the process are given in " Nowosti Techniki " (Moscow), No. 169, page 5.

Works Equipment News

Modern Aids for the Chemical and Allied Trades

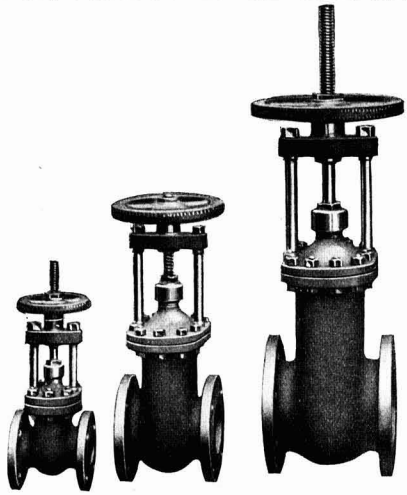
THE "Lud" gate type of valve is becoming well-known in chemical engineering. It is made in a standard range of sizes from ½ in. up to 20 in. bore, in "Firth Staybrite" (F.S.T. and F.M.B. mixtures) and in nickel-alloy or monel metal, pure aluminium, silicon aluminium and other similar alloys, as well as in phosphor bronze, cast iron, etc. "Lud" gate valves in "Firth Staybrite" have been in constant service for some five years on an important nitric acid plant, and are functioning to-day as perfectly as when first installed. The price of valves and similar fittings made of genuine "Firth Staybrite" is necessarily higher than that of similar fittings made in ordinary steel, gunmetal or iron, owing to the comparatively high cost of the castings (18 per cent.



Dixon "Lubricok" Lubricated Cock with Rising Plug

chromium, 8 per cent. nickel and 1 per cent. tungsten), and also on account of the extreme hardness of the steel and difficulties of working, especially in the case of small fittings with intricate coring. The makers of the "Lud" gate valves (S. Dixon and Son, Ltd., Leeds), claim, however, that in comparison with fittings which are subject to corrosion, "Firth Staybrite" is much less expensive in the long run.

In silicon aluminium valves of the "Lud" gate type, the smaller sizes (up to 1½ in.) are made with stainless steel spindle and internal parts, but the larger sizes are made of silicon aluminium throughout, with reinforced spindle, the alloy being cast on to a steel core. Another speciality is the "Lubricok," a spring loaded lubricated cock with a rising plug. The plug, which is solid and has no recesses other than the actual full area port, is pressed into the barrel of the body by an adjustable spring which is compressed by the screw cap at the top, the compression being in excess of the working pressure of the cock. A slight vertical movement of the plug is therefore available and when the lubricator



Dixon "Lud" Gate Valves made in Firth Staybrite Steel

at the bottom is given a partial turn, a grease pressure in excess of the working pressure of the cock is exerted on the bottom of the plug. The effect of this is to free the plug gently and safely, and at the same time a small amount of grease is injected into the barrel of the cock, thus lubricating the plug and securing smooth and easy action.

Economy in Power Production

THAT lower maximum demand means lower power bills is emphasised by a brochure recently issued by Crompton Parkinson, Ltd. They give one instance where a power user made a saving of £941 in the first year, for an expenditure of £500. This installation comprised a number of induction motors of various sizes, and the records showed for a year's working a maximum demand of 407 kVA and an annual consumption of 420,300 units, the power factor being 0.6. The cost for power, based upon a maximum demand rate of charging was as follows:—

	£
407 kVA at £7 10s. per kVA	3052
420,300 units at 0.75d.	1313
	£4365

A Crompton auto-synchronous motor of approximately 100 b.h.p., and operating at a leading power factor, was substituted for one of the induction motors, with the result that the power factor of the system was improved from 0.6 lagging to 0.92 lagging. This resulted in a reduction of the kVA demand to 271 kVA, and under the new arrangement the cost for power was:—

	£
271 kVA at £7 10s. per kVA	2032
445,300 units at 0.75d.	1392
	£3424

These figures show an annual saving, in the running cost, of £941. The capital outlay for the auto-synchronous motor

amounted to approximately £500, which was practically cancelled by the saving effected in six months' work. Perhaps more important still in this particular case was the fact that at 407 kVA the current in the cables was approximately 1,100 amperes, and these cables were so heavily overloaded that it was a question as to whether a new cable would not have to be provided from the power house to the factory at a capital outlay of approximately £3,000. The auto-synchronous motor, by reducing the maximum kVA to 271, brought the current in the cables down to approximately 700 amperes, thus considerably relieving them of their load and avoiding the necessity for laying additional cables.

A Thermograph for Pasteurisation Plant

THE temperature at which fluids are most satisfactorily pasteurised has been established to a high degree of accuracy. It has also been found that the limits of departure from the critical temperatures are extremely close, and the temperature gradients during pasteurisation for both rise and fall should be adjusted carefully if the best results are to be obtained. Where liquids are to be pasteurised in bulk, the difficulty in determining the temperature accurately and controlling it to the desired conditions is not great, but the problem of pasteurisation in bottles presents much difficulty owing to the fact that the mass of the bottle itself causes a considerable temperature lag. In many cases the actual temperature of the fluid inside the bottles is a matter of conjecture and is either estimated from the temperature outside the bottle or assumed from the heat of the spray water.

Researches into the problem have indicated that, in addition to the heating and cooling gradient failing to conform to the estimated curve, the actual maximum temperature of the liquid has not in all cases been reached owing to the mass

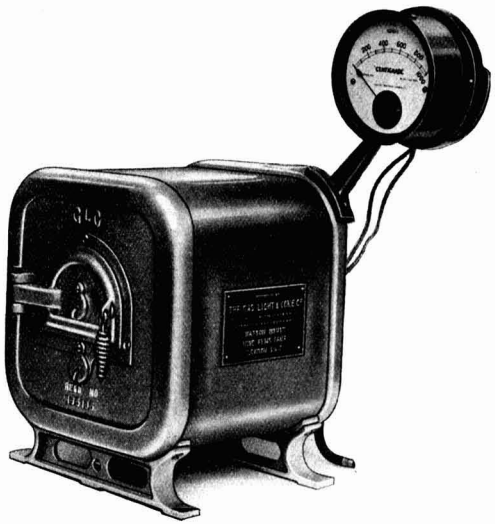
Bottle Thermograph for Pasteurisation Plant

and heat insulating properties of the bottle. In order to overcome these difficulties a bottle thermograph has been developed by the Cambridge Instrument Co., Ltd. This is a recording thermometer, made similar in form to an ordinary quart bottle, so that it may be placed on the conveyor in the pasteuriser and pass through the machine with the bottles undergoing treatment. The thermometer is of the mercury-in-steel type, the bulb being so arranged that it can be fitted through a stopper into an adjacent bottle, the records obtained thus show the actual temperature of the fluid inside the bottle. The canister containing the mechanism is watertight and may be opened readily for examination of the record. The charts, which are nine inches long, are clock-driven, and are usually arranged to run for two hours, the standard temperature range being from 30 to 150° F., whilst changes of 1° can easily be determined. The instrument may be used on any form of pasteuriser or heat treatment machine and at the close of an operation shows actually the rising gradient, the pasteurising temperature and the cooling gradient.

New Gas-Heated Muffle Furnace

AT the present time gas is the most widely used fuel for laboratory purposes, the chief reasons for its popularity being cleanliness, cheapness and ease of regulation. The newer methods of gas firing with high-pressure gas or blast air have found little application in laboratory work; the main advance during recent years has been in the production of new appliances, furnaces, ovens, etc., using low-pressure gas. Simultaneously gas-fired appliances are now being manufactured in which technical efficiency and a pleasing appearance have been successfully combined.

In furnace design the development of special refractories and insulating materials has enabled higher efficiencies to be obtained, and by reducing external heat losses has improved working conditions. Similarly the use of heat-resisting steel and other special alloys has enabled higher temperatures to be obtained and has facilitated the application of recuperation. As an example one may quote the fact that it is possible to maintain 1,000° C. in a standard laboratory furnace without special lagging and with a muffle of approximately 300 ccs. capacity by a gas consumption of 10 cu. ft. per hour.



Gas-Heated Muffle Furnace (Gas Light and Coke Co s Design)

For working at very high temperatures furnaces have been developed which are fired with low-pressure gas and blast air at, say, 0.5 lb. per sq. in. pressure, and by these means it has been possible, as in the Degussa high temperature furnace, to obtain 2,000° C., at which temperature the noble metals can be melted and high-grade refractories can be fired under laboratory conditions.

The new gas-heated muffle furnace, here illustrated, is supplied by Baird and Tatlock, Ltd., and is registered design made under licence from the Gas Light and Coke Co. It is intended for use at all temperatures up to 1,000° C. It will be found suitable for many kinds of laboratory and experimental work such as testing materials at high temperatures, assaying, heat treatment of steel, enamel work, china and glass heating and analytical work, etc., for which this range of temperature is required. The temperature in

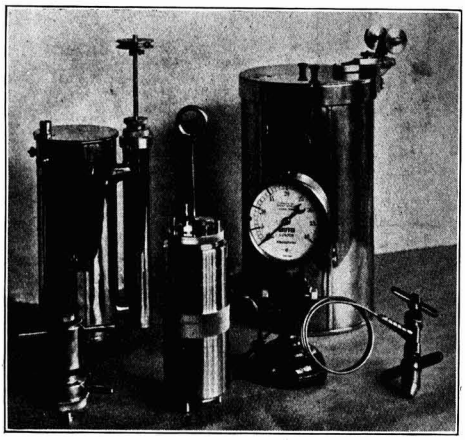
the muffle will be found very uniform, with a maximum variation of ± 5° C., so that accurate work can be carried out will all confidence. The heating up from cold is unusually quick, the furnace requiring only ½-hour to reach 1,000° C. Constant temperature conditions are assured by the use of a governor which provides steady pressure of the burner. For instance, a temperature of 1,000° C. has been maintained for 75 hours, with a maximum variation of ± 5° C. The flue gases of the furnace are entirely innocuous and it may be fitted in a small room without inconvenience. The muffle is 2½ in. high x 2¾ in. wide x 4 in. deep. The maximum gas consumption is 12 cu. ft. per hour.

High Temperatures in the Laboratory

TEMPERATURES in the neighbourhood of 2,000° C. are conveniently obtained in the laboratory by means of an electric furnace in which the heating elements consists of a tube of pure iridium metal (melting point 2,440° C.). Quite recently, however, a modified form of construction enables the furnace to be supplied at a considerably reduced price, the iridium heating element being replaced by an alloy of equal parts of iridium and rhodium. Rhodium (melting point 1,900° C.) is quoted at less than half the price of iridium and the alloy provides a safe maximum of 2,000° C.

An Improved Bomb Calorimeter

THE new Griffin-Sutton bomb calorimeter, introduced by Griffin and Tatlock, Ltd., departs from conventional design in many respects. It consists of a stainless steel cylindrical vessel open at both ends. The lower end is sealed by a rubber washer inserted between a flanged cap and a screwed sleeve; the cap carries the crucible support and terminals for electrical ignition. The upper end is sealed in a similar manner and here the cap carries an inlet valve of the Schrader type and an outlet valve for withdrawing the gaseous products of combustion. The sleeve is first screwed lightly into position with the fingers, thus slightly expanding the rubber washer. The oxygen with which the vessel is



Griffin-Sutton Bomb Calorimeter Outfit (Patent applied for)

charged enters between the flange of the cap and the internal wall of the vessel. The construction is such that the pressure exerted by the oxygen effectively completes the sealing through the rubber washer. The water chamber of the calorimeter consists of two cylindrical vessels of different diameters connected by tubes near the top and bottom. In the smaller tube a propellor stirring device is located. In the larger tube the bomb is placed. Rotation of the stirrer circulates water through the connecting tubes and thus over the top and bottom of the bomb and round its walls. The water calorimeter stands inside a larger calorimeter, or thermal shield, to which pulleys, for rotation of the stirrer, are fixed.

The advantages claimed for this method of construction are (1) a new type of sealing by internal pressure which enables the ends to be screwed in lightly by the fingers and as easily removed after the pressure has been released; (2) even distribution of the incoming oxygen round the internal wall of the bomb, thus completely avoiding disturbance of the charge; (3) unusually large area of contact between outer wall of bomb and water owing to long length and small diameter; (4) a clean straight cylindrical section ensuring against water pockets and making the interior easily accessible for cleaning; and (5) efficient stirring arrangements. A new and more convenient form of pellet press is shown in the accompanying illustration. It is so made that the ignition wire may be inserted in the sample before compression. After compression, the wire is thus firmly held in the moulded pellet and ignition failures are reduced to a minimum.

Commercial Rustproofing

THE most insistent call of industry during the past years has been for a protective finish on iron and steel at a price which not only is reasonable, but which will allow everything made of iron and steel to be well finished and protected from rust to the highest possible extent without appreciably increasing the price of the articles. For this problem Parkerizing was introduced. This process was first used in this country under licence some four years ago. The British Patent rights of the process are held by The Pyrene Co., Ltd.—the well-known fire and safety engineers who have applied to the process the most exhaustive tests.

The process consists of three main stages, cleaning, conversion of metal surface and finishing. It is vitally important that the article to be Parkerized should be free from grease; indeed, the thorough preliminary cleaning is perhaps the secret of the successful application of the Parker process. Using the I.C.I. degreaser, trichlorethylene vapour is employed and this vapour when condensed on to the work, dissolves every particle of oil or grease without staining or oxidising the article in any way. For converting the metal surface, the article is put in the process tank and left there until effervescence ceases. No harm is done if the article is left beyond the required time, as the process is foolproof. The solution in this tank converts the surface of the metal to a film of manganese phosphates, and when this has been accomplished, the chemical action ceases. When the article is removed from the tank it presents a smooth, silky surface of a mottled grey colour. Unless the work is to be painted or some other finish is to be applied, it is then necessary to apply a stain to colour the crystalline surface. After staining, the articles are immersed in a special Parcolac oil and dried; this operation impregnates the crystalline surface and completes the rust proofing process. The final finish is a pleasing black colour similar to a black cellulose finish.

The Parkerized surface lends itself to a variety of Parcolac finishes to suit various purposes. In addition it forms an ideal base for paint, lacquer, or enamel, and it is worthy to note that when such finishes are applied they will not lift or flake, and should an abrasion take place sufficient to expose the metal, rusting will not spread beyond the point of the abrasion. The process involves no electric current, no attention in the tanks, and the cost of operating is much less than in the case of any other rust proofing process consistent with the results it gives. The cost of the "I.C.I. degreasing" plant is extremely reasonable, especially when the speed of cleaning is taken into consideration; here the running costs are also low, as the plants require practically no attention except the addition of trichlorethylene liquid.

Parkerized surfaces resist the usual salt spray test from 30 to 100 hours. If, however, the finish is used as a basis for paint or enamel—there is no question that the extra protection given against rust is very great as it also "grips" paint or enamel and gives greater cohesion. Accordingly there is no danger of paint or enamel chipping or peeling, which is often the case when paint, etc., is applied direct to iron and steel, but it must be pointed out that the finish will not withstand acid tests unless protected by paint, any more than any other electro or other type of rust-proof finish. After severe tests The Pyrene Co., Ltd., have installed a large Parker plant, capable of processing 30 to 40 tons of work per week. This plant is at the service of those needing work to be processed quickly and efficiently, and also for demonstration purposes.

British Overseas Chemical Trade in December

Exports Continue to Improve

EXPORTS of chemicals, drugs, dyes and colours during December amounted to a total of £1,477,994, being £155,435 higher than the figure for December, 1931. Imports totalling £875,495 were lower by £337,458, and re-exports totalling £39,434 were lower by £210,155, as compared with December, 1931. For the twelve months ending December 31, 1932, exports amounted to a total of £17,377,524, an increase of £359,685 over the figure for the corresponding period ending December 31, 1931. Imports, on the other hand, were £9,578,482 (a decrease of £4,263,188), whilst re-exports of imported merchandise totalled £554,970 (a decrease of £579,013).

	Quantities. Month ended December 31. 1931	1932	Value. Month ended December 31. 1931 £	1932 £
Imports.				
Acetic Anhydride cwt.	—	606	—	1,790
Acid, Acetic .. tons	873	737	31,903	23,359
Acid, Tartaric, including Tartrates .. cwt.	1,984	3,401	7,170	11,879
Bleaching Materials ,,	5,326	9,769	12,887	13,347
Borax .. .. ,,	39,873	15,926	22,052	8,056
Calcium Carbide .. ,,	108,846	110,958	67,606	64,004
Coal Tar Products, not elsewhere specified value	—	—	3,854	1,497
Glycerine, Crude .. cwt.	278	3,348	375	5,474
Glycerine, Distilled ,,	1,488	269	3,240	487
Red Lead and Orange Lead cwt.	5,270	2,605	7,668	2,662
Nickel Oxide .. ,,	437	98	2,349	547
Potassium Nitrate (Saltpetre) .. .. cwt.	5,433	7,805	5,071	6,220
Other Potassium Compounds .. .. cwt.	174,795	133,701	66,283	64,538
Sodium Nitrate .. ,,	97,475	1,602	32,221	508
Other Sodium Compounds cwt.	28,804	18,786	25,013	14,356
Tartar, Cream of .. ,,	2,428	867	9,333	2,980
Zinc Oxide .. tons	314	14	6,348	348
Other Chemical Manufactures .. .. value	—	—	311,080	232,149
Quinine and Quinine Salts oz.	158,350	67,725	14,293	7,128
Bark Cinchona (Bark Peruvian, etc.) .. cwt.	465	970	2,155	5,365
Other Drugs .. value	—	—	115,355	126,201
Intermediate Coal Tar Products .. cwt.	183	—	2,238	—
Alizarine and Alizarine Red .. .. cwt.	—	—	—	—
Indigo, Synthetic ,,	20	—	149	—
Other Dyestuffs .. ,,	5,605	3,665	130,610	87,669
Cutch .. .. ,,	1,904	840	2,883	1,063
Other Extracts for Dyeing cwt.	4,822	1,394	16,275	4,074
Indigo, Natural .. ,,	5	—	85	—
Extracts for Tanning (Solid or Liquid) .. cwt.	165,673	144,199	129,632	93,727
Barytes, Ground .. ,,	39,313	22,000	7,720	4,338
White Lead (Dry) ,,	10,329	4,942	15,234	6,146
Other painters' colours and materials .. cwt.	111,432	72,681	161,871	85,583
TOTAL .. value	—	—	1,212,953	875,495
Exports.				
Acid, Sulphuric .. cwt.	4,125	2,540	2,137	1,872
Acid, Tartaric, including Tartrates .. ,,	651	622	3,696	3,036
Ammonium Chloride (Muriate) .. .. tons	491	454	7,285	7,177
Ammonium Sulphate ,,	40,228	26,200	209,453	128,227
Bleaching Powder (Chloride of Lime) .. cwt.	35,129	49,688	11,008	15,162
COAL TAR PRODUCTS—				
Anthracene .. cwt.	8	—	7	—
Benzol and Toluol gal.	4,267	160,637	311	17,238
Carbolic Acid (crude) gal.	715	8,868	114	1,271
Carbolic Acid (crystals) cwt.	749	775	1,895	2,041
Cresylic Acid .. gal.	86,540	60,196	9,297	6,100
Naphtha .. ,,	3,212	2,053	298	227
Naphthalene (excluding Naphthalene Oil) cwt.	5,551	9,379	1,163	2,547
Tar Oil, Creosote Oil, etc. .. .. gal.	243,805	3,469,686	4,041	51,259
Other Sorts .. cwt.	13,490	25,130	9,234	9,830
COAL TAR PRODUCTS value	—	—	26,360	90,513
Copper Sulphate tons	2,294	3,520	37,394	55,041
Disinfectants, Insecticides, etc. .. .. cwt.	31,964	29,828	70,629	69,735
Glycerine, Crude .. ,,	2,121	2,289	2,250	2,860
Glycerine, Distilled ,,	9,924	14,236	21,040	30,461
Potassium Chromate and Bichromate .. cwt.	1,099	724	2,486	1,889
Potassium Nitrate (Saltpetre) .. .. cwt.	1,057	2,510	1,719	4,383
Other Potassium Compounds .. .. cwt.	3,903	9,773	7,310	9,781
Sodium Carbonate, including Crystals, Ash and Bicarbonate .. cwt.	244,407	344,893	69,503	91,363
Caustic Soda .. ,,	133,353	131,783	86,342	91,964
Sodium Chromate and Bichromate .. cwt.	1,574	1,030	2,943	1,880
Sodium Sulphate, including Salt Cake .. cwt.	78,420	122,428	8,620	12,816
Other Sodium Compounds cwt.	48,840	90,014	50,866	87,214
Zinc Oxide .. tons	508	627	10,179	12,510
Other Chemical Manufactures .. .. value	—	—	212,272	225,236
Quinine and Quinine Salts oz.	97,968	59,842	13,006	8,255
Other Drugs .. value	—	—	196,504	216,697
Dyes and Dye-stuffs (Coal Tar) .. .. cwt.	9,071	10,701	83,985	96,666
Other Dyes .. ,,	11,220	18,642	7,913	15,823
Barytes, Ground ,,	762	4,071	290	1,566
White Lead (Dry) ,,	1,616	1,756	2,527	3,122
Paints and Colours in paste form .. .. cwt.	21,593	24,795	35,941	42,754
Paints and Enamels prepared .. .. cwt.	26,744	25,908	76,274	76,286
Other painters' colours and materials .. cwt.	36,866	36,375	62,627	73,705
TOTAL .. value	—	—	1,322,559	1,477,994
Re-Exports.				
Acid, Tartaric, including Tartrates .. cwt.	54	32	371	198
Borax .. .. ,,	73	441	57	308
Coal Tar Products, not elsewhere specified value	—	—	19	2
Potassium Nitrate (Saltpetre) .. .. cwt.	95	93	130	155
Sodium Nitrate .. ,,	908	5,000	384	1,530
Tartar, Cream of .. ,,	226	150	1,141	634
Other Chemical Manufactures .. .. value	—	—	189,954	8,693
Quinine and Quinine Salts oz.	8,460	2,573	1,064	473
Bark Cinchona (Bark Peruvian, etc.) .. cwt.	205	266	2,134	2,242
Other Drugs .. value	—	—	42,362	22,294
Cutch .. .. cwt.	534	76	1,059	110
Other Extracts for Dyeing cwt.	85	158	387	746
Indigo, Natural .. ,,	—	2	—	51
Extracts for Tanning (Solid or Liquid) .. cwt.	1,215	407	1,520	497
Painters' colours and materials .. .. cwt.	2,340	736	3,371	1,147
TOTAL .. value	—	—	249,589	39,434

News from the Allied Industries

Distilleries

THE DIRECTORS OF THE DISTILLERS COMPANY have announced their decision to pay an interim dividend of 7½ per cent. less tax, on the ordinary capital of £10,690,962. This is at the same rate as has been paid for some years, whereas there was a widespread fear that a reduction would be made. Following the announcement there was some fairly brisk bidding for the shares, which caused a sharp advance in the price.

China Clay

AN ADVERSE STORM PREVAILING on the South Coast in the early part of December, the shipments of china clay were considerably interfered with. For over a week vessels were unable to get either in or out of the principal clay ports. Details of shipments are:—Fowey, 30,968 tons of china clay, compared with 43,567 tons in November; 2,276 tons china stone, 962 tons of ball clay. Charlestown: 7,126 tons of china clay, 264 tons china stone; Par, 4,203 tons of china clay, 239 tons china stone; Penzance, 737 tons of china clay; Plymouth, 87 tons of china clay; Looe, 290 tons of china clay; Newnham, 81 tons of china clay; and 3,683 tons of china clay were borne to inland towns by rail throughout, making a total for December month of 47,175 tons of china clay, 2,779 tons of china stone and 962 tons of ball clay.

Artificial Silk

THE LOSS INCURRED IN 1932 by J. P. Bemberg A.G., the rayon manufacturers, will involve a reduction of capital, since the company carried forward a debit of over Rm.5,000,000 from 1931, and had no more reserves out of which the deficit could be written off. The exact amount of the loss for 1932 is not yet known. Falling sales and prices militated against the reduced production costs. Little revenue can be counted upon from the company's foreign interests, although there are some reasons for optimism in this connection. The British Bemberg Co. has achieved a large increase in output during the past year, but with unsatisfactory prices, there is little prospect of a substantial net profit. In the eight months to December, 1931, the trading loss was £8,893 and the net loss £88,196. It is reported that the American Co. will show a loss for 1932, although production has improved. The Japanese and Italian concerns have also increased their output, but no estimate of their results is yet possible.

Non-Ferrous Metals

THE INTERNATIONAL NICKEL CO., LTD., is re-opening at Copper Cliff, Ontario, the Orford process plant transferred from Port Colborne, Ontario, late in 1931. Resumption of operations will provide part-time employment for 300 men, and sufficient blister copper will be produced to meet the requirements of the Ontario Refining Co., Ltd., which is transferring consignments of electrolytic copper to Great Britain, The Orford process represents the first stage in separating copper-nickel matter into copper "tops" and nickel "bottoms."

JAPAN WAS A LARGE PURCHASER of Canadian aluminium during November, 1932. The quantity in question was considerably greater than the total of shipments of aluminium to Japan throughout the entire calender year 1931. Shipments to Japan of aluminium in blocks, etc., aggregated 4,110,600 lb., valued at £176,000. In the same month Great Britain took 2,829,900 lb., valued at £126,000.

GERMAN CONSUMPTION OF COPPER declined from 263,000 metric tons in 1927 to 160,000 in 1931, according to an authoritative but unofficial statistician. The percentage for electrotechnical uses—52 per cent. in 1927 and 54 in 1931—is slightly below the United States figure, while the proportionate consumption of metal goods apparently is twice as much—22 to 26 per cent. in Germany, 11 per cent. in the United States. Imports from the United States declined 77 per cent. from 1927 to 1931—56,234 to 36,319 tons. Imports from Chile have not declined so rapidly, and there has been a marked increase in receipts from Belgium, the Belgian Congo, and the smaller purchases from Yugoslavia. Refinery developments in Belgium and Chile are largely accountable for the change. Copper from Rhodesia has also appeared in the German market this year.

Rubber

THE SCHEME TO PROVIDE FUNDS for research in the rubber industry by a levy on all British rubber manufacturers, based on the quantities of rubber used by them, is revived in a Bill sponsored by a political group headed by Mr. W. Kirkpatrick, the Unionist member for Preston. The total contributions would be limited to an average of £15,000 a year, and on the basis of the present consumption of rubber in the United Kingdom (75,000 tons a year) it is estimated that the contributions from the maunfacturers would represent one-forty-fifth of a penny per lb. Similar Bills obtained a second reading in the House of Commons in 1928 and 1931. Amendments have been made in the present Bill to meet objections made in the earlier measures.

Matches

BRYANT AND MAY, LTD., announce that in response to the offer of November 24, 1932, holders of £500,000 of the 5 per cent. mortgage debenture stock have converted their holdings into the new 4 per cent. "A" mortgage debenture stock. The remaining £250,000 of the 5 per cent. stock will be repaid in cash on the due date, March 31 next.

AN AGREEMENT HAS BEEN REACHED between the Swedish Bank Skandinaviska Kredit Aktiebolaget and the International Match Corporation with regard to the German Bonds of a nominal value of $50,000,000 (£10,000,000 at par) which was handed to the bank by the late Ivar Kreuger, although they were in reality the property of the Corporation. The International Match Corporation will receive back the bonds to the nominal value of $21,000,000 (£4,200,000 at par) together with the coupons, while the Skandinaviska Kredit Aktiebolaget will keep the remainder.

Iron and Steel

THE GERMAN STEEL TRUST has announced that production during the months of October, November and December, the first quarter of the current business year, exceeded the corresponding figures last year, except for pig iron, whereas the turnover to cheaper prices showed a decline of about 6,000,000 marks (£300,000 at par). During the quarter the trust took on 7,125 new workmen, thus bringing their number at the end of the month of December to 88,893 or 4,381 more than a year ago.

THERE WERE SIXTY FURNACES IN BLAST at the end of December—one more than at the beginning of the month. Four furnaces began operations, and three were blown out during the month. Production of pig-iron in December amounted to 284,500 tons, compared with 267,700 tons in November and 330,600 tons in December, 1931. The production includes 76,600 tons of hematite, 123,600 tons of basic, 68,000 tons of foundry and 10,600 tons of forge pig-iron. The output of steel ingots and castings amounted to 430,400 tons, compared with 473,800 tons in November and 425,400 tons in December, 1931. The December figures bring the total pig-iron output for the year to 3,573,0000 tons, compared with 3,772,600 tons in 1931 and 6,192,400 tons in 1930, and of steel to 5,256,800 tons, compared with 5,202,600 tons in 1931 and 7,325,700 tons in 1930.

Purification of Cracked Petroleum

A New Use for Solid Zinc Chloride

ALTHOUGH liquid zinc chloride has long been known as a refining agent for cracked petroleum fractions, its employment in the solid form (as reported in "Nowosti Techniki," November 10, 1932) is something of an innovation. On their way to the rectifying columns the cracked vapours are passed through towers filled with zinc chloride supported on a porous material such as pumice stone or coke. The support is first impregnated with zinc chloride by moistening with a solution of the salt and drying at 150-200° C. Contact for a few seconds is said to suffice for purification at 250° C., owing presumably to the catalytic effect of the zinc oxide produced at this t emperature. Regeneration of the zinc chloride is easily effected by successive washing in water and boiling, when the loss only amounts to 0.2 per cent.

Inventions in the Chemical Industry

Specifications Accepted and Applications for Patents

THE following information is prepared from the Official Patents Journal. Printed copies of Specifications Accepted may be obtained from the Patent Office, 25 Southampton Buildings, London, W.C.2, at 1s. each. The numbers given under "Applications for Patents" are for reference in all correspondence up to the acceptance of the Complete Specification.

Specifications Accepted with Dates of Application

MANUFACTURE OF VINYL COMPOUNDS. H. Dreyfus. March 30, 1931. 385,978.

MANUFACTURE OF CELLULOSE XANTHATE DERIVATIVES AND ARTIFICIAL MATERIALS THEREFROM. Dr. L. Lilienfeld. March 31, 1931. 385,979.

MANUFACTURE OF DI- OR POLYVALENT ALIPHATIC ORGANIC COMPOUNDS. Dr. L. Lilienfeld. March 31, 1931. 385,980.

TREATMENT OF HYDROCARBON GASES. Anglo-Persian Oil Co., Ltd., A. E. Dunstan and E. N. Hague. April 9, 1931. 385,981.

PROTECTIVE COLLOIDS FOR ORGANOPHOBIC SUSPENSIONS. British Thomson-Houston Co., Ltd. April 23, 1930. 385,970.

PRODUCTION OF ANTHRACENE DERIVATIVES. Imperial Chemical Industries, Ltd., D. A. W. Fairweather, and R. F. Thomson. June 1, 1931. 385,984.

POLYMERISATION OF VINALACETYLENE. W. W. Triggs (*E. I. Du Pont de Nemours and Co.*). June 26, 1931. 385,963.

PROCESS FOR THE MANUFACTURE OF COMPLEX METAL COMPOUNDS. A. Carpmael (*I. G. Farbenindustrie*). June 26, 1931. 385,973.

MANUFACTURE AND USE OF WETTING PREPARATIONS. Imperial Chemical Industries, Ltd., C. Dunbar and W. Todd. July 6, 1931. 385,977.

TREATMENT OF CELLULOSE DERIVATIVES. British Celanese, Ltd. July 8, 1930. 385,999.

PROCESS OF TREATING CARBONACEOUS ARTICLES. M. J. Marcin and D. Mackenzie. Aug. 29, 1930. 386,022.

ALUMINIUM AND ALUMINIUM BASE ALLOYS. National Smelting Co. Sept. 4, 1930. 386,028.

PROCESSES FOR PRODUCING PREPARATIONS OF OPIUM. Akt.-Ges. Vorm B. Siegfried. Oct. 28, 1930. 386,038.

MANUFACTURE OF ACID-PROOF CEMENTING COMPOSITIONS. S. C. Chigison. Sept. 24, 1931. 386,045.

ALUMINIUM ALLOYS CONTAINING SILICON. Skoda Works, Plzen. Oct. 3, 1930. 386,051.

PURIFICATION OF ACETYLENE PREPARED BY THERMAN OR ELECTRICAL METHODS. J. Y. Johnson (*I. G. Farbenindustrie*). Oct. 3, 1931. 386,052.

DYEING MATERIALS MADE OF/OR CONTAINING CELLULOSE ACETATE IN BLACK SHADES. Silver Springs Bleaching and Dyeing Co., Ltd., F. E. Mason, and T. G. Allen. Jan. 5, 1932. 386,117.

MANUFACTURE OF UREA-FORMALDEHYDE CONDENSATION PRODUCTS AND ARTIFICIAL MATERIALS THEREFROM. Fabriques de Produits de Chimie Organique de Laire, and R. Armenault. Feb. 23, 1931. 386,146.

MANUFACTURE OF SHAPED ARTICLES FROM POLYVINYL ALCOHOLS. Consortium für Elektrochemische Industrie Ges. March 10, 1931. 386,161.

MANUFACTURE OF FOODSTUFFS RICH IN PROTEINS. Tres Chemisch-Pharmazeutisch Industrie und Handels Akt.-Ges. Dec. 28, 1931. 386,167.

PRODUCTION OF RESINS SOLUBLE IN OIL. Chemicon Akt.-Ges. April 11, 1931. 386,179.

PRODUCTION OF OXIDIC LAYERS ON ALUMINIUM, ALLUMINIUM ALLOYS, AND OBJECTS CONSTRUCTED THEREOF. Vereinigte Aluminiumwerke Akt.-Ges. May 26, 1931. 386,201.

PRODUCTION OF POTASSIUM CARBONATE. A. L. Mond (*Chemische Fabrik Buckau*). May 27, 1932. 386,208.

MANUFACTURE AND PRODUCTION OF DELUSTERED CELLULOSE ACETATE YARN.—Viscose Co. Sept. 16, 1931. 386,216.

PROCESS OF RECOVERING SULPHUR FROM SPENT GAS PURIFLING MASSES. Vereinigte Stahlwerke Akt.-Ges. July 18, 1931. 386,233.

MANUFACTURE OF SULPHURIC ACID ESTERS SUITABLE FOR USE IN DYEING AND PRINTING TEXTILE FIBRES. Durand and Huguenin Akt.-Ges. July 15, 1931. 386,245.

MANUFACTURE OF MONO-N-ALKANOL DERIVATIVES OF AROMATIC DIAMINES AND POLYAMINES. I. G. Farbenindustrie. Oct. 15, 1931. 386,254.

PRODUCTION OF POLYVINYL COMPOUNDS. H. Dreyfus. March 30. 1931. 386,005.

Applications for Patents

PRODUCTION OF COATINGS ON LIGHT METALS. J. Y. Johnson (*I. G. Farbenindustrie*). Jan. 5. (Germany, Jan. 5, '32.) 416.

CATALYTIC PRODUCTION OF ALCOHOLS, ETC. Imperial Chemical Industries, Ltd. Jan. 2. (United States, Jan. 2, '32.) 86.

METHOD OF DISPERSING SOLIDS. International Latex Processes, Ltd. Jan. 4. (United States, Feb. 8, '32.) 269.

PROCESS FOR PRODUCING A B-VITAMIN CONCENTRATE. H. P. Vogt-Möller. Jan. 6. 462.

PROOFING FABRICS WITH RUBBER LATEX. W. Robins. Jan. 4. 281.

CONCENTRATION OF EMULSIONS, ETC. P. Schidrowitz and F. G. Smith. Jan. 6. 538.

MANUFACTURE OF SHRINKABLE BOTTLE CAPS, ETC. Soc. of Chemical Industry in Basle. Jan. 2. (Switzerland, Jan. 8, '32.) 63.

PRODUCTION OF A PHARMACEUTICAL PREPARATION. V. Stein. Jan. 2. 56.

POCKET OPTICAL INSTRUMENT FOR TESTING ORGANIC LIQUIDS. E. Anselmi. Jan. 11. (Italy, Jan. 11, '32.) 949.

MANUFACTURE OF PHOSPHATIC MATERIALS FROM BONES, ETC. Chemical and Metallurgical Corporation, Ltd., and J. W. Crabtree. Jan. 13. 1227.

PRODUCTION OF DERIVATIVES OF ALBUMIN CLEAVAGE PRODUCTS. Chemische Fabrik Grünau Landshoff and Meyer Akt.-Ges. Jan. 13. (Germany, Feb. 16, '32.) 1242.

TREATMENT OF AMMONIACAL LIQUOR. C. Cooper. Jan. 10. 797.

MANUFACTURE OF DYESTUFFS. N. I. Fisher and Kodak, Ltd. Jan. 9. 643.

MANUFACTURE OF LIGHT-SENSITVE MATERIALS. I. G. Farbenindustrie. Jan. 11. (Germany, Jan. 11, '31.) 946.

MANUFACTURE OF NEW HYDROXYTHIONAPHTHALENES, ETC. I. G. Farbenindustrie. Jan. 11. (Germany, Jan. 11, '32.) 981.

PRESERVATION OF GREEN FODDER . I. G. Farbenindustrie. Jan. 11. (Germany, Jan. 22, '32.) 984 to 990.

MANUFACTURE OF PIGMENTS. I. G. Farbenindustrie. Jan. 12. (Germany, Jan. 13, '32.) 1102.

BLASTING EXPLOSIVES. Imperial Chemical Industries Ltd. Jan. 10. 869.

PRESERVATION OF RUBBER. Imperial Chemical Industries, Ltd. Jan. 12. 1080.

COPPER ALLOYS, AND ARTICLES MADE THEREFROM. Imperial Chemical Industries, Ltd., and M. Cook. Jan. 13. 1258, 1260, 1261.

MANUFACTURE OF METAL ARTICLES. Imperial Chemical Industries, Ltd. Jan. 13. 1259.

MANUFACTURE OF NITRILES. Imperial Chemical Industries, Ltd. Jan. 13. 1263.

DYEING PROCESS. Imperial Chemical Industries, Ltd. Jan. 13. 1264.

MANUFACTURE OF PERYLENE DYESTUFFS. Imperial Chemical Industries, Ltd. (*Du Pont de Nemours and Co.*). Jan. 14. 1317.

MANUFACTURE OF SULPHURIC ESTERS OF LEUCO COMPOUNDS OF VAT DYESTUFFS. J. Y. Johnson (*I. G. Farbenindustrie*). Jan. 13. 1214.

MANUFACTURE OF MIXED FERTILISERS. J. Y. Johonson (*I. G. Farbenindustrie*). Jan. 13. 1215.

MANUFACTURE OF NITROGENEOUS CONDENSATION PRODUCTS. J. Y. Johnson (*I. G. Farbenindustrie*). Jan. 13. 1216.

IMPROVING LUBRICATING OILS, ETC. J. Y. Johnson (*I. G. Farbenindustrie*). Jan. 13. 1217.

MANUFACTURE OF PLASTIC COMPOSITIONS. J. Y. Johnson (*I. G. Farbenindustrie*). Jan 13. 1218.

MANUFACTURE OF CONDENSATION PRODUCTS. J. Y. Johnson (*I. G. Farbenindustrie*). Jan. 13. 1219.

PRODUCTION OF CONDENSATION PRODUCTS FROM HYDROXYLATED CYCLIC COMPOUNDS AND ACETYLENE. J. Y. Johnson (*I. G. Farbenindustrie*). Jan. 14. 1301.

SEPARATION OF CRUDE RESIN INTO COLOURED RESINOUS PRODUCTS. E. Marsden. Jan. 9. (New Zealand, Jan. 7, '32.) 748.

LIQUID POLISH FOR CELLULOSE LACQUER. O. Mathieson. Jan. 11. 903.

PRODUCTION OF FERTILISERS. P. Parrish. Jan. 12. 1057.

MANUFACTURE OF COPPER SULPHATE. M. Serciron. Jan. 11. (Belgium, Sept. 1, '32.) 943.

MANUFACTURE OF OXYCHLORIDES OF COPPER, ETC. M. Serciron. Jan. 11. (Belgium, Sept. 1, '32.) 945.

ALUMINIUM MAGNESIUM ALLOYS, ETC. A. H. Stevens (*Aluminium, Ltd.*). Jan. 9. 706, 707, 708, 709.

COATING ARTICLES WITH RHODIUM. W. W. Triggs (*Baker and Co.*). Jan. 12. 1075.

MANUFACTURING ARTIFICIAL STRUCTURES FROM CUPRAMMONIUM CELLULOSE SOLUTIONS. W. W. Triggs (*Bemberg Akt.-Ges.*) Jan. 13. 1251.

Heating, Ventilating and Air Conditioning

A TWENTY-FOUR page publication has recently been produced by Sturtevant Engineering Co., Ltd., dealing with heating and ventilating. There are numerous figures showing examples of Sturtevant industrial heating and ventilating installations in various engineering shops. Some examples of air conditioning plant are also shown.

From Week to Week

MESSRS. W. S. EYRE, A. J. T. TAYLOR, AND H. A. MILLER have retired from the board of Ruths International Accumulators, Ltd., and Dr. R. Friedmann has been elected chairman.

THE LIMESTONE NOW BEING QUARRIED by the Clogrennane Lime Works, Carlow, Ireland, and utilised in the manufacture of carbonate of lime and caustic ground lime, is reported to be the purest yet discovered.

THE LECTURE AND EDUCATIONAL SECTION of Billingham Synthonia Recreation Club have completed arrangements for the second half of the 1932-33 session. Among the speakers will be Lord Leverhulme, and Dr. W. H. Coates, a director of Imperial Chemical Industries, Ltd.

MR. LIONEL BLUNDELL AND MR. H. M. BURNS have collaborated in the discovery of a paint which is impervious to water; will not "rainspot"; which resists fumes, gases, and salt air; and combines flexibility with hardness. It is claimed that a metal panel can be covered with this new paint, allowed to dry, and then be bent or twisted without causing a single crack in the surface.

THE LORD MAYOR OF LONDON will visit the John Benn Hostel on April 10 and will have supper with the boys. The guests and the boys will be equal in number and will sit alternately round the tables. After supper the boys will take their guests round their home and then provide a gymnastic display, a minstrel show and other forms of entertainment.

SIR FREDERICK GOWLAND HOPKINS, the new president of the British Association for 1933, was welcomed to the chair at the meetings of the organising sectional committees of British Association on January 6. Sir Alfred Ewing, the retiring president, in introducing him, said that the Association looked with greater hope to the problems dealing with the science of life, about which no one could speak with more authority than the new president.

IN A STATEMENT issued by the Irish Free State Minister for Industry and Commerce showing the number of new factories which have been put into operation since the inception of Mr. De Valera's tariff policy, ten months ago, two new establishments manufacturing chemical goods have been established in that country. The Minister added that he did not propose to divulge the names of the firms which had opened these factories.

THE NEXT EVENING MEETING of the British Wood Preserving Association will be held on January 25, at 6 p.m., in the Lecture Hall of the Auctioneers' and Estate Agents' Institute, 29 Lincoln's Inn Fields, London, W.C.2, when Mr. Alex. H. Dewar, F.I.C., chairman of the Greenwich Inlaid Linoleum Co., will give a lantern lecture on "Some Experiments in the Control of Dry Rot." The chair will be taken by Mr. J. Ramsbottom.

THE MANUFACTURE OF LINOLEUM was described by Dr. J. Allan, chief chemist to Williamsons, of Lancaster, in his paper entitled "Linoleum and Oilcloth Manufacture," at a meeting of the Manchester section of the Oil and Colour Chemists' Association on January 13. The making of the raw material, linseed oil, to the final linoleum was shown to be a series of intricate operations, especially with regard to inlaid linoleum. The various oxidisation processes—including the Scrim, Walton, and Taylor methods— of the linseed oil were also dealt with.

IT HAS BEEN ANNOUNCED IN TORONTO that the firm of Downs, Coulter and Co., Ltd., of Bradford, intend to establish a mill in the Toronto district for the manufacture of worsteds, artificial silk, cotton, and textiles. The initial investment is $500,000. The machinery will be shipped from England, and the plant is expected to begin operations in May. Mr. J. W. Downs, president of the Canadian company, was one of the advisers to the British delegates at the Ottawa Conference.

FOLLOWING EXPERIMENTS which have revealed the high carbon content of peat found in Irish boglands, Mr. J. J. Quilty, in association with M. J. Cruse, proposes that peat should be used as a "mix" for rubber in place of barytes, zinc oxide and carbon black as at present, thus reducing the cost considerably. It is understood that they have communicated their discovery to Dr. T. J. Drakely, of the London Polytechnic, and a staff of research workers under his direction are carrying on further experiments. Provisional world patents have been applied for and the new product is to be called "Quilcru."

OFFICIAL REPORTS ON THE SPRAYING OF WEEDS with dilute sulphuric acid are still very cautious in this country, but the method continues to be widely used in France with extremely good results. For charlock, wild radishes, chickweed, speedwell and groundsel a 5 to 7 per cent. solution is used, and a 10 to 12 per cent. for poppies and cornflowers. Sulphuric acid has, of course, to be handled carefully. The first results of spraying are liable to look a little alarming, for the crop gives one the impression that it has been badly damaged, but the spray affects only the outer leaves and the central shoot is uninjured, so that after a couple of weeks there is no sign of any ill-effects. It is said that no great increase of liming is necessary when the acid spray is used.

AFTER SIXTY YEARS' LABORATORY WORK, Mr. J. F. Cutbill retired on Saturday, January 14, from the service of Price's Patent Candle Co., of Bromorough Pool.

IT IS ANNOUNCED BY W. MERCK AND CO., INC., of the United States, that Dr. Hans Molitor has been appointed director of research in pharmacology to the company. Dr. Molitor has not only studied at Vienna, but also at Edinburgh, Cambridge, London and Utrecht.

METHYLENE BLUE has been proved to be a successful antitode in cases of potassium cyanide poisoning. At San Francisco a patient, having become unconscious from taking this poison, had recovered completely a quarter of an hour after an injection of methylene blue. The discovery was the result of much research.

MR. W. H. TRIMM, of Hyde, has been appointed a representative for Redfern's Rubber Works, Ltd., of Hyde, Cheshire, for the territory of South Lancashire, Cheshire, and Derbyshire. The ground which he has taken over was formerly covered by Mr. W. A. McGilvray, who will now devote his attention to North Lancashire, Northumberland, Durham and Yorkshire.

A CONSIDERABLE AMOUNT OF KELP for the manufacture of iodine is being dried and burned along the Donegal coast following the throwing up of large quantities of seaweed by the recent storms. Last year was somewhat unprofitable for this industry as the iodine content of the kelp was greatly reduced by heavy rains which fell during the drying process.

A CONFERENCE BETWEEN REPRESENTATIVES of the Chemical Workers' Union and the Drug and Fine Chemical Manufacturers' Association was held in London on January 17 to discuss the terms of a new national agreement in substitution of the existing agreement, which expires on January 31 under notice given last July. These agreements regulate the wages and conditions directly and indirectly of 20,000 workers, male and female.

THE BOARD OF THE INSTITUTE OF PHYSICS on January 10 elected to membership: Fellows, L. V. Chilton, E. R. Davies, R. A. Fereday, J. C. M. Brentano, R. W. James, E. Madgwick, W. V. Mayneord, J. M. Nuttall; Associates, J. Bor, H. A. Nancarrow, G. R. Noakes, H. C. Poole, S. W. Redfearn; Student members, W. D. Bradley, A. W. S. Franklin, C. E. Gardner, H. G. Hawker, W. J. Mitchell, G. Mole, J. R. Moore and H. Wilman.

AS PART OF A SCHEME FOR THE DEVELOPMENT of its plant at Chesterfield, the Staveley Coal and Iron Co., Ltd., has recently placed an order with Simon-Carves, Ltd., of Cheadle Heath, Stockport, for a complete coke handling and grading installation having a capacity of 120 tons per hour. The order includes the whole of the screening machinery, handling plant, conveyor gantries, etc., to deal with both the coke produced at the company's ovens and a quantity from outside sources.

A HOT-POT SUPPER AND SMOKER, organised by the Liverpool section of the British Association of Chemists, has been arranged for February 1, at the Stork Hotel, Queen Square, Liverpool, at 6.45 p.m. All members and their friends are invited; the cost will be 3s. 6d. New members are specially invited to take this opportunity of meeting the general secretary and section committee. Those who intend to be present are requested to notify the hon. secretary, Mr. A. Betton, 3 Woodburn Boulevard, Woodhey, Rock Ferry, Ches., not later than January 28.

THE NATIONAL COMMITTEE FOR WOOD UTILISATION in the United States has issued as its twenty-second report a 151-page book on "Chemical Utilisation of Wood," prepared by H. K. Benson, chairman of the Division of Chemistry and Chemical Technology of the National Research Council, Washington. The report discusses physical properties and chemical composition of wood, sawdust, and ground wood products, wood-processing and manufactured products, chemical wood pulp, wood distillation and naval stores, tanning and wood extracts, carbohydrates from wood, sulphite waste liquor, and wood research laboratories. The use of wood as a substance in chemical and technological processes for industrial purposes is a matter of growing importance.

DIRECTORS, MANAGERS AND EMPOYEES of United Dairies, Ltd., to the number of about 600, visited the London School of Hygiene and Tropical Medicine on January 11 and 12 to study the ways in which scientific research has improved, and is improving, methods of milk production and distribution. A film, specially prepared by the firm to illustrate good and bad methods of milk production, was shown to the party and afterwards a visit was paid to the food museum of the school. Professor W. W. Jameson, the Dean, welcomed the parties and spoke of the need of a closer alliance between industrial concerns and research and scientific organisations. Mr. J. H. Maggs, chairman of United Dairies, replying to Professor Jameson's welcome, said he recognised the great part science had played in improving milk production and distribution methods. The public was always at liberty to inspect the company's pasteurising and distribution depots and see how they carried out their task. They were always willing to co-operate with any bodies or societies interested in the improvement of the milk supply.

NITRATE STOCKS at present held in Chile amount to 2,800,000 tons, according to the results of an authorised survey.

OWING TO THE ABNORMAL DEPRESSION OF TRADE, the Council of the Institute of Brewing has decided that the usual banquet should not be held in 1933.

THE KAI CHENG CHEMICAL CO., a Chinese corporation with a capital of about £75,000, is reported to have under construction a sulphuric acid plant with a capacity of 6,000 tons a year, and it proposes also to manufacture nitric and hydrochloric acids.

AT A MEETING OF THE GRAND COUNCIL of the Federation of British Industries, on January 11, Lieut.-Gen. Sir George Macdonogh was nominated to succeed Sir George Beharrell as president of the Federation for the coming year. Subject to confirmation Sir George will enter on his new office some time in April.

THE DIRECTORS OF BENN BROTHERS, LTD., publishers of THE CHEMICAL AGE, have declared the usual interim dividends, payable on February 15, at the rate of 3 per cent. on the 6 per cent. preference shares, 6½ per cent. on the ordinary shares and 1s. 3d. per share on the deferred shares, all less tax.

FOR THE FIRST TIME, Imperial Chemical Industries, Ltd., will be represented at the British Industries Fair, Olympia, next month by a special chemical exhibit organised by I.C.I. (Alkali), Ltd., and I.C.I. (General Chemicals), Ltd. The exhibit will be thoroughly representative of the wide and varying products of these groups, but the procedure has been followed of selecting certain products of exceptional novelty or interest and giving them prominence.

A STARCH FACTORY, planned nearly two years ago by a group of local business men, together with Continental experts, for the manufacture of starch, glucose, and similar products, is to be opened at Athlone, County Westmeath, in the near future. Athlone is the centre of a large potato-growing district and will therefore be able to obtain plentiful supplies of raw materials cheaply. It is stated that 70 hands will be employed during the initial stages of development.

SIR ERNEST BENN AND MR. JAMES MAXTON, M.P., will debate the question, "Should death duties be abolished?" in the National radio programme at 9.30 p.m. to-night (Saturday). The debate is the first of a new Saturday evening series in which the value of modern institutions will be debated shortly and sharply by well-known speakers. Sir Ernest Benn will argue on the folly of collecting capital, and spending it as income, and Mr. Maxton will oppose his views.

IN CONNECTION WITH THE PROPOSED DEAL between Canada and Soviet Russia, the negotiations for the exchange of oil for cattle to a value of $7,000,000 seem to be at a standstill. The Canadian Government promised a statement early this week about the proposals, which were initiated by the Winnipeg syndicate, but no announcement has yet been made. The Winnipeg sponsors of the scheme have returned home, but expect to take up the project again with the Government at a later date.

"IN CHASE OF TRUTH OF ALCOHOL" is the title of a monograph by Professor H. E. Armstrong, published recently by the True Temperance Scientific Committee (Donnington House, Norfolk Street, Strand, London, W.C.2, price 1s.). In it Professor Armstrong says: "The case against alcohol, apart from the evidence from over-indulgence, is largely based upon unwisely conceived experiments bordering upon the farcical." Not only does alcohol taken at, or after meals help digestion greatly, but it is also definitely of fuel value, and probably of food value as well. "It were time we abolished Pecksniff as our leader and became sensible, like foreign nations," the author adds.

DR. C. V. DRYSDALE, Director of Scientific Research at the Admiralty, Mr. F. Edmond, chief mining agent to the Wigan Coal Corporation, Ltd., and Major H. M. Hudspeth, chief mining engineer to the Board, have been appointed members of the Safety in Mines Research Board. The appointment of Professor Jocelyn Thorpe would normally have ended on December 31, 1932, under the scheme of retirement in rotation. At the request of the Secretary for Mines, Professor Thorpe has accepted a special extension of his term of service for a period of two years. Professor C. H. Lees, whose appointment was specially extended at the end of 1931, has now completed his term of service.

Obituary

DR. JOHN THOMAS, F.I.C., a managing director of the Dyestuffs Group of Imperial Chemical Industries, Ltd., on January 18, at Wilmslow, Cheshire. Aged 46.

MR. ALBERT MAYON HENSHAW, on January 13, aged 68, at Talke, near Stoke-on-Trent. Mr. Henshaw was a well-known mining expert, being for many years managing director of the Talk-o'-th'-Hill Colliery; he was also a director of the Staffordshire Chemical Co., Ltd., Chatterley, and of the New Acid Co., Ltd., Tunstall.

MR. J. W. SAVILLE, of St. Helen's Road, Leigh, on January 15. Mr. Saville was a well-known analytical chemist and teacher of chemistry. He went to Leigh about thirty years ago, and was a teacher of chemistry at the Leigh Technical School. For the last twenty-one years he had been analytical chemist to the Leigh and Atherton Joint Sewerage Board.

Prices of Chemical Products

Current Market Conditions

THE position of chemicals generally in the London market is firmer, with quite a good demand. There is no change to report in the market conditions in regard to coal tar products. Prices of nitrogen fertilisers remain unchanged. On account of the prolonged fine weather there has been some demand for sulphate of ammonia for early use in the south of England. The general run of prices on the Manchester chemical market during the past week has been steady to firm, with only occasional easiness in evidence. On the whole, the volume of business is about up to the average booked just before the end of the year and up to the present there has been little indication of the improvement that the market was inclined to look for recently. In certain branches of the dyeing trade, however, there has been some seasonal speeding up of activity and good deliveries of chemicals are being taken. Business has been brisk during the past week in the Scottish chemical market with an increase of home and export inquiries. With the following exceptions, the prices of chemical products remain the same as reported in THE CHEMICAL AGE of December 24 (pp. 610-611).

General Chemicals

ACID, ACETIC.—Tech. 80%, £38 5s. to £40 5s.; pure 80%, £38 5s. to £40 5s.; tech., 40%, £19 15s. to £21 15s.; tech., 60%, £28 10s. to £30 10s. LONDON: Tech., 80%, £38 5s. to £40 5s.; pure 80%, £39 5s. to £41 5s.; tech. 40%, £20 5s. to £22 5s.; tech. 60%, £29 5s. to £31 5s. SCOTLAND: Glacial 97/100%, £48 to £52; pure 80%, £39 5s.; tech. 80%, £38 5s. d/d buyers' premises Great Britain. MANCHESTER: 80%, commercial, £39; tech. glacial, £52.

ACID, CITRIC.—LONDON: 10d., less 5%. MANCHESTER: 10d.

ACID, OXALIC.—LONDON: 48s. to 57s. 6d. per cwt. according to packages and position. SCOTLAND: 98/100%, £49 to £52 per ton ex store. MANCHESTER: £52 ex store.

ACID, TARTARIC.—10½d. per lb. SCOTLAND: B.P. crystals, 10½d., carriage paid. MANCHESTER: 10¾d.

AMMONIUM CARBONATE.—SCOTLAND: Lump £32 per ton; powdered £34 in 5 cwt. casks delivered buyers' premises U.K.

ARSENIC.—LONDON: £22 14s. c.i.f. main U.K. ports for imported material; Cornish, nominal £23 f.o.r. mines. SCOTLAND: White powdered £27 ex wharf; spot, £27 10s. ex store. MANCHESTER: White powdered Cornish, £24 10s. at mines.

POTASH, CAUSTIC.—LONDON: £42. MANCHESTER: £41.

POTASSIUM PERMANGANATE.—LONDON: 8½d. per lb. SCOTLAND: B.P. crystals, 8½d. MANCHESTER: Commercial, 8¾d.; B.P., 8¾d.

SODA, CAUSTIC.—Solid 76/77° spot, £14 10s. per ton d/d station. SCOTLAND: Powdered 98/99%, £17 10s. in drums, £18 15s. in casks. Solid 76/77%, £14 10s. in drums; 70/73%, £14 12s. 6d., carriage paid buyer's station, minimum 4-ton lots; contracts 10s. per ton less. MANCHESTER: £13 5s. to £14 10s. contracts.

SODIUM ACETATE.—£22 per ton. LONDON: £22 10s. to £23.

SULPHATE OF COPPER.—MANCHESTER: £15 10s. to £16 per ton f.o.b.

ZINC SULPHIDE.—1s. 1d. to 1s. 2d. per lb.

Pharmaceutical and Fine Chemicals

ACID, ACETYL SALICYLIC.—2s. 9d. to 2s. 11d. per lb.

ACID, CITRIC.—9¾d. per lb.

ACID, SALICYLIC, TECHNICAL.—1s. 2d. to 1s. 4d. per lb.

AMIDOPYRIN.—20s. per lb.

BISMUTH.—Carbonate, 6s. 10d. per lb.; citrate, 9s. 3d. per lb.; nitrate (cryst), 4s. 7d. per lb.; oxide, 10s. 6d. per lb.; salicylate, 7s. 7d. per lb.; subchloride, 10s. 3d. per lb.; subgallate, 7s. 3d. per lb.; subnitrate, 5s. 11d. per lb.

IODINE RESUB., B.P.—15s. 2d. to 19s. 3d. per lb.

IODOFORM.—B.P., cryst., precip., powder, 18s. 2d. to 22s. 6d. per lb.

PHENACETIN.—4s. 6d. per lb. LONDON: 4s. 9¾d. per lb.

PHENOLPHTHALEIN.—3s. 10d. to 4s. 6d. per lb.

POTASS. IODIDE, B.P.—13s. 5d. to 15s. 11d. per lb.

SODIUM IODIDE, B.P.—14s. 5d. to 17s. 6d. per lb.

SODIUM SALICYLIC.—Powder, 2s. to 2s. 8d. per lb.; crystal, 2s. 1d. to 2s. 2d. LONDON: Powder, 2s. 1d. to 2s. 8d., including packing and delivery; crystals 1d. extra.

Essential Oils

BERGAMOT.—8s. per lb.

CAMPHOR.—Brown or white, 90s. per cwt.

CASSIA, 80/85%.—4s. 3d. per lb.

CITRONELLA.—Ceylon, 2s. 4d. per lb.

CLOVE.—90/92% English, 4s. 10d. per lb.

EUCALYPTUS.—Australian B.P. 70/75%, 1s. per lb.

LAVENDER.—Mont Blanc 38/40%, 11s. 3d. per lb.

LEMON.—5s. 6d. per lb.

PEPPERMINT.—Wayne County.—14s. per lb.

PETITGRAIN.—6s. 3d. per lb.

Coal Tar Products

ACID, CARBOLIC (CRYSTALS).—9d. to 10d. per lb. Crude, 60's, 1s. 11d. to 2s. per gal.; 2% water, 2s. MANCHESTER: Crystals, 9d.; crude, 2s. 3d. SCOTLAND: Sixties, 1s 7d. to 1s. 8d.

PITCH.—Medium soft, £4 17s. 6d. to £5 per ton. MANCHESTER: £4 15s. to £5 f.o.b. LONDON: £4 14s. to £4 16s. 6d. f.o.b. East Coast port.

Commercial Intelligence

The following are taken from printed reports, but we cannot be responsible for any errors that may occur.

Mortgages and Charges

[NOTE.—The Companies Consolidation Act of 1908 provides that every Mortgage or Charge, as described therein, shall be registered within 21 days after its creation, otherwise it shall be void against the liquidator and any creditor. The Act also provides that every Company shall, in making its Annual Summary, specify the total amount of debts due from the Company in respect of all Mortgages or Charges. The following Mortgages and Charges have been so registered. In each case the total debt, as specified in the last available Annual Summary, is also given—marked with an *—followed by the date of the Summary, but such total may have been reduced.]

BRYANT AND MAY, LTD., London, E., match manufacturers. (M., 21/1/33.) Registered Jan. 5, trust deed dated Jan. 2, 1933, securing £750,000 debenture stock, present issue, £500,000; charged on properties in Poplar, etc. (subject, etc.), also general charge. *£921,224. May 12, 1932.

CHESHIRE UNITED SALT CO., LTD., London, E.C. (M., 21/1/33). Registered Jan. 10, £5,000 debentures, part of £35,000 (not ex.); general charge (subject, etc.). *£3,500 mort. £25,000 debentures. Oct. 14, 1932.

ELTON COP DYEING CO., LTD. (M., 21/1/33.) Registered Jan. 4, series of £5,000 (not ex.) debentures, present issue £350; general charge. *Nil. July 1, 1932.

TARFROID (1931), LTD., London, E.C., tar manufacturers. (M., 21/1/33.) Registered Jan. 6, £1,800 debenture to Oceana Development Co., Ltd., 3 London Wall Buildings, E.C.; general charge.

Satisfaction

TARFROID, LTD., London, E.C., tar manufacturers. (M.S., 21/1/33.) Satisfaction registered Jan. 6. £2,000, registered September 7, 1932.

County Court Judgment

[NOTE.—The publication of extracts from the "Registry of County Court Judgments" does not imply inability to pay on the part of the persons named. Many of the judgments may have been settled between the parties or paid. Registered judgments are not necessarily for debts. They may be for damages or otherwise, and the result of bona-fide contested actions. But the Registry makes no distinction of the cases. Judgments are not returned to the Registry if satisfied in the Court books within twenty-one days. When a debtor has made arrangements with his creditors we do not report subsequent County Court judgments against him.]

RADIUM AND CHEMICAL CO., LTD., 31 London Wall, E.C., manufacturers. (C.C., 21/1/33.) £16 10s. 1d. Dec. 2.

Forthcoming Events

Jan. 23.—Royal Society of Arts. "Thermal Insulation." (Lecture I). Ezer Griffiths. 8 p.m. John Street, Adelphi, London.

Jan. 24.—Hull Chemical and Engineering Society. "Flax." H. G. Woolman. 7.45 p.m. Grey Street, Park Street, Hull.

Jan. 25.—British Association of Chemists (Manchester Section.) "An Individualist's Opinion of Big Organisation, including the proposed Chemists' Reorganisation." C. M. Whittaker. 7.30 p.m. Grand Hotel, Aytoun Street, Manchester.

Jan. 25.—Institution of Chemical Engineers. Papers on Sewage Disposal Practice. H. E. Whitehead, F. R. O'Shaughnessy, L. R. Howson, Dr. Karl Imhoff. 5.30 p.m. Burlington House, London.

Jan. 26.—Mineralogical Society. 5.30 p.m. Burlington House, London.

Jan. 27.—The Chemical Society. The Ostwald Memorial Lecture. Professor, F. G. Donnan. 6 p.m. Chemistry Lecture Theatre, The University, Liverpool.

Jan .27.—Society of Chemical Industry (South Wales Section). "Town Gas in South Wales Industries." A. J. Cruise. 7.15 p.m. Technical College, Cardiff.

Jan. 27.—Manchester Literary and Philosophical Society. "Calico Printing." F. A. Ermen. 7 p.m. 36 George Street, Manchester.

Jan. 30.—University of Birmingham Chemical Society. "Rare Earths." Dr. J. Newton Friend. 5.30 p.m. Chemical Lecture Theatre, Edgbaston, Birmingham.

Jan. 25.—The British Wood Preserving Association. "Some Experiments in the Control of Dry Rot." Alex H. Dewar. 6 p.m. Lecture Hall of the Auctioneers' and Estate Agents' Institute, 29 Lincoln's Inn Fields, London.

Company News

Distillers Co., Ltd.—An interim dividend of 7½ per cent. is payable on February 1 on the ordinary shares.

Chemical Bank and Trust Co. of New York.—The financial statement shows $324,457,852 of deposits and $66,412,501 of capital, surplus and undivided profits.

British Oil and Cake Mills, Ltd.—The directors have declared an interim dividend of 5 per cent., less tax, on the ordinary share capital, the whole of which is held by Lever Brothers, Ltd. Last year the interim was 6 per cent.

New Transvaal Chemical Co.—Final dividends are announced for the year ended June 30 last of 3 per cent. on the cumulative first preference shares and 4 per cent. on the cumulative "A" preference shares.

Canada Cement Co.—The report for the year to November 30 last shows profits from operations and income from investments, after making provision of $555,650 for depreciation of capital assets, of $2,086,074, less bond interest $1,052,748. Premium on New York funds takes $102,995, fire insurance reserve $120,400, and reserve for repairs, etc., $25,000, leaving $784,931.

Tariff Changes

Canada.—By an Order in Council of December 16, 1932, the regulation established by Order in Council of October 28, is cancelled and the following regulation is made and established, to be effective from October 28, 1932. The following articles imported to be used as materials in Canadian manufactures, are subect to reduced rates of duties of Customs as set forth, until otherwise established. Mixtures of methyl alcohol and other ingredients, when imported by tanners for use exclusively as a solvent for dyes for the dyeing of leather in their own factories, British preferential tariff per proof gal. 20 cents; intermediate tariff per proof gal. 20 cents.; general tariff per proof gal. 20 cents.

Chemical Trade Inquiries

The following trade inquiries are abstracted from the "Board of Trade Journal." Names and addresses may be obtained from the Department of Overseas Trade (Development and Intelligence), 35 Old Queen Street, London, S.W.1 (quote reference number).

British India.—A former resident representative in India of certain United Kingdom cotton piece-goods mills has recently established himself in Calcutta as an agent for manufacturers of mill stores and wishes to undertake the representation for Bengal and adjacent territory, on commission, of United Kingdom manufacturers of essential oils, aromatic chemicals, soap perfumes and raw materials for soap factories and perfumery works; also brilliantine, hair oil perfumes, and essences for flavouring mineral waters, aerated water, syrups. (Ref. No. 79.)

Egypt.—A firm of general merchants and commission agents desires to represent United Kingdom manufacturers of iron, steel and metal manufactures (copper, brass, tin, zinc), such as sheets, bars, foil, pipes, plates, rods and tubes, rails; lubricating oils and greases, vegetable oils (including linseed oil), artificial silk goods. (Ref. No. 111.)

Egypt.—A firm of commission agents in Alexandria is anxious to represent British manufacturers of varnishes, enamels, cellulose lacquers, dry colours (red lead, ultramarine blue, zinc white, lithopone, etc.), linseed oil. (Ref. No. 113.)

Turkey.—A firm of commission agents desires to represent United Kingdom manufacturers of tin bars, caustic soda, soda silicate, caustic potash, chloride of potash, sulphate of potash, sugar in cubes in boxes of 50 kg. (Ref. No. 115.)

Books Received

Economic Conditions in Chile, November, 1932. Report by Arthur J. Pack, Department of Overseas Trade. London: H.M. Stationery Office. Pp. 48. 1s. 6d.

Economic Conditions in Ecuador, September, 1932. Report by R. M. Kohan, Department of Overseas Trade. London: H.M. Stationery Office. Pp. 44. 1s. 6d.

Water Pollution Research. Summary of Current Literature. Vol. VI. No. 1. January, 1933. Abstracts Nos. 1-120. London: H.M. Stationery Office. Pp. 36. 2s.

Importation of Molasses into France

THE French "Journal Officiel" of December 23 contains an Order, dated December 22, providing that the total quantity of molasses for the preparation of sweetened foods for animals which may be admitted into France at the reduced duty of 25 centimes per degree of absolute saccharine richness and per 100 kilogs. during the period February 1, 1933, to January 31, 1934, is to be 40,000 metric tons, distributed over the period in four unequal parts.

New Companies Registered

C. H. Quinn, Ltd.—Registered as a "private" company on December 30. Nominal capital £1,500 in £1 shares. Objects: To carry on the business of chemists, druggists, drysalters, oil and colour men, etc. Directors: C. H. Quinn, The Newlands, Westfield Road, Blackpool, J. Whyld and F. M. Burdett.

Coroy Chemicals, Ltd. Registered as a "private" company on January 2. Nominal capital £400 in £1 shares. Manufacturers of and dealers in chemicals, minerals, oils, etc. Directors: E. E. Young, "Treween," Park Crescent, Harrow, R. E. Cooban and S. St. John.

P. J. Millard, Ltd. Registered January 9. Nominal capital £5,000 in £1 shares. Seed crushers and manufacturers of linseed, cotton and other cakes, oil extractors, cake and oil manufacturers, oil refiners and manufacturers of cattle food and feeding and fattening preparations, etc. Directors: P. J. Millard, "Ashlands," Fareham, Hants. Mrs. Agnes E. Millard, Florence Millard and Nancy Millard.

Union Oxide and Chemical Co., Ltd., 12 Pepys Street, Seething Lane, London, E.C.3.—Registered as a "private" company on December 22. Nominal capital £20,000 in £1 shares. Dealers in metals, ores and mineral substances, etc. Directors: H. V. Parker, and W. Astlec.

Reduction in the Price of "Nust"

THE Nor-Rust Liquid Lead Co., Ltd., as a result of the sale of its entire output last year, the fall in price of metals and complete modernisation of plant, has reduced the price of "Nust" from 1s. 9d. per lb. to 9d. per lb. At this price the quality of "Nust" will enable its more general use in all industries. In future "Nust" will be sold at the following prices, ex works: 10 lb. containers, 1s. per lb.; 28 lb. containers, 11d. per lb.; 56 lb. containers, 10d. per lb.; 1 cwt. containers, 9d. per lb.

Salt Trade in British India

Result of Inquiry for Additional Import Duty

THE Government of India recently decided that an inquiry should be held into representations that were made asking for an increase in the additional import duty on foreign salt imported into India, which was imposed upon the Salt (Additional Import Duty) Act, 1931, and they appointed the Collector of Customs at Calcutta to conduct this inquiry. H.M. Trade Commissioner at Calcutta now reports that the inquiry was held between November 9 to 24, 1932. In the opinion of the Government of India, the result of the inquiry shows conclusively that up to the present time nothing has happened that would justify any increase in the import duty and they, therefore, consider that no case has been made out for increasing the additional duty, but should any marked further reduction in the general level of prices be established, which cannot be justified on the ground of further reduction in freights, the position may require reconsideration.

Season's Greetings

More Calendars and Diaries for 1933

FURTHER seasonable gifts have reached us since the compilation of the list of calendars, diaries and other tokens sent out by chemical and allied firms which appeared in the THE CHEMICAL AGE last week, as follows:—

CHEMICAL SUPPLY CO., LTD.—A combined desk diary, index and scribbling pad.

PREMIER FILTERPRESS CO., LTD.—Refills for the company's perpetual calendar.

UNITED POTASH CO., LTD.—"The Potash Notebook, 1933," with a covering note to the effect that readers can obtain free copies of the notebook on application to the Agricultural Department, United Potash Co., Ltd., 112 Fenchurch Street, London, E.C.3.