The Chemical Age

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Notes and Comments

Consultants and Consulting

WE cannot record any surprise on reading the announcement that the Institute of Chemistry continues to receive complaints that attempts to undertake professional chemical consulting and analytical practice are made by rate-aided institutions as well as by members of other professions. The consultant in any industry is in a difficult position—a position that is becoming increasingly difficult as the years pass. We have heard an established consultant of many years' standing describe his as a dying profession. Another stated that it was one into which he would not wish his worst enemy to enter. The consultant, in short, is one whom every man's hand is against; we would not advise any young chemist to think of venturing upon that side of his business.

The decay dated from the time when industry realised the necessity of expert assistance. Time was when the consultant was pre-eminently the man who could give that assistance. He was not infrequently the only man who could do so, just as the medical man is the only one to whom we may look for relief from illness. The belief grew, not unreasonably, that firms could be better served by employing chemists and engineers as ordinary members of their staffs. Perhaps it might be better to say that in most instances the increasing standard of attainment of the chemists and engineers employed rendered it less necessary to call in the services of a consultant. In time that position extended to one in which firms expected their staffs to solve all their problems, and to conduct all their analyses without outside assistance. To-day most technical employees feel that it is a confession of weakness to ask for external aid.

The Modern Idea of Service

A SECOND cause for the decay of the consulting profession is that of the modern idea of *service*. The people who vend vacuum cleaners, wireless sets, watches and a host of other things have familiarised us with the idea that the man from whom a machine is bought will keep it in order for a fixed period. Constructional firms have now highly skilled staffs and if any defect arises, even years after the installation of plant, it is to the constructional firms that the user looks for assistance—assistance, moreover, that in many instances is given without charge. In many industries the constructional firms go farther still. In order to get orders for plant they go to almost absurd lengths before the contract is placed. It has thus become quite common for a prospective purchaser to send an inquiry to some or all of the firms in his industry. This inquiry is in the vaguest terms. The purchaser does not even know what he wants. The constructional firms prepare competitive schemes. Sometimes many such are prepared in the course of a single inquiry. The purchaser has the benefit of the combined brains of all the firms in suggesting the best layout and the most advantageous type of plant.

All this work involves the constructional firms in great expense whether they receive any orders or not. Glaring instances have been reported in the Press where firms were involved in more expense in the aggregate than the value of the contract. All this system is doubtless very much to the advantage of the purchaser, but it is not to the advantage of the suppliers, who find themselves called upon to do the work which used to be and should be done by the consultant, without receiving any recompense. Many architects are to-day finding themselves in the same position. It can only be remedied, so far as the consulting engineer is concerned, by the constructional firms mutually agreeing not to undertake any work save through a consultant. In the present days of competition, however, firms manifest such eagerness to "get the inquiry," that this solution seems hopeless.

Competition from the Colleges

THE third modern difficulty of the consulting profession comes from the direct competition of the Universities and technical colleges. At some colleges —we have a recent instance in mind—the salary offered is too low to attract a really experienced man, but the inducement is held out deliberately that the successful candidate can, if he so desires, accept consulting work. He thus has the whole resources of the University or college, often without payment, as compared with the established consultant who must pay for everything, including rent and rates. The competition of the colleges may be less intense in London than elsewhere, but in the provinces it is very marked. It is encountered, moreover, not only where it is encouraged by the authorities, but in other spheres as well. Some lecturers and professors probably receive far more from the extraneous consulting work than from the chairs they occupy. Frequently the work is not deliberately sought. In the provinces, particularly, the University or college is regarded as the local home of learning, a belief fostered by the authorities in order to attract students and (probably) legacies and donations. That is quite legitimate. But it also leads to the involuntary advertisement of the staffs of the departments as the greatest authorities in the industries they teach.

Naturally and unthinkingly local industrialists take their problems to the Universities for solution. The problem is a difficulty. Without consulting work, it is held, the lecturers would not retain touch with industry. That may be true in a narrow sense, but there is much more to be said for the utter prohibition of consulting work by teaching staffs unless the entire fees, which should be higher than those charged by the regular consultants, go to the University.

Science and Politics

EVENTS in Germany have again brought into prominence the inter-relationship, if any, between science and politics. How far should the man of science or of learning in any branch *necessarily* concern himself with political affairs? Should he be regarded as one who lives apart from the world, privileged to bury himself in a subject that is to him at once a means of existence and a hobby, and wherein his discoveries can benefit the world through exploitation by others, or should he be regarded as one who by reason of his superior intellect should be a leader in the everyday affairs and politics of the world? The German Nazis have no doubts upon the subject. Addressing the assembled professors of Berlin University, Dr. Rust, the Prussian Minister of Education took them severely to task for neglecting politics. He complained that while the students were fighting the political battle, the professors were " still completely bottled up in your scientific tasks, which, one must admit, you performed admirably. In these years, you in professorial aloofness and absorbed in your great work of research, overlooked the fact that youth sought in you the leaders of the future German nation. . . . This is a tragedy not only of the professors but also of the students. . . I must dismiss a number of German professors so that the German Universities may again fulfil their task of combining the scientific instruction and the leadership of youth."

A tragedy, indeed! The similarity between the treatment of the intelligentsia in Soviet Russia and Nazi Germany is painful. It may well be asked how a man whose life and being are devoted to science can be expected to throw himself heart and soul into political movements. If scientists and professors are to be at the mercy of whatever political party happens to be in power, their position will be impossible. Had the professors been active Hitlerites they would probably have been dismissed by the former regime. As they were not, they are to be dismissed by the present regime as soon as it has the power to do so. So the Universities, the ancient seats of learning, are to be brought down to the level of municipal government in America, where most of the posts appear to change hands every time an election is lost and won. Such a system is logically only possible when those who hold the posts are given the opportunity to fill their pockets whilst in office so that they may live whilst striving to oust their temporarily victorious opponents.

The Needs of Humanity

THERE is an old story of the eminent Russian, who, in the days of the Czars professed astonishment at the lack of political fervour among the students of Oxford and Cambridge. " In my country," he said, " the students are a political force." The result of allowing the semi-educated to meddle with politics is painfully evident to-day in that country. It may be equally painfully evident to-morrow in Germany. A ban has just been placed upon politics at our older Universities, and it is evident that we are in no present danger of allowing politics to be an essential part of our Universities.

Having made it clear that our scientists must be free to work in their own way without interference from any political body, we are bound to say, however, that scientific men as a class cannot escape criticism if they cut themselves off too completely from their fellows and from the current problems of the world. There are those purely theoretical and abstruse minds which are totally unfitted to cope with realities, and which can only give of their best when they allow themselves to be immersed in the higher realms of mathematics, or of chemistry, or of physical conjecture, but among scientists there are many who are able to interpret the trend of science in terms of the needs of humanity. To such men the world has a right to look for guidance, not by the vociferous affirmation of the public meeting and the political platform, but through reasoned theses delivered in Parliament, in the council chamber or in the Press—whether lay or technical. Professor Gibbs was near the truth when he affirmed that it is to the chemist that industry should look for inspiration and leadership, and that he should be at once the apostle and architect of the new order. The scientific worker has much to say regarding the health, the conditions of life and the general welfare of mankind; his attitude should be one of calm scientific thought based on scientific fact as ascertained by incontrovertible experiment.

Salesmen's Reports

ARE salesmen's reports necessary? Are they to be relied upon? And are they worth the time and trouble spent on them by harassed commercial travellers at the end of a hard day? The answer to these three questions, according to Mr. C. C. Knights, speaking at a meeting of the National Association for Salesmanship last week in London, was yes, definitely yes. The sales manager wants to know what his customers think about his goods. Why they buy, or more particularly, why they don't. He wants to know why his salesman didn't get an interview, or if he got an interview, why he couldn't get an order. Salesmen often do not go to work systematically. If they did, they could get their reports written up in half an hour. There is a time in the evening between five and six when, as salesmen know only too well, customers cannot be seen, and the reports could easily be written up then.

Mr. Knights urged the necessity for salesmen to carry with them a looseleaf notebook in which to note customers' characteristics and peculiarities. " It is no use trying to recall just as you enter a shop, what it was the customer liked about the goods the last time you called, and how big an order he placed. Carry a looseleaf notebook with a customer on each page, and you have all the information you want at your finger tips." Also, Mr. Knights suggested, it would be better if, for office purposes at any rate, salesmen's territories were known by numbers, rather than by the name of the salesman. As a sales manager he dislikes hearing his salesmen talking about " *my* territory," " *my* customers," etc. They are not his. They are the firm's.

Industrial Spectro-Photometry

A Choice of British Instruments for Measuring Colour

The exact measurement of colour is of immense industrial importance. This authoritative article has been supplied by Bellingham and Stanley, Ltd., to whom we are also indebted for the accompanying illustrations.

IN addition to the application of the spectrograph and spectrometer to the analysis of materials by their emission spectra, both instruments have an equally important use in the study of the absorption of light by dyes, solutions, and other substances. Nearly every solid and liquid will transmit light of some particular wavelength. For instance, gold in thin layers transmits green light, while silver transmits light in the ultra-violet at wavelength 3,100A. Pitch is comparatively transparent to infra red light, while rock salt transmits the infra red to beyond wavelength 230,000A, in addition to the entire visible spectrum and the greater part of the ultra-violet. Solutions transmit light in greater or less degree, and while often being transparent to the visible spectrum absorb the ultra-violet and the infra red. In some cases the absorption is selective, that is, a comparatively narrow band of the spectrum will be absorbed while regions on both sides are transmitted freely.

In many industries the exact measurement of colour may mean success or failure in the finished product, as for instance, in the manufacture of dyes, colour printing, colour photography, and a vast number of other processes. Further, the colour tests made in biological work, and the qualitative estimation of exceedingly small amounts of salts in solutions, impurities in drinking water, etc., are of supreme importance.

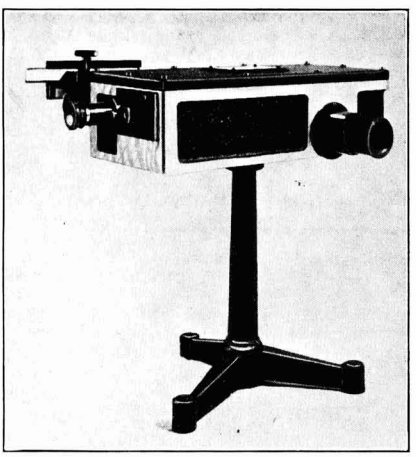


Fig. 1.—Neutral Tint Wedge Photometer.

Instruments which deal with colour estimation may be included in one group, and these are spectrometers, photometers, spectrographs and colorimeters, each of which, with their accessories, have their own particular use and value. The general design of the spectrometer is well known, although the earlier types of instrument illustrated in most text books on the subject, are now seldom used, and they have been replaced by instruments which have been designed to give accurate and rapid measurements. For chemical work, it is only necessary that the instrument should give good definition, ample light, and read wavelengths directly without calibration. For the photometric measurements as would be required in investigating the amount of light transmitted by a sample, several photometers are available.

Probably the most simple type of photometer is that in which the comparison light is reduced by a neutral tint wedge which is arranged to travel over the upper portion of the spectrometer slit, so that the match can be made with the light transmitted by the sample which passes the lower portion of the slit. To obtain a fine border line between the two beams, some optical device, such as the Albrecht rhomb is usually mounted between the two beams so that they are in juxtaposition, and divide the length of the slit into halves. An instrument using the neutral tint wedge photometer is shown in Fig. 1, and is extensively used for investigating the light transmitted by filters, dyes, etc., and for determining the quality of the reflected light from printing inks and coloured materials. While the neutral tint wedge is simple, and gives rapidity in working, it has one disadvantage, and this is the departure from exact neutrality, and for accurate work it is sometimes necessary to carry out a preliminary calibration of the wedge for the range of spectrum required. There are now available excellent cast gelatine wedges, which are neutral over the greater part of the visible spectrum. Another type of photometer depends on polarisation as in the Nutting and B-S instruments. Both these are intended for use when measurements to a high degree of accuracy are necessary. If light passes through two Nicol prisms in train, the amount of light transmitted is proportional to the square of the cosine of the angle between the principal planes of the Nicol prism. If, therefore, two such prisms are inserted in the comparison beam of the photometer the amount of light transmitted can be controlled by turning one of the prisms, and if this prism carries a graduated arc the amount of light transmitted is determined by direct reading.

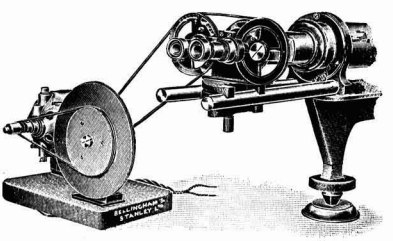


Fig. 2.—Latest Type of Sector Photometer.

With all polarisation instruments it is important that the optical system in both beams should be identical, and that both beams should enter the spectrometer slit in the same plane of polarisation so that no modification of one beam takes place relative to the other by reflection or refraction in the spectrometer.

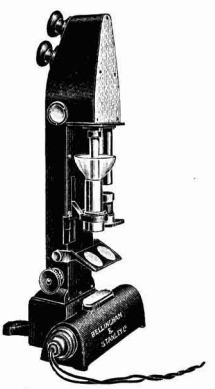


Fig. 3.—The New British Colorimeter.

Photometry in the ultra-violet is equally important, particularly for investigating the absorption spectra of organic substances, and an immense amount of important work has been carried out in this direction. The ultra-violet can only be explored by photography or by the photo-electric cell. In place of the spectrometer used for visual work, it is necessary to employ a spectrograph capable of photographing the spectrum over the range required, and generally it is necessary to equip the instrument with quartz elements in place of glass, as glass transmits only to about wavelength 3,000A whereas quartz transmits to wavelength 1,800A.

Previous to about 1912 all absorption measurements in the ultra-violet were only qualitative, although several attempts were made to construct a suitable photometer for this region

of the spectrum. The first satisfactory photometer was of the rotating sector type, and when photography is employed is still the most satisfactory instrument to use. The instrument has, on occasions, been criticised on account of the intermittent exposure, but it has been shown that this criticism has little foundation, and that the results are perfectly accurate providing certain simple precautions are taken.* A sector photometer was described in "Journal of the Royal Society of Arts," October 21, 1921, which gave a continuous exposure on the photographic plate, but this can only be obtained if the light source is focussed on the spectrograph slit, which is not the condition for even illumination, and after a long series of trials the instrument was abandoned.

The Polarisation Photometer

The polarisation photometer has also been used for the ultra-violet, and with a modified form of Nicol prism constructed without cement the instrument can be used up to the limit of transmission of Iceland spar, but as this instrument needs long exposures it cannot compare with the sector instrument for speed of operation. The latest type of sector photometer which is based on the suggestions made by H. J. McNicholas in the "Bureau of Standards Journal of Research," *1* (6), 942, is shown in Fig. 2, attached to a spectrograph, and forms one complete unit. This instrument eliminates all the various adjustments required in the earlier instruments of this type. It is extremely easy to operate, and no adjustments are required in setting up, except to place the light source in the required position, a matter of a few seconds. It is now the standard instrument employed in vitamin control, and is in use in the more important chemical works for this and other purposes. It also has one very great advantage over other instruments, and this is, that it can be used with an arc as light source, thus greatly reducing the time necessary for exposure. The procedure adopted for ultra-violet spectrophotometry, is to place in one beam a tube with quartz windows, carrying the solvent, while in the other beam is placed a similar tube carrying the solution. The sector in the beam containing the solution remains at a fixed opening, while the adjustable sector is set at a different opening for each exposure, and a series of spectrum photographs are taken, each with a different and known opening of the adjustable sector. Each spectrum is in two portions, an upper and a lower half. The upper half remains constant for each exposure and consists of the light which has passed the solution, while the other changes in intensity and has been modified by the opening of the adjustable sector. If each spectrum is examined points will be found where the upper and lower portions match in density, and as the sector opening and the wavelength is known, the absorption curve can be drawn.

Probably the most important of all colour measuring instruments is the colorimeter, which is found in nearly all laboratories. (This instrument should not be confused with an instrument bearing the same name which is employed for determining the colour of material in terms of the three primary colours.) The colorimeter is used principally for the estimation of the strength of a solution by its colour, and by the use of suitable colour filters an accuracy can be reached which far transcends that obtained by any other means. For the qualitative estimation of amounts down to one part in 6,000,000 this instrument gives accurate and rapid measurements and no spectrometric method is so suitable for this class of work. The instrument fails, however, when other substances are present in the solution which may give a similar colour reaction.

British Colorimeters

Unfortunately, in the past, these colorimeters were nearly all of foreign manufacture, and were imported into this country at an exceedingly low figure, thus preventing the successful manufacture of a British instrument. There is, however, a British instrument now available, which possesses many important improvements, and is of more rigid construction than the foreign instruments. The new British instrument, as shown in Fig. 3, is fitted with only one plunger, and comparison is made against a cell of standard thickness. This method is more accurate than the employment of double cells and plungers, but is not so rapid in action, as a suitable strength of solution must be prepared first to serve as a standard.

A photometer using the photo-electric cell has been recently designed by Dr. Guelke, of the Manchester College of Technology. In this instrument light from a slit is split into two beams by means of a rotating mirror disc. One beam traverses or is reflected from the sample, afterwards falling on the photo-electric cell alternately with the first beam. The alternating potential difference thus set up, is after amplification, fed to a rectifying commutator on the motor shaft and then to a moving coil instrument, the moving element of which carries a wedge shaped aperture placed in the path of one of the beams.

* A long series of investigations were carried out by E. C. C. Baly, F.R.S., R. A. Morton and R. W. Riding, dealing with the comparison of various photometers, including the sector photometer and photo electric methods and the accuracy of the sector instrument was established. Many independent investigations have also been carried out and these lead to a similar conclusion.

Utilisation of Coke Oven Tar

New Outlets in Germany

ONE of the lines of attack which is regarded with some favour in the German coke oven industry is the hydrogenation of high-boiling tar fractions to viscous oils suitable as lubricating agents. Catalytic hydrogenation at 200° C. and 100 atmospheres initial hydrogen pressure gives a maximum yield of 53 per cent. oil of good quality. It is also interesting to note that an exceptionally high asphalt yield is obtained by heating in the presence of atmospheric oxygen, but all efforts to eliminate the asphalt-forming substances from the oils thereby produced have failed—thus rendering the latter impracticable as lubricants. On the other hand, the reaction can be exploited with a view to increasing the pitch output by air-blowing the tar oils at an elevated temperature.

Another line of approach to the problem, according to Dr. H. Broche ("Chemiker-Zeitung," April 19, 1933, page 304), is the conversion of the heavy tar oils—which cannot be sold at an economic price as heating oils—into motor fuel, the method adopted being partial combustion of the oils to carboxylic acids and subsequent decarboxylation. This process requires no external application of heat and can be carried out in simple and cheap plant. Commencing with 100 kg. naphthalene, for example, which is first oxidised to phthalic acid, the theoretical yield of benzol is 61 kg. The crude tar fraction is preferably passed in the vapour form in admixture with air at 400° to 450° over vanadium pentoxide or other suitable catalysts deposited on pumice stone. In actual practice, a 49 per cent. yield is obtained, so that 204 kg. naphthalene are required for each 100 kg. benzol produced. The method holds out great promise in view of the fact that the market price of benzol is almost three times as high as that of naphthalene, so that it is extremely interesting to note that it has been applied with equal success to the tar oils boiling above 200° C.

In view of the present scarcity of pitch, considerable significance attaches to the above-mentioned polymerisation of tar oils by blowing with air, laboratory tests indicating that the average 60 per cent. yield of pitch can be raised to 90 per cent., and the product is in no way inferior to normal pitch as a briquetting agent. Attempts have also been made to eliminate the defective qualities of coal tar oils in respect of their use in Diesel engines with a view to competing with petroleum or lignate oils. The principal object in view was the reduction of the ignition point of the tar oil, an object which was achieved by treatment with oxidation catalysts, the most effective being vanadium pentoxide deposited upon silica gel. At the same time a much simpler method of reducing the ignition point of tar oils was discovered and merely involves the introduction of an ignition contact constructed of corrosion-proof steel into the pre-combustion chamber of the Diesel engine.

Financial Position of the Chemical Industry

By S. HOWARD WITHEY, F.C.I.

FLUCTUATIONS in the values of national currencies, and the continued fall in prices, have necessitated many administrative economies in the chemical industry, and the progress in the reduction of costs has, in some instances, resulted in an increased volume of business within the shelter of the protected home market. The figures shown in the audited accounts of Imperial Chemical Industries, Ltd., covering the twelve months ended December last were surprisingly good and extremely encouraging, the gross profit realised by this great combine during 1932 aggregating £6,415,423, representing an increase of more than 37 per cent. in relation to the previous year's figure. The allocation to the company's central obsolescence fund was unchanged at £1,000,000, but £686,351 was debited for income tax, as compared with £260,395 charged against the 1931 profits, so that the net profit worked out at £4,729,072, representing an increase of nearly 40 per cent. The declaration of a final dividend of 3½ per cent. on the ordinary shares made 6 per cent. for the year, as compared with 4½ per cent. distributed the previous year, and after transferring £500,000 to reserve, a credit balance of £543,770 goes forward to the next account, as against £516,825 brought in. Registered in 1926, the company controls numerous concerns, the authorised share capital being £95,000,000, of which a total of £77,148,333 has been issued and paid up, comprising £22,690,448 in the form of 7 per cent. cumulative preference £1 shares (the dividend on which takes £1,586,751), £43,589,605 in ordinary £1 shares (the 6 per cent. dividend on which absorbs £2,615,376), and £10,868,280 in deferred shares of 10s. denomination (upon which no dividend has been paid since 1929). The accounts of the Magadi Soda Co., Ltd.—which is associated with the Imperial Chemical Industries through I.C.I. (Alkali), Ltd.—disclosed a loss of £19,505, after providing £16,381 for obsolescence and £17,028 for debenture interest, thereby increasing the debit balance to £71,205, which is carried forward.

Soap and Glycerine

Soap, glycerine and chemical manufacturers have made good profits, the net profit of £6,228,162 realised by Lever Brothers, Ltd., constituting a record. After transferring £250,000 from the exchange reserve fund no longer required, the profit figure was £6,478,162, as compared with £5,903,498 shown in the 1931 account, enabling the dividend on the ordinary stock to be increased from 10 per cent. to 15 per cent. The company has an authorised capital stock of £130,000,000, of which a total of £59,369,584 ranks for dividend, comprising £30,577,099 in 7 per cent. cumulative preference; £15,505,173 in 8 per cent. "A" cumulative preference; £3,787,312 in 20 per cent. cumulative preferred ordinary; £3,000,000 in 20 per cent. "A" cumulative preferred ordinary; and £6,500,000 in ordinary stock. After transferring £250,000 to the general reserve and a similar sum to the contingency reserve, and writing off £201,104 for debenture discounts and issue expenses, the appropriation account shows a credit balance of £250,675 to go forward, as against £230,482 brought in.

The profit realised by Joseph Crosfield and Sons, Ltd., also shows a satisfactory increase, the net amount for 1932 being £696,351, as compared with £680,072 realised in 1931, the ordinary dividend being maintained at the rate of 30 per cent. and an increased balance carried forward to the next account. This company, which was registered in 1896, controls the Erasmic Co., Ltd.; D. C. Keeling and Co., Ltd.; and Medley and Son, Ltd., and is itself controlled by Lever Brothers, Ltd., the authorised share capital being £10,000,000, of which £4,900,000 has been issued and paid up, *viz.*:—£400,000 in 5 per cent. cumulative pre-preference £1 shares; £500,000 in 6 per cent. cumulative preference £1 shares; £1,000,000 in 6½ per cent. cumulative preference £1 shares; £1,500,000 in 7½ per cent. "A'" cumulative preference £1 shares; and £1,500,000 in ordinary £1 shares. William Gossage and and Sons, Ltd., realised a net profit of £55,121 during 1932, and after meeting the preference dividend a credit balance of £37,660 is carried forward. Registered in 1894, the company now has an authorised share capital of £5,450,000, of which only £1,900,000 has been issued, made up of £450,000 in 5 per cent. cumulative preference £1 shares; £750,000 in 6½ per cent. cumulative preference £1 shares; and £700,000 in the form of ordinary £10 shares.

Lead and Antimony

Lead manufacturers report satisfactory results in spite of the difficult industrial conditions, and during the past year a profit of £199,269 was realised by Goodlass Wall and Lead Industries, Ltd., this figure being arrived at after debiting depreciation and comparing with £219,148 shown in the 1931 account. The balance of net profit proved to be £143,495—a decline of only £19,485—and as the 1931 figures covered a period of thirteen months, and a reduced amount was necessary to meet the dividend on the preference and preferred ordinary shares, it was found possible to raise the rate of ordinary dividend from 2 per cent. to 3 per cent., and to carry forward an increased surplus to the next account. This company was registered towards the end of 1930 for the purpose of acquiring the business of Goodlass Wall and Co., Ltd., and Associated Lead Manufacturers, Ltd., and holds a controlling interest in numerous lead, antimony and kindred concerns, the authorised share capital being £3,250,00, of which a total of £3,002,535 ranked for dividend, consisting of £1,346,050 in the form of 7 per cent. cumulative preference £1 shares; £451,807 in 7 per cent. non-cumulative preference ordinary 10s. shares; and £1,204,678 in ordinary 10s. shares. The preference shares were recently quoted at 22s. 6d., and the preferred at 9s. 6d. The 1932 accounts of Alexander, Fergusson and Co., Ltd., disclosed a profit of £20,170, which compares with £18,388 realised during the preceding thirteen months, enabling the dividend of 12½ per cent. to be maintained, and the bonus on the "A" ordinary and "B" ordinary shares to be increased from 2½ per cent. to 7½ per cent., and the carry forward to be increased after allocating the sum of £5,000 to depreciation, as before. Registered in 1897, this company has an authorised share capital of £140,000, all of which has been issued and paid up, comprising £70,000 in 5 per cent. cumulative preference shares; £35,000 in "A" ordinary, and £35,000 in "B" ordinary shares, all of £1 denomination.

Starch, Blue and Blacklead

World conditions have greatly handicapped manufacturers of starch, blue, and blacklead, and when the difficulties are taken into account the gross profit of £1,175,187 made by Reckitt and Sons, Ltd , during the past year must be regarded as very satisfactory. After debiting debenture interest and directors' fees the net profit worked out at £1,261,862, which figure compares favourably with £1,148,026 realised during 1931, the rate of ordinary dividend being consequently maintained at 22½ per cent. for the fourth successive year. By transferring £150,000 to the general reserve, that fund is brought up to £1,250,000, and of an authorised share capital of £5,148,000 a total of £5,057,695 ranked for dividend, comprising £500,000 in the form of 4½ per cent. first cumulative preference £1 shares; £909,695 in 5 per cent. second cumulative preference £1 shares; and £3,648,000 in ordinary £1 shares. The balance sheet showed current liabilities of £1,125,156, against liquid assets aggregating £3,576,715. Manufacturing and wholesale chemists have succeeded in weathering the storm, and in the case of Prichard and Constance (Manufacturing), Ltd., the rate of dividend on the deferred ordinary shares has been raised from 20 per cent. to 35 per cent., the 1932 account revealing a net profit of £19,237, as compared with £14,584 realised during the preceding twelve months. Dubarry Perfumery Co., Ltd., report a net profit of £19,549 for 1932, enabling a final dividend of 15 per cent. to be declared on the ordinary shares, making 20 per cent. for the year, as before, and after allocating £6,236 to taxation account there remains a credit balance of £3,587 to go forward to the 1933 account, as against £7,306 brought in from 1931. The final figures of R. Hovenden and Sons, Ltd., were made up to January 6 last, the audited profit and loss account disclosing a net profit for the year of £15,349, after

charging £1,987 under the heading of income tax. This figure compares with £17,727 realised during the previous twelve months when no special provision was made for income tax, and in order to maintain the carry forward the ordinary dividend has been reduced from 10 per cent. to 6½ per cent.

Paint and Varnish

Profits made in the manufacture of enamels, varnish, cellulose finishes, and water paint, have varied considerably, but generally speaking the net margins have been less. The figures submitted by Paripan, Ltd., covering the twelve months to December last reveal a net profit of £5,200, which compares with £7,292 realised by this company during the previous year, the dividend being reduced from 15 per cent. to 12½ per cent. This company was registered in 1919, and of an authorised share capital of £50,000 a total of £38,438 has been issued and paid up in 5s. shares of one class only. After transferring £1,712 to taxation reserve, and writing off £200 American development expenditure, the account shows a credit balance of £3,757 to go forward, as against £4,072 brought forward.

Unsatisfactory results are reported by india rubber manufacturers and water proofers, due in the main to currency restrictions and the depression in the home market. During 1932, a net loss of £16,682 was sustained by George Spencer, Moulton and Co., Ltd., increasing the debit balance to £24,886, which has been written off the reserve. This company was registered in 1891 as a private concern, and was converted into a public company five years ago, the authorised share capital being £600,000, of which £258,006 has been issued and paid up in the form of 5s. shares of one class only. During the same period J. Mandleberg and Co., Ltd., sustained a loss of £26,832, to which must be added £3,500 allocated to depreciation, also £4,900 dividend on £70,000 of 7 per cent. cumulative preference shares, bringing the total debit up to £35,232, which was covered by bringing in the sum of £17,587 from the previous account, and by transferring £19,000 from reserve, the credit balance of £1,355 being carried forward to the next account. Registered in 1889, the company has an authorised capital of £720,000 in £1 shares.

Drugs and Pharmaceutical Chemicals

Improvements in the marketing of medical and scientific products, combined with internal re-organisation, have enabled British Drug Houses, Ltd., to maintain home trade and to expand export trade, with the result that the gross profit for 1932 was £60,303, as compared with £36,381 for the previous twelve months. The company's ordinary shares consequently re-entered the dividend list, the distribution being at the rate of 5 per cent. as in 1930, and after transferring £10,000 to reserve a slightly increased amount is carried forward to the next account. Registered in 1908, the company has an authorised share capital of £642,000, all of which has been issued and paid up, consisting of £242,000 in 5 per cent. cumulative preference £1 shares, and £400,000 in ordinary £1 shares. A record net profit was realised during the same period by Wright, Layman and Umney (1932), Ltd.—proprietors of the well-known Wright's coal tar soap, etc.—the gross figure being £52,791, and the net figure £40,302—enabling a dividend of 10 per cent. to be paid on the £60,000 worth of ordinary shares, and the sum of £17,500 to be transferred to reserve. This company was registered a year ago in place of the old company. The 1932 accounts of Barclay and Sons, Ltd.—the wholesale patent medicine vendors, manufacturers and druggists' sundriesmen—reveal a net profit of £3,941, or a decline of £813, but the ordinary dividend of 7½ per cent. has been maintained for the third successive year.

Cosach Reorganisation

Terms of New Scheme

THE long-awaited Cosach scheme has now arrived in London, and is under close examination by the leading bankers and merchants concerned. The present Cosach organisation is to be split up into a producing and a selling side. The producing side, in turn, is to be split up into Lautaro and Anglo-Chilian (the "Guggenheim" plants) on the one hand, and the rest of the Cosach producers on the other hand. A small production quota will also be reserved for those few independent producers who have stood outside Cosach all along.

The whole business, both of selling and of producing, has for several years been overshadowed by the immense stocks of nitrate lying in Chile. These amount to some 2,000,000 tons. Besides the usual and obvious disadvantages of unwieldy stocks, these stocks involve the additional complication that they are security for the loans of over £7,000,000 by which the industry is bound to its bankers. Failing an agreement, the bankers have therefore been unwilling to finance further production at a time when the first object of the banks must be to get their advances repaid by a steady liquidation of the stocks.

Stock Liquidation

The scheme now proposed, however, makes special provision to meet this problem. The Sales Corporation (*i.e.*, the selling side referred to above) will in future meet demand as to 20 per cent. by drawing on stocks, and as to 80 per cent. by drawing on new production. If sales rise above 1,000,000 tons a year, any surplus above the 1,000,000 tons will be met as to 33⅓ per cent. from stocks and as to 66⅔ per cent. from new production. The whole of the stocks will be made over to the bankers. Their cost price will be assumed to be £3 per ton. As the stocks are liquidated the bankers will receive the £3 per ton plus 75 per cent. of the profit over and above that. The remaining 25 per cent. of the profit will go to the Chilean Government.

The scheme for the production side provides that 66⅔ per cent. of the production shall be allotted to Lautaro and Anglo-Chilean (about 45 per cent. to Lautaro and 22 per cent. to Anglo-Chilean), and the remaining 33⅓ per cent. to the other producers now included in Cosach—as already said, a further small quota will be reserved for the small independent producers.

Division of Profit

The financial provisions which are founded on this reorganisation of the business structure are based on the central idea that profits shall be concentrated in the Sales Corporation, which is to take over the nitrate from the producers at cost price. As already explained, 20 per cent. of sales (up to 1,000,000 tons a year) will come from stocks. The general finances of the scheme will, therefore, depend on the remaining 80 per cent. of sales, until the present stocks are liquidated, which may well take five to eight years. Of the profits on these sales of newly produced nitrate, 25 per cent. will go to the Chilean Government. The remaining 75 per cent. will be subject to a first charge to secure the bond service, and will provide for the profits of the rest of the industry.

Under the financial provisions, 4 per cent. bonds will be exchanged for the 7 per cent. prior secured bonds; part of the second secured bonds will be cancelled, part taken over by other companies and part converted into preference shares; the preference will be converted into ordinary and the ordinary shares will be drastically reduced.

New Rosin Derivatives

A NEW use is suggested for stearyl and palmityl alcohols (manufactured by the hydrogenation of technical stearic acid) by the discovery that they readily react with rosin. According to F. Fritz ("Chemiker-Zeitung," May 6, page 354), the reaction product of rosin with stearyl alcohol which is obtained by prolonged heating at 200° C. or higher is a non-tacky solid from which the smell of rosin, as well as that of the alcohol, has disappeared. The new rosin esters are applicable to the production of shoe polishes and anti-corrosive paints, and they also function as softeners for nitro-cellulose in the manufacture of artificial leather.

Colloidal Behaviour in Paint and Varnish Systems

Applications of a Structural Scheme

MR. W. ESMOND WORNUM presented a paper on "Colloidal Behaviour in Paint and Varnish Systems" at an ordinary meeting of the Oil and Colour Chemists' Association which followed the annual meeting in the lecture hall of the Institute of Chemistry on May 11. Mr. J. A. Frome-Wilkinson presided.

As the result of prolonged investigations and an attempt to correlate behaviour in certain resin and varnish systems with some form of colloid structure, Mr. Wornum put forward a structural scheme, which he has found helpful in understanding some of the many factors operating in varnish technology, and in obtaining them in some form of perspective. He hopes to present at a future date a further paper devoted to a study of the application of the structural scheme to various problems pertaining to paint and varnish technology. He pointed out that compounds such as rubber, or cellulose and its derivatives, are characterised by long-chain molecular structures, the molecules themselves being built up by a series of chemical units bound together by primary valence. Molecules of this type usually showed in their state of aggregation certain properties associated with the colloidal state. It might reasonably be anticipated that some such similar structure existed in the larger molecules which conferred colloidal properties in varnish and resin systems, although the chain lengths of these molecules were probably of a much smaller order than those of the naturally-occurring substances mentioned.

The starting point of his structural scheme was the molecule. Except in very dilute solutions, he said, these large molecules could not exist in the free state, and tended to form aggregates or "micelles."

Discussing the manner in which colloid complexity was built up through various states and stages of aggregation of the disperse phase, he said the simplest case arose when dealing with direct straight-chain molecules which were incapable of cross-linking, for with these the molecules aggregated in the micelle were held together by purely cohesional or secondary valence forces, often referred to as the Van der Waal forces. The micelle in this case was a reversible one, and since forces of a cohesional order alone operated, its character probably approached somewhat closely the type of evanescent swarm which Stewart had referred to as a "cybotactic complex," and which Kisler called a "cyboma."

Effect of Cohesional Forces

When one studied the higher states of aggregation in this system one found again that it was these same cohesional forces, and these forces alone, which operated between the micelles during the formation of the secondary flocculates and of the coagulum. It followed that any treatment capable of reducing or overcoming these cohesional forces could bring about a micellar and, *e.g.*, in very dilute solutions, even a molecular dispersion, or alternatively, the bringing into operation of these forces would produce a condition of reversible gelation. In so far as they were justified, as he believed they were, in considering resinification as the formation of a colloid gel by micellar coagulation, they would expect resins, composed of simple straight-chain compounds, to be capable of solution in suitable solvents, and also to be capable of being rendered fluid by heat, provided, of course, that such heat treatment did not bring about chemical decomposition. This was, in fact, the case, and such resins were classified as being of the heat non-convertible type.

If, during the formation of the micelle, through reactive groups in the chain, further chemical reaction could take place, such that the molecules within the aggregates became bound together by primary valence linkages in place of the cohesional forces, a very different state of affairs arose. Molecular dispersion no longer became possible without a primary valence rupture, so that as a first result the micelle was irreversibly built up. Strictly speaking, a micelle thus formed became in itself a large molecule, or macro-molecule, but for the purpose of his paper Mr. Wornum considered it as an aggregate of molecule bound together by primary valence linkages, and thus drew from the beginning a distinction between reversible and irreversible changes. It must also be borne in mind, of course, that the extent to which chemical reaction could occur within the micelle was dependent upon chance contact; therefore, the micelle might not be wholly composed of molecules bound together by primary valence linkages, and secondary valence or cohesional forces might also play a part. In any case, a complexity of structure was built up which rendered molecular redispersion very much more difficult.

Selection of Solvent

When one examined the physical and chemical relations between micelles of this character, one found either of two situations could arise. If at the time of flocculation or coagulation the conditions were such that direct chemical action could not or did not take place, the forces acting between the micelles would be of a purely cohesional character, and therefore, re-dispersion of the micellar swarms or secondary flocculates or of the coagulum to the micelle stage became merely a question of the selection of a suitable solvent or the application of heat; *i.e.*, any gelation which arose under these conditions would be of the reversible type.

If, however, conditions were such that primary valence reaction could and did occur between micelles at the time of swarming or coagulation, new irreversible structures of varying degrees of complexity would result. If these reactions did not proceed beyond the secondary flocculate stage, then coagulation, in which cohesional forces alone took part, might produce either a reversible or irreversible gel, depending upon the size and character of the secondary flocculates and the ease with which re-dispersion could be effected under any given set of conditions. In the majority of cases gelation would here be of the reversible type, since the formation of an irreversible gel at this stage would indicate that large secondary flocculates had been built up in the sol, and, as this would lead to great instability, coagulation would be more likely to arise while chemical reaction was still in progress, producing therefore a coagulum and an irreversible gel in which primary valence took part. It was to these systems, in which irreversible changes took place, that the heat convertible and the element convertible resins and drying oils belonged.

Irreversible Conditions

The term "irreversible" in relation to these systems was an arbitrary expression to be considered with reference to the set of conditions under which re-dispersion could or could not be reasonably achieved. The irreversible gel, in other words, was irreversible only in so far as its structure contained large physical units, which could not be dispersed beyond a certain point without primary valence rupture. The ease with which dispersion could be effected depended largely upon the size and shape of these constituent irreversible units, and the author applied the expression only to those gels which could not be readily dissolved or dispersed in any of the usual solvents.

One was able, from these preliminary considerations, to distinguish broadly between the heat non-convertible and the heat and element convertible resins, and as the latter were dependent upon intermicellar reactions involving primary valence, which implied, of course, that the chain molecule itself must be constituted of sub-units which were polyreactive, and had a reactivity greater than (2, 2), the theory so far developed was in complete agreement with Kienle's postulates for resin formation based on chemical considerations. Whilst, however, Kienle's work focussed attention on the changes in molecular form which could be produced by changes in the chemical reactivity of the reacting units which made up the chain, consideration of molecular shape or size alone did not quite suffice to explain the different colloidal states in which any particular resin might be obtained. For example, a straight phthalic anhydride-glycerol resin could exist in two forms—the soluble, when esterification was stopped prior to heat gelation, and the insoluble, when heat gelation had taken place. Mr. Wornum did not consider that they were justified in attributing these difference in physical state to changes in size, shape or structure of the molecule itself.

Effect of Science on Metallurgy

Developments of the Past Fifty Years

METALS in the service of human life and industry formed the subject of the first annual Research and Development Lecture of the British Science Guild, delivered by Sir Harold Carpenter, D.Sc., F.R.S., in the Hall of the Carpenters' Company, London, on May 16, when Lord Melchett presided.

Only as recently as just over a century ago, said Sir Harold, changes in metallurgical practice were mainly the result of chance discoveries or the consequence of a reaction to changing economic conditions. The use of coke in the blast furnace, for example, was practically compelled by the scarcity of charcoal and the legislation introduced to preserve the timber that remained for the construction of ships of war. Before the industrial revolution there was no definite urge to progress. Improvements were accepted when they appeared and new metals were utilised when they were discovered, but no conscious effort was directed towards these ends. Then came the time when the scientific spirit began to affect the technical side of the metal industry and the position altered just as it did in all other industries, and attention began to be directed to the systematic search for new alloys, new methods of heat and mechanical treatment, more economical methods of manufacture, better plant, and greater reliability in the product.

Countless advances in all these directions have been made in the past century, and particularly in the past forty years. Larger supplies of ores have been located by scientific prospecting. Improvements in methods of ore concentration have enabled poorer and poorer deposits to be successfully exploited. Developments in smelting and other types of extraction processes have made new metals industrially available and old metals cheaper and more plentiful. The introduction of new processes of refining has made possible the production of purer metals and the scientific study of alloying has led to the production of a very large number of alloys with properties suitable for every conceivable purpose. All this has not emerged directly from laboratory experiments. That is not the way that science has mainly influenced metallurgy. Actually the reactions between science and this industry have been very complex, but there is no doubt that the rapid advances of recent years have been ultimately dependent on science as represented by the fundamental work of research laboratories, the more definitely practical experiments of the industrial laboratories, the scientific training of the personnel of works and the spread of the scientific habit of mind throughout the metallurgical community.

Introduction of Aluminium

The most conspicuous illustration of the influence of science on metallurgy is to be found in the existence of aluminium as an industrial metal. It is the most plentifully occurring metal in the earth's crust and yet has become available only within living memory. Already it takes rank with the other six main industrial metals, *viz.*, iron, copper, nickel, lead, zinc and tin. It is hardly stating the case too strongly to say that to-day iron and aluminium are the two most valuable metals that we know. The one has been used by mankind for three thousand years, the other for less than fifty.

Aluminium came to life as it were yesterday and it is not too much to say that, although so young a metal, our scientific knowledge of it is as complete as that of iron. It could not have been born except in a scientific age. It exists as the second main constituent of the earth's crust in combination with silicon and oxygen as clay or as secondary enrichment products such as the laterites and bauxite. The reaction between aluminium and oxygen is one of the most powerful exothermic reactions known. Practical use is made of this fact in the application of thermit, a finely divided mixture of aluminium and ferric oxide which is used in the welding of steel rails, where the heat of oxidation of the aluminium at the expense of the ferric oxide is sufficient to melt the iron and raises its temperature to over 2,000° C. The oxide of aluminium cannot be reduced by carbon. It requires the energy of the electric current and the metal of to-day is produced by the electrolysis of alumina in a bath of cryolite. How comes it then that aluminium cannot merely exist as a metal but can be used for the great variety of purposes for which it is employed at the present time? The answer is that when cast in ingot form the compact metal is rapidly covered with a thin film of oxide sufficiently strong to protect the underlying metal from further oxidation. It is, however, not merely a question of strength but also of structure, and that of the oxide is such that it prevents the diffusion of oxygen from the air to the underlying metal. This film also serves to protect the metal during fabrication, and even if it is destroyed in places is replaced by a fresh one. Its existence was shown some years ago by Dr. Seligman and Mr. Williams.

Development of Light Metal Alloys

Aluminium is the first light metal to enter the ranks of the industrial metals. Its sp. gr. is about 2.73 and it has therefore only about one-third of the specific weight of the others which have been known and used for so long a time. It can be cast, worked, alloyed and fabricated. This metal and its light alloys have been the source of much general public interest in recent years owing largely to their utilisation in domestic use, aircraft construction and the automobile industry. Metallurgically, it is one of the most interesting of the metals, and so much scientific investigation has been devoted to it and its alloys that the technique of its manufacture is highly efficient. The aluminium industry of the world has grown by leaps and bounds since the metal became relatively cheap commercially, and this growth appears likely to continue. Its applications are destined to increase to a large extent and the only present deterrents to its much greater employment are the question of price and the possible exhaustion of bauxite supplies. Its merits and those of its alloys have been forced upon the engineering trades against a not inconsiderable opposition, and their actual worth for use as materials of construction has been proved beyond any doubt. About 50 per cent. of the production of aluminium is used as such in the manufacture of sheets, wire, rods, etc. The remaining 50 per cent. is principally employed in the manufacture of light alloys.

Science has also rendered available two other light metals which may also have a commercial and industrial future. Magnesium (sp. gr. 1.74) has become available in increasing quantities in the last 20 years and is already finding certain applications in the aircraft industry. Beryllium, another light metal (sp. gr. 1.85) with a higher melting point than either aluminium or magnesium, seems destined to take its place among the group of industrial light metals, and much research has been carried out on it during the last ten years.

Industrial Importance of Steel

In terms of industrial importance steel stands far above all other metals and alloys, and of the numerous types now available plain carbon steel is the most widely used. Fully 90 per cent. by weight of the steel manufactured to-day is the variety known as mild steel. It is the basis of engineering construction, being used for bridges, ships, boilers, tubes, concrete reinforcements, building frames, machinery, wire, rod, sheet and countless other purposes. One of the reasons why it is so extensively used is that it is easy to manufacture and that practically speaking its properties are independent of heat treatment. It has, however, one serious disadvantage, *viz.*, its liability to corrode under the usual conditions of service, although modern scientific research has recently led to the introduction of a modification in its composition which possesses superior physical and mechanical properties and which it is claimed is more resistant to general corrosive conditions. The steel in question contains silicon and manganese. It was largely employed by Dorman, Long and Co., in the construction of the arch of the Sydney Harbour Bridge. The weight of this arch is about 38,000 tons and more than two-thirds of it consists of this high tensile steel.

The plain carbon steel cutting tool, gradually developed through many centuries as the most important tool in the pre-scientific age, was undoubtedly a beautiful product, but its best cutting properties were only retained at comparatively

low temperatures and at 250° C. most of its cutting hardness has disappeared. The revolutionary feature of the modern high speed cutting tool is its ability to maintain a sharp strong cutting edge while heated to a temperature far above that which would at once destroy the cutting ability of the carbon steel tool. These tools are of alloy steels. They contain chromium, tungsten, vanadium and cobalt, in addition to the ordinary constituents of steel. All of them possess the property of red hardness, *i.e.*, the ability to retain hardness at a red heat. A high speed tool can be made to cut continuously at speeds so great that the friction of the chip on the tool heats the point of contact to about 700° C., and the work cut is tempered to a blue heat, *i.e.*, to at least 300° C. These tools have in the last five-and-twenty years worked a complete revolution in the machine shop practice of the whole world, affording largely increased outputs and commensurably lower costs.

Stainless Steel

In recent years, however, other cutting materials have been discovered which have even better properties. These are the new carbide tools containing carbides of iron, chromium, tungsten and molybdenum. Owing to their brittleness, however, they cannot be used alone, and alloys containing them cannot be made in the usual way. By a suitable process, however, the powders are compressed and fritted. The chief material used is tungsten carbide with the metal cobalt as a binder.

The discovery of stainless steel is one of the major inventions of this century and the great variety of its applications is only now beginning to be realised. It owes its resistance to corrosion to the presence of over 11 per cent.. of chromium, which confers on the steel the property of forming self-healing protective oxide coatings. The first stainless steels made in this country did not have a high resistance to corrosion except in the hardened condition, and hence they were used primarily for cutlery, valves and instruments. The range of properties, however, that can now be obtained from them is such that it is no longer correct to regard stainless steel as a particular kind of steel, but rather as a modified form of it in which most of the mechanical properties of ordinary steels may be obtained in addition to high resistance to corrosion.

Manganese steel is another remarkable example of the effect of scientific research on the development of metallurgy. It was discovered by Sir Robert Hadfield in 1884. In dealing with the properties of metals it was pointed out that in general, hardness and ductility were contrary properties, so that when hardness is essential some ductility must be sacrificed and *vice versa*. In manganese steels great hardness is measured by resistance to wear and abrasion is combined with great ductility. The alloy is intrinsically soft and ductile, but if it is subjected to wear or if attempts are made to machine it a constitutional change takes place at the surface and an extremely hard constituent is produced. This effectively prevents wear. A conspicuous example of its use is in the construction of railway switches and crossings. When these have to carry heavy traffic they are subjected to intense wear, and if they are made of carbon steel sufficiently hard to resist this they are liable to fracture under the stresses imposed. Manganese steel provides a solution of this difficulty, for it is so tough it cannot be broken as long as it is subjected to wear.

Oil and Colour Chemists' Association

Mr. Frome Wilkinson Re-elected President

THE fifteenth annual general meeting of the Oil and Colour Chemists' Association was held in the lecture hall of the Institute of Chemistry, 30 Russell Square, London, on May 11, the president, MR. J. A. Frome Wilkinson, being in the chair.

The report of the council for the past year showed that the membership had increased to a total of 454, a net increase of 28 during the year, despite the industrial depression. The accounts showed an increase in the Association's assets. The Manchester Section, under the chairmanship of Mr. A. Hancock, has continued to progress. Reference was made to the establishment of the Manchester joint advisory committee, composed of the secretaries of the various scientific societies there, by means of which co-operation between the societies concerned has been secured, their meetings have been co-ordinated and a joint syllabus arranged.

The Council recommended for adoption a proposal that the best student of the year at certain recognised educational institutions be presented with a year's free membership of the Association.

MR. R. G. BROWNING, proposing the adoption of the report and accounts, commented with pleasure upon the increase of the Association's financial resources, and the fact that the Association was represented on many allied organisations and was thus keeping its cause before the public generally.

The resolution was seconded by Mr. D. W. Bomford, and was carried.

Election of Officers

The following officers were elected for the ensuing year: President, Mr. J. A. Frome Wilkinson; vice-presidents: Mr. T. Hedley Barry, Mr. A. A. Drummond, Mr. G. A. Campbell, Mr. S. Romilly Hall, and Mr. Noel Heaton; hon. secretary, Mr. Forrest Scott; hon. treasurer, Mr. M. E. Dougherty; hon. auditor, Mr. H. D. Bradford; members of council, Dr. G. F. New, Mr. W. E. Wornum, Mr. W. Carrott and Mr. R. G. Browning.

A vote of thanks was accorded the retiring members of council for their services to the Association.

On the motion of Mr. H. Randall, seconded by Mr. W. Carrott, the meeting agreed to an alteration to Rule 19, to enable the council to present a year's free membership of the Association to the best student of the year at certain recognised educational institutions, as mentioned in the annual report.

MR. NOEL HEATON, past-president, proposed "That this annual general meeting of the Oil and Colour Chemists' Association views with alarm the present position of the Research Association of British Rubber Manufacturers, and wishes to place on record its conviction that the continuance of co-operative scientific research by the Association is essential to the maintenance and development of the rubber industry." He explained that the Research Association, which had existed for some 13 years, had arrived at the stage at which State aid automatically ceased, so that it had to be supported entirely by the industry. The industry, however, had not given all the financial support required to enable the Association to carry on its work properly, and efforts had been made to promote a Bill in Parliament to provide for a levy on rubber, the proceeds to be devoted to research. In order to do that it was necessary to convince members of Parliament of the necessity for the work and its value to the community, and to that end the Research Association needed the support of all technical institutions interested in its work. The support needed for this purpose was moral, and not financial, and it should be given whole-heartedly, for there was an intimate connection between oil and colour chemists and the rubber industry; for instance, many of the ingredients used were common to both industries. It would be a tragedy if the Research Association had to close down. Anyone who had been in touch with it must have been impressed by the sound manner in which it was working, and by the value of that work, not merely to the rubber industry, but also to the oil and colour industry and the community in general. Mr. Heaton pointed out that the Research Association of British Paint, Colour and Varnish Manufacturers would sooner or later have to stand on its own feet.

MR. T. HEDLEY BARRY seconded, and the resolution was carried.

Informal Meetings

MR. D. W. BOMFORD proposed that the Association should hold during the winter session three informal meetings for the purpose of the free discussion of technical matters, each on different evenings of the week, the interval between each

meeting to be two months. He pointed out that some members were interested in only a limited number of the papers presented to the formal meetings of the Association, and he felt the Association would gain by affording members opportunities for informal discussions on technical matters. The reason for varying the evenings of the week on which the proposed meetings would be held was that some members had other business to attend to on certain evenings, so that if the meetings were always held on the same evening of the week some members would never be able to attend. The proposed limitation to three meetings in the session was quite arbitrary, but he suggested three during the first session in order to gauge the interest of members.

Mr. R. F. BOWLES, who seconded, said he understood that such a scheme had been established successfully in the Manchester Section of the Association. Such meetings would encourage younger members to speak, and would afford opportunities for the discussion of a variety of topics which perhaps did not warrant a paper.

Mr. R. G. BROWNING moved an amendment, the effect of which was to put the resolution in the form of a recommendation to the council, and this was subsequently carried.

Mr. BOMFORD suggested that it might be left to those attending the meetings to raise there any matters they would like discussed. Another possible method was for suggestions to be sent in writing to an appointed chairman, to reach him by a certain date prior to the meeting.

An ordinary general meeting of the Association followed, at which a paper dealing theoretically with colloidal behaviour in paint and varnish systems was presented by Mr. W. Esmond Wornum. A report of the paper appears in page 453 of this issue.

The Chemical Society in the Provinces

First Meeting at Leeds

THE Chemical Society, whose ordinary meetings have always previously been held in London, inaugurated its series of visits to the principal provincial centres on May 12, when a largely attended meeting was held at the Leeds University. The new chemistry lecture theatre in the extensive chemistry wing of the University, now nearing completion, was used for the meeting.

The business sessions were devoted to a discussion on "Substitution in Organic Compounds." The chief speakers were Professor R. Robinson, F.R.S. (Oxford), whose paper was read by Mr. J. C. Smith, but who later took part in the discussion, Professor G. M. Bennett (Sheffield), Dr. C. W. Shoppee (Leeds), Professor C. K. Ingold, F.R.S. (London), Dr. J. W. Baker (Leeds), Professor H. M. Dawson, F.R.S. (Leeds), Professor Kenner, F.R.S. (Manchester), Professor A. Lapworth, F.R.S. (Manchester), and Professor J. F. Thorpe, F.R.S. (London), president of the Institute of Chemistry).

Factors Governing Substitution

The factors governing substitution were shown to be mainly electrical in character. Sir J. J. Thomson's discovery of the electron (the unit of negative electricity) led eventually to the view that an atom consists of a nucleus of protons (units of positive electricity) surrounded by various shells of electrons. The properties of the atoms are determined by the number and arrangement of electrons in the outer shells, while chemical combination is brought about by the sharing of such electrons between different atoms, thus inducing a relatively stable condition. The sharing of two electrons by two atoms constitutes what is known to chemists as the single bond, while the reactive double bond consists of two atoms sharing four electrons.

Systems containing double bonds are able to transmit small electrical charges, especially if there is alteration in the single and double bonds present in the molecule of carbon atoms. Recent work has shown that benzene, which consists of six atoms of carbon in the form of a ring with a hydrogen atom attached to each carbon, is non-polar or electrically neutral. Replacement or substitution of one of the hydrogen atoms by, for example, a particular combination of one nitrogen and two oxygen atoms known as the nitro-group, causes a small but definite permanent electrical charge in the resulting molecule. The nature of such a charge is one of the controlling factors in the process of further replacement or substitution of a second hydrogen atom. Such a process is involved in the preparation of dyestuffs intermediates.

Members of the Society were welcomed in one of the laboratories of the new department by Sir James Baillie, the vice-chancellor of the University, and took tea in the department. Later, a dinner was held in the University Refectory.

Professor R. W. Whytlaw Gray, F.R.S., of Leeds University, proposing the toast of "The Chemical Society," said the occasion was an important one. It was the first time a gathering of that sort with important chemical discussions had been held outside London, and all the chemists of the Leeds area must feel it was a great honour that Leeds was chosen for this departure. It would be an incalculable advantage to the young chemist, and he hoped this was the first of many discussions which would be held in the provinces. Chemists outside London perhaps scarcely realised sufficiently the important part played by the Chemical Society in the development of science. It was the oldest chemical society in the world, and for upwards of 90 years it had been the focus point of British chemistry. It had devoted the whole of its resources to furthering the advancement of chemistry by its publications, its encouragement of research, and its manifold activities.

The Help of the Universities

Professor G. T. Morgan, president of the Society, in replying to the toast, said the reason the Society had visited Leeds was that Leeds so far as both the old Yorkshire College and the present University were concerned, had rendered it such great service over a number of years. The names of such people as Sir Edward Thorpe, Professor Arthur Smithells, Professor Perkin, and Professor Green came to mind, and the present generation, in the work of such men as Professor Whytlaw Gray, Professor Challenger, and Professor C. K. Ingold, who was formerly at Leeds, was living up to the tradition of former days.

The visit, Professor Morgan explained, was in pursuance of a policy recently inaugurated by the Council of the Society to carry its activities further afield than London, where such meetings had previously been held. The Society fully realised that in many provincial centres the needs of local chemists were already met by the efforts of the Institute of Chemistry, the Society of Chemical Industry, the Society of Dyers and Colourists, and other bodies; it was no part of its function to institute local sections. But a movement was on foot, of which it would be impolitic to say much perhaps at the moment, leading towards the amalgamation of various chemical organisations, and this new policy was a gesture on the part of the Society, a move to come into contact with other societies in the provincial centres.

Thanks were extended to the local representative of the Society, Mr. H. S. Patterson, for his work in supervising the arrangements for the visit.

Algerian Phosphate Production

FOR January, 1933, the phosphate production in Algeria totalled 43,300 metric tons as compared with 53,800 tons for December, 1932. January exports exceeded production by 26,000 tons. It is reported in Algeria that Cie. des Phosphates de Constantine and Cie. des Phosphate et du Chemin de Fer de Gafsa are to combine in the near future. If the merger should be accomplished it would bring together the two leading commercial producers in North Africa. Constantine produce practically all of the 571,000 tons of phosphate mined in Algeria during 1932 although some shipments were made by others from stocks. Gafsa, leading producer in Tunisia, accounted for almost 70 per cent. of the 1,623,000 tons exported from that country during 1932.

Activities of the Mellon Institute

Industrial Research in 1932-33

THE twentieth annual report of the director of Mellon Institute (E. R. Weidlein) emphasises the effect of the recent economic crisis upon industrial research in general. It is stated that not a few companies have been obliged to close their laboratories; many other concerns, mostly of larger size, were forced by budgetary restrictions to reduce their investigational expenditures, although in a large number of manufacturing organisations research has been carried on extensively as though conditions were normal. In general, those scientifically managed corporations that, prior to 1930, benefited richly from the services of ably directed, competent research specialists, have continued to sustain well-staffed laboratories; several of these companies have already profited from this support of applied science during the severe depression, and other rewards will come. A few laboratories, forced to cut their operating expenses by laying off part of their personnel, were able, by judicious elimination, to prevent losses in the productivity of their staffs. In most instances, however, the ordeal of reduction has diminished research power. In addition, this reduction has principally involved recent appointees—mainly assistants and other workers of junior grade—and older men, often specialists of high reputation, who are no longer needed because of alterations in investigational policies necessitated by market aspects or prospects. Metallurgical and ceramic laboratories have suffered the most, and food, textile, and pharmaceutical laboratories have been affected the least, by such economic changes.

Throughout the last fiscal year 67 industrial fellowships—18 multiple and 49 individual fellowships—have been in operation. These different investigations required the services of 109 fellows and 28 assistants during all or part of the year. At the close of the year 55 industrial fellowships—14 multiple and 41 individual fellowships—were active, and 83 fellows and 15 assistants held positions thereon. Twenty-six fellowships have been at work for five years or more, and of this number 14 have concluded ten years of research and nine fellowships have been operating for 15 years or more.

Coke and Coal Gas

Many noteworthy advances have been made by the fellowships of 1932-33. The multiple coke and coal gas fellowship supported by the Koppers Research Corporation continued its broad investigation of problems in coke technology. The work in 1932 had mainly to do with coke for domestic use, including preparation and treatment, with particular regard to market requirements, as well as studies of the combustion characteristics of coke. Additional research has been accorded to the liquid purification of coal gas for the removal of hydrogen sulphide with its simultaneous recovery as sulphur. During the year this work has resulted in several installations, showing high efficiency and economy of operation. Extensive studies of the formation of gummy deposits in coal gas have been continued and processes of elimination have been developed. In these researches much time and effort have been required to devise and standardise methods for the estimation of very small quantities of nitric oxide in coal gas.

The multiple food fellowship of the H. J. Heinz Co. has been occupied in the development of new varieties of strained vegetables; in a study of the comparative nutritive values of strained vegetables prepared by factory methods and by various procedures used in the home, with particular reference to vitamin contents; in an investigation of the vitamin contents of various other vegetable products; and in research on new cereal products.

Organic Synthesis

In organic synthesis the outstanding progress on the multiple fellowship of the Carbide and Carbon Chemicals Corporation has included the development of methods of producing amines, among which may be mentioned morpholine, triethylene tetramine, and several others of the same general type. These chemicals are being made on a small scale at present and various applications are being investigated. Several new types of glycol compounds have been developed for the textile industry, especially for the lubrication of textile fibres, and practical results with one of these compounds indicate definite economies in the lubrication of wool fibres. Similar materials have been synthesised that are applicable to the lubrication and conditioning of silk and rayon fibres. Several new compounds have also been synthesised for use in dye baths and pastes. New types of plasticisers and resins have been investigated, and an attempt has been made to determine the specifications for an ideal plasticiser for nitro-cellulose and cellulose acetate. The research on vinyl resins has continued, resulting in special types of resins for specific purposes. The applications of several new solvents have been studied. These new products include methyl isobutyl carbinol and its esters, alpha-ethyl hexanol and its esters, methyl isobutyl ketone, phenyl glycols, and phenyl-glycol ethers. New types of cosmetics, polishes, and emulsions have been developed, and the latter have been applied to special industrial uses and methods.

New Uses for Sugar

The multiple fellowship on sugar sustained by The Sugar Institute, Inc., has continued its quest for industrial uses of cane sugar. The preparation of sucrose octa-acetate has been brought through the semi-commercial stage, with every indication that it can readily be made in quantity. Further development of the production of this sucrose ester awaits the results of the investigation of its applications. Its most interesting property is its high viscosity. At its melting point it is sufficiently viscous that crystallisation does not occur and the resulting glassy stage has been found of interest in certain applications. Its viscous nature has also led to its use in adhesives. The homologous esters, octapropionate and octabutyrate, have been prepared. The first of these is crystalline and less viscous that the octa-acetate; the second has not been crystallised. The octabutyrate is soluble in petroleum distillates, differing in that respect from the lower esters. Progress has been made in the preparation of some phthalyl derivatives of sucrose. Sucrose ethyl carbonate has been studied with a view to commercial development; it is a viscous syrup. An investigation of the preparation of levulinic acid and its esters has been conducted, and improvements in yield have been effected. The levulinic esters, particularly the butyl and amyl, are insoluble in water, quite stable, and excellent solvents for nitro-cellulose. The study of the value of sucrose in lime-sand mortar has been continued.

Research in Pure Chemistry

During the year fellows of the Department of Research in Pure Chemistry have published reports of investigations on the preparation of the di- and isomeric tetrachlordioxanes; on the composition of quince-seed mucilage, the preparation of γ-*d*-taloon-lactone, and the optical rotation of the amide and of certain salts of *d*-talonic acid; and on the properties of *d*-mannuronic acid lactone. Completed researches, to date unpublished, include the preparation of dibenzoyl-*d*-tartaric acid and the determination of the optical properties of pure quinidine; the action of sodium and sodium amide on cinchona alkaloids; and the preparation of β-hydroxyethyldihydrocupreine. Studies are in progress on the stereo-chemistry of quinoline alkaloids; on reactions involving the vinyl and secondary alcohol groups in quinine and cinchonine; and on the composition of the newly discovered polyuronide occurring in *Salix longifolia* and the preparation of beta-hexonic acids.

THE output of refined primary lead in the United States, from domestic ore, in 1932, amounted to 255,337 short tons, valued at $15,320,000, compared with 390,260 tons, valued at $28,879,000, in 1931, a decrease of 35 per cent. in quantity and of 47 per cent. in value. The production of refined lead from foreign sources, principally Mexico, Newfoundland, Sweden and Canada, amounted to 33,024 short tons, a decrease of 37 per cent. from the production in 1931. Antimonial lead produced at primary smelters in 1932 totalled 21,024 tons.

Chemical Production in Japan

Notable Expansion of Exports

IN his report on economic conditions in Japan, 1930/32 published by the Department of Overseas Trade (H.M. Stationery Office, 3s. 6d. net) the Commercial Counsellor to the British Embassy at Tokyo shows that a further period of depression was experienced in both industry and trade after the removal of the gold embargo in January, 1930.

Notable progress has been made in the production of both heavy and pharmaceutical chemicals. Certain heavy chemicals which were until lately imported in large quantities are now exported. With regard to the alkali situation, there are two groups of makers, those manufacturing soda ash, caustic soda and bicarbonate of soda by the ammonia soda process, and those manufacturing caustic soda by the electrolysis of salt. Allowing for conversion of soda ash into caustic soda, the position in 1933 should be :—

	Consumption.	Production.	Shortage.
Soda ash	132,000	112,500	19,500
Caustic soda	100,000	95,000	5,000

Since exports command a high price in yen, domestic makers are selling abroad, and therefore the actual deficiency to be filled by imports in 1933 may be as much as double the shortage given. By the end of 1934, making due allowance for increased consumption, it is estimated that Japan will have a surplus production of 10,000 tons of soda ash and 5,000 tons of caustic soda, which may compete in foreign markets with United Kingdom supplies. It should be noted that the alkali industry has been built up under official protection, in the shape of subsidies and import tariffs.

Sulphate of Ammonia

It is only within the last twenty years that Japan has come to use artificial fertilisers to any great extent. In the year before the war, consumption amounted to under 120,000 tons, of which domestic production accounted for less than one-fifteenth. Since then, domestic manufacturers have gained an ever-increasing share of the trade, until in 1931 they definitely ousted foreign producers as chief suppliers of the Japanese market, including Japan proper, Korea and Formosa. This development of the domestic industry has indeed been an outstanding feature of the period under review (June, 1930, to December, 1932), and has recently been still further stimulated by the drop in the yen and consequent rise in price of competitive products. In July, 1930, the monthly home production was still under 20,000 tons, whereas in August, 1931, it had grown to over 36,000 tons and in August, 1932, to 42,000 tons. In the year 1931, the total domestic manufacture for Japan and Korea amounted to 602,668 tons, while for 1932 it is estimated at 677,400 tons and for 1933 at 842,500 tons. The bulk of this increase is due to the extension of the Kawasaki factory of the Showa Fertilizer Co., whose production rose from 72,000 tons in 1931 to 130,000 (estimated) in 1932. The Miike Chisso Kogyo Co.'s factory similarly increased its output from 5,500 to 30,000 tons. Domestic production would have reached ever greater proportions had it not been for difficulties experienced by the Chosen Chisso Co., which to some extent hampered its productive activities. So far as quality is concerned, Japanese sulphate of ammonia is on a par with the imported article. Plans for 1933 provide for an increase from 33,000 tons in 1932 to 85,000 by the Sumitomo Fertiliser Co., from 130,000 to 150,000 by the Showa Fertiliser Co.'s Kawasaki factory and from 216,000 to 300,000 tons by the Chosen Chisso Co. By the summer of 1934, two new factories, with a total output of 70,000 tons of sulphate, are expected to be in operation.

Calcium Cyanamide and Superphosphates

The production of calcium cyanamide in 1931 is given as 87,000 tons, nearly half of which came from the Showa Fertiliser Co.'s factory at Kanose, and for 1932 it is estimated at 106,600 tons. This increase is due to augmented output by the *Denki Kagaku* (Electro-Chemical) Co. at its Omuta and Omi works. The Fushiki factory, with a small output, suspended operation in 1932. All the domestic demand for this chemical is supplied by Japan itself, and there is no foreign importation. The amount of production depends on the price ruling for ammonium sulphate.

There are thirteen superphosphate factories in Japan and one in Formosa, with a producing capacity estimated at about 1½ million metric tons. The control of superphosphate production has not succeeded so far, as some important makers remain outside the Association, whose member companies are enforcing a 55 per cent curtailment. The output for the first half of 1932 was 481,000 metric tons. The Association has encouraged export, in order to maintain prices in the home market, and fair quantities have been sent to tht United States, the Philippines, India and the Netherlands Indies.

Compound fertilisers, mostly compounds of nitrogen and phosphoric acid in different proportions, some with an addition of potash, are manufactured by the leading companies. The total production for 1932 was estimated at about something over 35,000 metric tons, exclusive of horticultural fertlisers; but new brands are now being marketed experimentally.

Recent production of industrial acids statistics are not available. The latest figures are for 1930, which show: Sulphuric acid, 949,000 metric tons; hydrochloric acid, 35,300 metric tons; nitric acid, 19,600 metric tons; acetic acid, 5,335,000 metric tons. These amounts are well below capacity. The daily capacity of all works in Japan and dependencies for production of lead chamber sulphuric acid is said to be over 5,000 metric tons.

Mozambique Oils and Oilseeds

Effects of the Depression

THE Department of Overseas Trade has issued a report on Economic Conditions in Portuguese East Africa, by H. A. Ford, British Consul-General, at Lourenço Marques (H.M. Stationery Office, 2s. 6d.). In his report Mr. Ford remarks that the Colony of Mozambique is primarily devoted to agriculture, and depends upon the prices which its agricultural products obtain in Europe, for the maintenance of a satisfactory trade balance. The fall in prices has, therefore, caused an adverse trade balance, and the excess of imports over exports has resulted in a heavy and increasing drain of gold. A crisis was reached and resulted in the passing of a monetary decree providing for a rigorous curtailment of imports and the control of gold transfers, Portugal, however, having many trade preferences.

Vegetable oils were principally exported from the government-administered territory to the Union of South Africa, where the benefit of exemption from customs duties, under the terms of the Mozambique Convention of 1928, assures a good market for them; 1,847 tons valued at £47,522 were exported in 1931 as against 2,344 tons valued at £66,623 in the previous year. Oil seeds are the most important products as far as value is concerned. In spite of the prevailing depression in prices, 66,720 tons valued at £533,176 were exported in 1931 as against 65,536 tons valued at £683,721 in the previous year. Quelimane and Mozambique districts are the chief centres of production and export, Quelimane accounting for 32 per cent. and Mozambique 50 per cent. of the total. The seeds are marketed in the various countries of Europe and in South Africa. The exports of ground nuts of the colony were 26,434 tons valued at £227,539, Mozambique district accounting for 82 per cent. and Cabo Delgado 12 per cent. In the previous year 24,893 tons valued at £258,155 were exported, Mozambique supplying 75 per cent. of the total and Cabo Delgado 15 per cent. Ground nuts are principally marketed in Germany, France and Holland. Ground nuts sent to Lourenço Marques are carried at half-rate by the railway company's road motor service, and enjoy a 40 per cent. reduction in the port charges.

The chief imports of interest from the United Kingdom are lubricating oils, iron and steel. Industrial development is being encouraged. Soap making, oil extraction by compression from copra, castor oil plants, cotton seed, mafueira, and sunflower, are of importance. The industry in the territory of the Mozambique Company is mostly agricultural; minerals have been discovered but are not worked to any great extent.

The Manufacture of Printing Ink

By WOODFORD H. HARRISON

This article is reprinted from "Industrial and Engineering Chemistry," April, 1933. The author is associated with the California Ink Co., Inc., of San Francisco.

ALTHOUGH printing ink manufacture is essentially a chemical industry, it is only recently that the chemist has had an opportunity to organise properly the ink experience of many years past and to build a scientific foundation of fundamental information. The ink maker of to-day still employs many materials simply by rule-of-thumb; good scientific reasons for their uses are not always known. To be more explicit lithographic inks have practically always been made of pigment, oxidisable oils (chiefly linseed oils), driers, and possibly waxy materials. The pigment is ground into heat-polymerised oils to obtain an ink of proper consistency which is considerably more viscous and plastic than an enamel paint.

It is known by experience that the correct combination of pigment, viscous polymerised oils, and drier will work reasonably well on a lithographic press; that is, it will distribute properly on inking rolls, take readily on the lithographic plate without adhering to the dampened portion of the plate, transfer sharply to the rubber blanket and then likewise to the paper or other material being printed. After being so printed it must dry with the desired finish in proper time, and perhaps take well over other colours, or accept other inks afterwards, or both. The adjustment of the ink to do all of these things was at one time accomplished by purely rule-of-thumb methods. It may always have been common sense to avoid use of a vehicle that can emulsify readily with water or the water solutions used on lithographic damping rolls.

The Work of the Chemist

The ink chemist, however, is thinking of the picture as one largely influenced by surface tension of vehicle and interfacial tension between vehicle and water, between pigment and water, and between pigment and vehicle. Exploration of such fields not only provides a better understanding of the functions of the materials used, but also brings to light untried materials having more favourable properties than those now in use. Methods developed in the past few years for measurement of preferential wetting of pigments by liquids and of adhesion tension are of great value in contributing toward a better understanding of ink formulation. These are tools with which the printing-ink research chemist must become more familiar.

In spite of pronounced differences between varieties of printing inks, they are nearly all similar in principle of make-up. Most printing inks consist principally of a suspended pigment or colour in an oil which may vary from an oily fluid to a sticky and viscous or plastic material. The colour is usually insoluble both in water and in the oil in which it is suspended, and it may be either organic or inorganic. The binding material or vehicle, although nearly all oil, is supplemented by various gums, resins, waxes, and water-insoluble soaps.

Adaptation of Properties

The ink maker thinks of the term "printing ink" as a very general one, conveying little meaning until it is further modified by terms such as offset, litho, or news, but requirements go far beyond the kind of press on which it is to be used. Speed of the press, climatic conditions, kind of paper, and the purpose for which the printed matter is to be used—all aid in determining specifications to which an ink must conform. For instance, high-speed presses like those used for newsprint require a rather tackless ink of semi-plastic fluid consistency. It must dry entirely by penetration in order to permit handling of a newsprint as soon as it comes from the folder of the press. News inks consist largely of pigments ground in lubricating petroleum oils with various resinous materials to obtain pigment dispersion, proper consistency, and other necessary properties.

The properties of inks are suited to any set of printing conditions (1) by changes in consistency to obtain good working properties for particular job and press conditions; and (2) by selection and compounding of resins, oils, pigments, waxes, driers, antioxidants, and insoluble soaps to provide desired colour, method of drying (*i.e.*, by penetration or oxidation), drying speed, finish (*i.e.*, flat or glossy), minimum of offset and sticking of printed materials, and other properties of minor importance. There are also certain requirements that depend largely on the nature of pigments used, such as colour permanency toward light, heat, alkali, acids, water, hot paraffin, foodstuffs, various adhesives, etc.

Ink Vehicles and Pigments

Printing ink vehicles have more influence on working properties of inks than most other ingredients. The way in which its consistency and wetting power for pigments affect ink properties has already been explained. Inks that dry by absorption usually contain vehicles consisting of petroleum oils, resins, and possibly waxes. Hard-drying inks that do not entirely depend on absorption for drying usually contain polymerised linseed oil that may vary in consistency from that of the raw oil to a long sticky material that will barely flow. Combinations of resins and drying oils are used for gloss inks, and other combinations for special requirements.

Ink pigments are too numerous to list. It is necessary to use approximately eighty to ninety pigments, including whites and blacks, in order to obtain desired colour, permanency, and price, and to meet other specifications listed above. Nearly all the colours and white pigments used in paint are also used in inks, although the paint pigments consisting of large-sized particles, such as natural iron oxides and barytes, are too gritty for ink making. Lead chromates, iron blues, insoluble dyes (especially azo), phosphomolybdic and phosphotungstic lakes of basic dyes, and the calcium, barium, and aluminium lakes of acid dyes are the general classifications which cover the important ink colours.

Pigments and varnishes must be manufactured in ways to improve their mutual compatability. Pigments not easily wet by varnishes are known as hard-grinding. It has long been known that the grinding of pigments in oils on roller mills is a process involving wetting and breaking up of agglomerates, but not appreciably causing rupture of individual particles. Therefore, an easily wetted pigment not only improves the working properties of the resulting ink, but it also costs less to grind. This does not mean that a hard-grinding pigment always makes a poor ink. It may be hard-grinding because the vehicle does not readily displace adsorbed air, and hard agglomerates formed during drying of pigment are difficult to break. Once ground, such a material may be very satisfactory. This problem of complete pigment dispersion is of extreme importance, and, on the face of it, it would seem that there should be a way to coat any pigment to make it easily wetted by any vehicle, and to find vehicles that easily wet any pigment. Actually this is probably true, but such adjustments too often interfere with other desirable properties.

Particle Size and Tinctorial Strength

Ease in grinding frequently does not mean that the pigment remains in a condition of good dispersion. Particles sometimes loosely flocculate and disperse again when agitated; this may be viewed in a microscope. Particle size and shape of pigments influence the properties of inks. Without going into the manufacture of pigments, it should be noted that ink manufacturers need control over manufacture of ink pigments. The effect of particle size on tinctorial strength of coloured pigments is well known. The shape or crystalline form plays almost as important a role in ink pigments. Numerous examples have been found in which control of crystal form improved uniformity in ink properties. A good example may be found in lead chromates which may be made to consist of extremely long needle crystals or of the same crystal structure, but shorter and larger in diameter. Two such colours may have the same average particle size, same strength, and close to same colour, but in inks the larger crystal dries with more of a matte finish and works differently on the press.

Preferential wetting of moist pigments by common ink vehicles over water affords a simple and relatively cheap grinding process. The pigments precipitated in water and

filtered can be made to give rather firm press cakes which, when mixed with most ink vehicles, such as polymerised linseed oil, give up water and become entirely wet by the oily vehicle. Such a process eliminates drying, dry-grinding, and the major amount of roller mill grind of the ink. Dispersion of the pigment is also better because particle agglomerates have no opportunity to form during a drying process. Any pigment may be so handled if pigment and vehicles are made to have favourable adhesive tensions. An example of a pigment which has no preference for linseed oil over water is iron blue. If, however, a small percentage of lead oleate is added, preference is established.

Effect of Age on Inks

Printing inks are often such complex mixtures that it is difficult to predict undesirable chemical reactions that can occur with age. It is not uncommon to have a dozen or so ingredients (all there for a true need and mainly organic compounds) in a single ink. Considering this, it is surprising how seldom the unexpected happens. When the unusual does give trouble, it is an interesting experience to trace down the causes.

A few years ago the fading with age of very light blue and green tints containing iron blues was a source of continual annoyance. This fading of the blue took place in the shelf package and was always thought to be caused by reduction of ferric ferrocyanide by the drying oils present, since oxidation of the printed proof restored the blue colour. Inasmuch as a concentrated iron blue ground in a polymerised linseed oil undergoes no measurable loss in strength with age, it was reasonable to believe that the substance being oxidised by ferric ferrocyanide was present in small amounts and might be removed or previously oxidised. This, however, did not prove to be exactly the case. Briefly, it was found that linseed oil reacted upon by excess ferric ferrocyanide, and then separated from the ferric ferrocyanide, still retained power to fade to a light blue tint. Further investigation proved that these tints faded more rapidly in tin cans than in glass—a case of oxidation of tin. Many opaque white pigments contain small amounts of strong reducing agents. Small amounts of potassium chlorate ground in the ink proved to be a preventative of the fading. Practically all other oxidising agents failed because of their speed of reaction or detrimental effects on the colours. Potassium chlorate present in amounts of 0.5 to 1 per cent. does not react readily with polymerised linseed oil, but keeps the iron blue oxidised. Inks so made show no appreciable change over a period of several years. Tin cans should be lacquered, tin tubes changed to aluminium. While this cure for fading of blue and green tints is satisfactory if the vehicle is of the linseed oil type, the presence of moisture, tung oil, or many types of resinous materials presents new problems.

Nearly all inks having polymerised drying oils for vehicles must contain oxidation catalysers. The ink maker, like the paint manufacturer, uses certain organic salts of lead, cobalt, and managanese. These would be quite satisfactory were it not for their adsorption by many pigments, causing loss in drying rate with age. It would seem that drier added in amounts greater than the quantity needed for complete saturation of the pigment would overcome loss in drying rate, and this is the case in some instances; however, this method necessitates an ageing period which is frequently impracticable, and is unsatisfactory for other reasons which follow. The theory is that the drying salts are adsorbed in an oriented fashion, with the metallic atom in and the organic group out. This would certainly kill the material as a catalyser, since its action depends upon the positive atom which is taken out of solution by this picture. Some pigments of extremely small particle size adsorb enormous amounts of catalysers, making correction by addition of catalysers in larger amounts than can be adsorbed impractical. Pigments that give most trouble in this regard are aluminium hydrate, titanium oxide, and phosphomolybdic lakes of basic dyes.

Antioxidants and Autoxidants

Antioxidants as well as autoxidants are worthy of the ink chemist's attention. Although they are now used in inks simply to counteract the effects of pigments that are natural oxidation catalysers, they have other possibilities. An ideal printing ink for many purposes would dry as soon as it touched the paper but would remain soft and workable on all inked portions of the press. Antioxidants do not make such an ink possible, but they tend in that direction. It is simple to make an ink that will dry hard on paper within an hour or less under average atmospheric conditions, but sufficient oxidation of ink also takes place on the press rollers and plates to make impossible running conditions. Addition of the proper antioxidant retards oxidation on the press more than on the paper. Guaiacol is one of the most effective antioxidants for this purpose, but unfortunately the spread between its effectiveness on paper and on the press is not sufficient, nor do such negative catalysers retain their effectiveness with ageing of the ink. Theory has it that the antioxidant concentrates itself at ink surface. On printing rollers or plates the ink film is of sufficient thickness to permit such surface concentration, but on paper the ink film is not only much thinner but is absorbed so that this surface action is at least reduced.

Economic Conditions in Ecuador

A Serious Financial Situation

ACCORDING to a report on the Economic Conditions in Ecuador by R. M. Kohan, British Consul-General at Quito, issued by the Department of Overseas Trade (H.M. Stationery Office, 1s. 6d.) the slump in international prices for agricultural produce has particularly affected Ecuador, whose welfare depends greatly on her agriculture. Purchasing power has been reduced with consequent reaction on all spheres of life, the import trade in particular. The following table based on official statistics shows Ecuador's foreign trade from 1929 to June, 1932.—

Year.	Exports.	Imports.
1929	£3,884,850	£3,584,800
1930	£3,360,270	£2,665,900
1931	£2,360,850	£1,836,550
1932 (half year)	£1,030,125	£404,900

On comparison of the above figures it will be observed that during 1931 exports decreased 35 per cent. and imports 48 per cent. as compared with the year 1929. The first half year of 1932 as compared with the same period for 1931 shows that exports have decreased 20 per cent. and imports 56 per cent.

The imports under the heading of drugs, chemicals, paints and perfumery were:—

1929	£240,393
1930	£222,584
1931	£189,203

The imports in 1931 by sub-divisions were:—

Paints, inks, etc.	£22,853
Perfumery, soap, etc.	£34,083
Drugs and chemicals	£128,657

The chief suppliers of the articles under the general heading were: the United States, United Kingdom, France, Germany and Holland, in the order named. The chief articles imported from the United Kingdom during 1931 were:—

Cocoa nut and similar soaps	621,760 lbs.
Rosin and grease soaps	61,490 ,,
Linseed oil	163,540 ,,
Caustic soda	248,550 ,,
Sodium cyanide	380,620 ,,
Stearine	54,580 ,,

The oilfields of Ecuador are being successfully developed and most of them are operated by foreign companies and with foreign capital, British in particular. The fall in the price of petroleum led the undertakings to restrict their output and reduce their staffs. In July, 1931, a measure was passed prohibiting the importation of crude petroleum and its by-products.

The present oil concessions cover an area of 99,360 hectares, of which 49,088 were acquired outright under the Mining Code and the balance on lease under the Hydrocarbon Law now in force.

British Celanese, Ltd., v. Courtaulds, Ltd.

Continuation of Appeal Hearing

IN the Court of Appeal on Monday, the Master of the Rolls and Lords Justices Lawrence and Romer resumed the hearing of the appeal by the British Celanese, Ltd., against a judgment of Mr. Justice Clauson in favour of Courtaulds, Ltd., on a question of alleged infringement of plaintiffs' patents by the defendants. The Judge held that the plaintiffs' patents were invalid and ordered their revocation.

Sir Arthur Colefax, for the plaintiffs, continued his arguments. He said in Clark's specification there was no description of a process in which they were eliminating a solvent by evaporation nor in which expressly they were using a solvent of cellulose derivative. Air was not the evaporative medium. Moreover there was nothing in the document to warrant the view that Clark disclosed a process in which the filaments were being led out continually as produced. The specification was in no sense prejudicial to the subject matter of plaintiffs' patents and it did not make any contribution to the production of artificial silk by evaporative method.

Lord Justice Romer asked Sir Arthur to define the problem which plaintiffs' patent tried to solve.

Sir Arthur: The problem was to get an improved dry spinning process in the manufacture of artificial silk.

Lord Justice Romer: That is all? Nothing but an improved process?

Sir Arthur assented and said that such a process was described in the claim.

Lord Justice Romer: I wanted to find out what was the problem your patents were trying to solve. Until I know that I cannot judge as to the bearing of the alleged anticipations.

Problem of Improved Process

Sir Arthur repeated that the problem was to get an improved process. He did not say that the patentee directed himself to any one aspect of the problem, but it was beyond question that the improvements obtained were outstanding.

Sir Arthur dealt with the Lehner specification of a German patent which Mr. Justice Clauson had held completely anticipated plaintiffs' patent, and said that his lordship had found that the specification disclosed downward spinning. In counsel's submission there was a confusion between extrusion and spinning. In plaintiffs' document spinning did not merely mean extrusion. Secondly, in Lehner's specification, the extrusion was not downward. Moreover the filaments did not travel through an evaporative atmosphere, and air was not the evaporative medium.

The specification was published in 1891, almost at the beginning of the rayon industry and it had nothing whatever to do with plaintiffs' process. The basic error of Mr. Justice Clauson's judgment, said counsel, was that he never came near appreciating what plaintiffs' invention was. He had the curious idea that it was simply spinning downwards with outside winding in combination.

That was not the claim at all. The invention was for a process in which they were producing a dry-thread dried by the evaporative medium of warm air in the enclosed casing. It was impossible to hold that it was anticipated or prejudicially affected by Lehner. There was no prior knowledge that if there was downward spinning they could obtain a length of travel which would give them a useful spinning speed and that was the matter to which Mr. Justice Clauson gave the go-by in his judgment.

Bersch's Specification

Continuing his speech, Sir Arthur dealt with Bersch's specification, which was one of those on which the defendants relied as anticipating plaintiffs' patents, and said that in the experiments plaintiffs conducted based on that specification they did not succeed in obtaining filament formation. The process described, he said, was not an evaporative one in the sense in which plaintiffs used the expression. There was no difference between what Courtaulds were doing and the process in plaintiffs' documents and broadly the apparatus used was the same.

Summarising the bearing of prior documents and alleged common knowledge, he said the plaintiffs' case was quite a simple one. They said there was no art and no common knowledge which was germane to the subject with which their patents dealt. Their process was novel, its industrial utility was outstanding, and in those circumstances it was not in keeping with the decisions of the courts to find an invention lacking in patentable subject matter.

The fundamental point was that they could not find anything which suggested that it had been appreciated that if they extruded downwards they could obtain the spinning of filaments of a useful length and with that was wrapped up the crucial question of speed. It certainly was not obvious, he submitted, that if they had recourse to spinning downwards they could accomplish the evaporation sufficiently to permit of outside winding without undue economic loss of spinning speed.

One Patent Revoked

Counsel pointed out that Mr. Justice Clauson held that the defendants had proved that Bersch had disclosed a workable process. Counsel said with confidence that they had not done so. They certainly got filament formation, but that did not prove that the process was workable. Plaintiffs said that defendants never carried out Bersch's specification or attained his result. The only evaporative method in that specification was after filament formation and further treatment was required before rayon was produced.

Before dealing with the second patent, which relates to plaintiffs' cap spinning device for simultaneously twisting and winding continuous filaments, as produced, Sir Arthur announced that plaintiffs had decided not to proceed with the appeal against the revocation of their third patent No. 203,092 which was concerned with means for assuring uniformity of spinning conditions.

On that patent there were two issues—infringement and validity—but that patent would now stand revoked on the order of Mr. Justice Clauson. Plaintiffs recognised that it would not be proper in the circumstances to proceed with that appeal.

The Master of the Rolls: That patent will stand revoked.

The hearing was adjourned.

New Wool Bleaching Process

Deterioration of Colour Avoided

THE discovery by the Wool Industries Research Association of a new method of bleaching is giving a fresh appearance to garments which hitherto have shown signs of deterioration in colour. The process is stated to confer upon wool fabrics a permanent white not susceptible to "yellowing" by laundering or dry-cleaning, and is applicable to all forms of white woollen fabrics, including flannels, blankets, and tennis-ball cloth. Investigations that led to the discovery were due to a retailer drawing attention to a woman's woollen jumper, badly faded in parts, the colour of which had deteriorated rapidly while the wearer was carrying out household duties. Strong sunlight or other atmospheric influences were ruled out as possible causes of the fading and, since the dyestuff used was scheduled as fast to ordinary conditions of wear, the case presented an interesting problem for research. Further research led to the conclusion that a combination of circumstances had occurred which, acting together, had created a condition in which such fading became possible. This combination was identified as being due to the amount of sulphur dioxide present in relation to the amount of alkali left in the fabric. The discovery explained not only the fading of the jumper, but the cause of many off-shade effects on dyed fabrics, worn in town atmospheres where sulphur dioxide fumes are found as a result of smoke.

The new bleaching process, it is stated, is now established commercially under mill conditions, and its success has been confirmed by practical tests made at home and in India and Australia. Many important firms have adopted it and are marketing in increasing quantities flannels, blankets, woollen underwear, and, indeed, all forms of white goods made from wool to which it has been applied.

British Overseas Chemical Trade in April

A Heavy Decrease in Exports

EXPORTS of chemicals, drugs, dyes and colours during April amounted to a total of £1,378,558, being £256,010 lower than the figure for April, 1932. Imports totalling £800,852 were higher by £233,059, and re-exports totalling £20,312 were lower by £10,223 as compared with April, 1932.

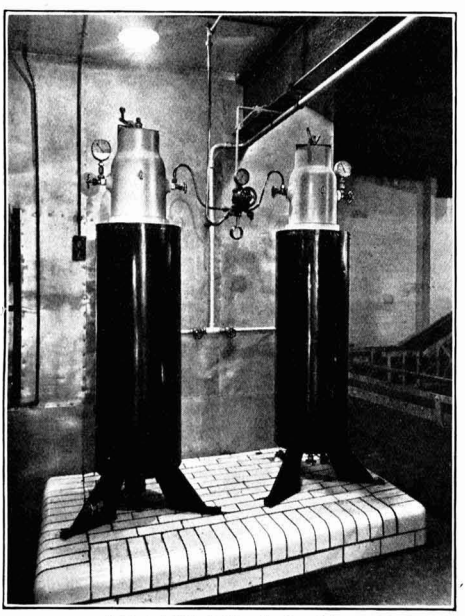
	Quantities. Month ended April 30 1932.	Quantities. Month ended April 30 1933.	Value. Month ended April 30 1932. £	Value. Month ended April 30 1933. £
Imports				
Acetic Anhydride .. cwt.	449	101	1,340	282
Acid, Acetic ..	431 tons	16,857 cwt.	14,874	28,678
Acid, Tartaric, including Tartrates .. cwt.	634	1,275	1,225	4,584
Bleaching materials ,,	3,829	3,655	1,595	2,874
Borax .. .. ,,	24,771	6,144	12,528	3,382
Calcium Carbide .. ,,	42,944	59,455	26,754	34,422
Coal Tar Products, not elsewhere specified value	—	—	414	15,648
Glycerine, Crude .. cwt.	—	5,589	—	7,623
Glycerine, Distilled ,,	5	656	15	1,141
Red Lead and Orange Lead cwt.	120	1,186	149	1,093
Phosphorus .. ,,	—	—	—	—
Kainite, etc. .. ,,	52,258	96,093	9,911	16,619
Potassium Nitrate (Saltpetre) .. .. cwt.	17,045	7,315	8,621	6,189
Other Potassium Compounds .. .. cwt.	55,231	77,343	34,771	52,067
Sodium Nitrate .. ,,	—	20	—	3
Other Sodium Compounds cwt.	17,272	54,562	12,578	29,616
Tartar, Cream of .. ,,	63	556	241	1,775
Zinc Oxide .. tons	73	93	2,305	1,448
Other Chemical Manufactures .. .. value	—	—	188,117	168,668
Quinine and Quinine Salts oz.	45	242,921	2	21,132
Bark Cinchona (Bark Peruvian, etc.) .. cwt.	242	417	1,204	1,876
Other Drugs .. value	—	—	74,331	119,455
Intermediate Coal Tar Products for Dyes cwt.	21	6	226	79
Alizarine and Alizarine Red .. .. cwt.	—	—	—	—
Indigo, Synthetic ,,	—	—	—	—
Other Dyestuffs .. ,,	3,083	3,321	63,045	77,062
Cutch .. .. ,,	1,433	1,010	1,045	1,899
Other Extracts for Dyeing cwt.	919	2,457	3,565	8,801
Indigo, Natural .. ,,	2	7	48	100
Extracts for Tanning (Solid or Liquid) .. cwt.	35,938	154,335	33,143	95,227
Barytes, Ground .. ,,	14,427	22,056	2,997	4,107
White Lead (Dry) ,,	3,714	5,303	5,148	6,480
Other painters' colours and materials .. cwt.	47,058	78,024	67,001	88,522
TOTAL .. value	—	—	567,793	800,852
Exports				
Acid, Sulphuric .. cwt.	5,435	3,245	3,097	2,809
Acid, Tartaric, including Tartrates .. cwt.	695	576	5,065	2,443
Ammonium Chloride (Muriate) .. .. tons	287	277	5,064	5,030
Ammonium Sulphate ,,	33,916	23,613	179,903	139,584
Bleaching Powder (Chloride of Lime) .. cwt.	47,995	57,735	14,338	15,549
COAL TAR PRODUCTS—				
Anthracene .. cwt.	—	—	—	—
Benzol and Toluol gal.	21,948	38,371	2,181	4,079
Carbolic Acid (Crude) ,,	1,593	9,325	185	1,427
Carbolic Acid (Crystals) cwt.	1,089	781	3,234	3,495
Cresylic Acid .. gal.	83,229	55,293	9,123	7,045
Naphtha .. ,,	1,363	3,267	128	237
Naphthalene (excluding Naphthalene Oil) cwt.	12,930	13,997	3,497	4,389
Tar Oil, Creosote Oil, etc. .. .. gal.	1,387,908	3,025,976	31,663	43,169
Other Sorts .. cwt.	49,683	19,206	14,856	7,680
COAL TAR PRODUCTS value	—	—	64,867	72,121
Copper, Sulphate of tons	7,755	6,504	146,494	92,605
Disinfectants, Insecticides, etc. .. .. cwt.	35,030	26,346	73,080	58,852
Glycerine, Crude' .. ,,	6,683	1,874	11,986	2,766
Glycerine, Distilled ,,	7,448	4,666	16,480	9,587
Potassium Chromate and Bichromate .. cwt.	1,579	1,200	3,797	2,977
Potassium Nitrate (Saltpetre) .. .. cwt.	1,932	2,902	3,262	2,900
Other Potassium Compounds .. .. cwt.	2,398	1,706	7,523	7,347
Sodium Carbonate, including Crystals, Ash and Bicarbonate .. cwt.	322,249	288,518	83,299	71,081
Caustic Soda	126,263	166,011	90,564	115,448
Sodium Chromate and Bichromate cwt.	1,953	1,459	3,814	2,653
Sodium Sulphate, including Salt Cake .. cwt.	10,268	19,708	2,522	2,600
Other Sodium Compounds cwt.	72,381	61,781	75,526	58,136
Zinc Ozide .. tons	1,094	874	20,985	16,865
Other Chemical Manufactures .. .. value	—	—	262,141	224,562
Quinine and Quinine Salts oz.	75,361	75,034	9,418	7,801
Other Drugs .. value	—	—	226,589	191,515
Dyes and Dyestuffs (Coal Tar) .. .. cwt.	9,718	9,538	90,093	81,548
Other Dyestuffs .. ,,	10,999	12,494	12,136	12,396
Barytes, Ground .. cwt.	1,355	2,089	768	937
White Lead (Dry) ,,	1,737	1,995	3,162	3,158
Paints and colours in paste form .. .. cwt.	22,272	17,019	39,400	29,584
Paints and Enamels prepared .. .. cwt.	35,280	26,049	105,889	80,049
Other painters' colours and materials .. cwt.	41,887	38,106	72,730	64,215
TOTAL .. value	—	—	1,034,568	1,378,558
Re-Exports				
Acid, Tartaric, including Tartrates .. cwt.	48	35	320	192
Borax .. .. ,,	154	502	105	285
Coal Tar Products value	—	—	4	—
Potassium Nitrate (Saltpetre) .. .. cwt.	76	207	123	144
Sodium Nitrate .. ,,	5,341	4,146	2,548	1,683
Tartar, Cream of .. ,,	308	111	1,250	454
Other Chemical Manufactures .. .. value	—	—	8,953	8,247
Quinine and Quinine Salts oz.	4,238	5,372	632	522
Bark Cinchona (Bark Peruvian, etc.) .. cwt.	250	262	2,064	2,214
Other Drugs .. value	—	—	20,053	13,311
Cutch .. .. cwt.	508	411	619	560
Other Dyestuffs .. ,,	52	120	253	551
Indigo, Natural .. ,,	6	8	178	158
Extracts for Tanning (Solid or Liquid) cwt.	228	338	323	276
Painters' colours and materials .. .. cwt.	783	172	1,905	610
TOTAL .. value	—	—	39,535	29,312

IN their April catalogue of second-hand microscopes and accessories, Charles Baker include apparatus for recording observations, and objectives, the latter comprising achromatic-dry, achromatic-water immersion, achromatic-oil immersion, apochromatic, and projection types. The "Simplex" photomicrographic cameria also figures in the catalogue. This camera has been designed to simplify photomicrography.

Works Equipment News

A Modern Source of Carbon Dioxide

THE supply of CO_2 as a solid has many advantages to the consumer, not least of which is the fact that only the net weight of CO_2 has to be handled. There is no occasion to move heavy cylinders about, or to couple them up and uncouple them again when empty. To facilitate the handling of solid CO_2 in cases where it is desired to make use of CO_2 as a gas, Imperial Chemical Industries, Ltd., have introduced a special liquefier, in which all pipe lines remain permanently coupled up. This liquefier is a kind of large-sized cylinder, equipped if necessary with a jacket so that it may be heated. On removal of the top cover, Drikold blocks are dropped in and the cover is then put back and secured, an operation which takes about 15 seconds. As the liquefier warms up, pressure is built up, and in any time from four minutes upwards, according to the method of heating, a supply of pure CO_2 under pressure is available. Only the blocks of Drikold have been handled; the liquefier contains nothing but CO_2; no tools have been required : the whole operation is the essence of simplicity and



A Typical Drikold Liquefier Installation

has been carried out so rapidly that practically no gas has been wasted.

Rpeated tests have shown that Drikold is outstandingly the purest form of CO_2 on the market. The product is made by I.C.I. under conditions of the utmost cleanliness. A special investigation on the question of oil contamination has been carried out, and in no case does the oil content exceed 0.0001 per cent. by weight, or one part per million. It may be thought that as the liquefier contains air before the Drikold has been introduced, some air will be present in the first sample of gas obtained. Actually the latter contains less than 0.2 per cent. of air, as the CO_2 given off from the blocks of Drikold as they are put into the liquefier is enough to displace all the air by the time the cover is fitted. The use of CO_2 of such purity is of particular benefit to brewers and manufacturers of aerated waters. They can be assured that their bottling pressure represents only CO_2 without the contamination of air or any other gas, thus minimising the risk of burst bottles. Brewers are further safeguarded against the undesirable further fermentation after bottling due to oxygen and the so-called " wild yeasts " which are present in gas contaminated with air. Other consumers of CO_2 will, by using Drikold, ensure for themselves a supply of gas of a uniformly high standard of dryness, purity and cleanliness unattainable in liquid CO_2 cylinders. They will, further, be obliged to handle only the nett weight of CO_2, thus avoiding the extra labour and trouble involved in the use of heavy cylinders. Finally, they will be enabled to use the CO_2 more economically owing to the elimination of the wastage usual with cylinders, due to " blowing off " of gaseous impurities, water, etc.

General Arrangement of the Liquefier

Three sizes of liquefier are available, the capacities being 25, 50 and 100 lb. of Drikold; all three sizes are similar in construction. The accompanying illustration shows the general arrangement of a liquefier installation. The equipment includes a gas valve at the top of the cylinder, a drain valve at the bottom, and a bursting disc (safety device) at the top. A third valve is fitted at the top of the cylinder, to which a pressure gauge may be attached. The bursting disc has been arranged to burst at 1,400 lb. per sq. in. The normal working pressure of the liquefier is 500 lb. to 880 lb. per sq. in., depending on the temperature of the atmosphere surrounding it, and is unlikely to reach 1,400 lb. per sq. in. unless some method of heating the liquefier is employed in order to hasten the liquefaction and gasification of the Drikold. In most cases the application of heat will be an advantage to the user, in which case the fitting of a pressure gauge is essential, and the pressure must not be allowed to exceed 1,100 lb. per sq. in. Should the bursting disc operate, the whole of the contents of the cylinder will be discharged and a new disc must be fitted. Before issue for use to customers, every liquefier is tested hydraulically to 1,800 lb. per sq. in. Tests to destruction have also been carried out; the pressure at which the liquefier failed was found to be about 9,000 lb. per sq. in.

Some Necessary Precautions

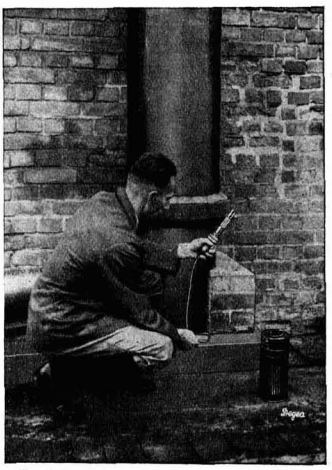
When charging the liquefier with Drikold it is of great importance not to put in more than the designed weight. The liquefiers have been so designed that this cannot be done with whole round blocks, but it is a point that should not be forgotten, since overfilling might lead to a rise of pressure which would fracture the bursting disc. The liquefier is intended for use with round blocks of Drikold, each weighing approximately 25 lb., the dimensions being approximately 7 in. in diameter and 14 in. long. If whole blocks are put in, it will be found impossible to put in more than one, two or four blocks (*i.e.*, 25, 50 or 100 lb.), according to the capacity of the liquefier, but if broken pieces are used they should be weighed first as otherwise it is possible to overload the liquefier. Before putting the Drikold into the liquefier, the condensed moisture on the blocks should be wiped off, otherwise some will be introduced, which is undesirable. It is almost impossible to avoid introducing a small quantity of moisture (a few parts per million) in this way, and for this reason it is advisable, when releasing the pressure in the liquefier before recharging with Drikold, to release it *via* the bottom drain valve. This will blow out any traces of moisture which would otherwise collect. The only source of water is this condensate, which is a minute proportion of that usually associated with the liquid CO_2 sold in tubes.

A Carbon Monoxide Detector

THE " Evertrusty Degea " detector, supplied by Wallach Bros., Ltd., utilises the fact that when carbon monoxide clashes with a mixture of iodine pentoxide and fuming sulphuric acid, iodine is liberated, which according to its volume, changes a white carrier substance to various shades of blue-green. The appliance consists of a nickel-plated cylindrical body containing a layer of activated charcoal for keeping back such gases that may interfere with the measurement. It also contains a test tube filled with a white substance and a comparison tube, and has at one end a compressible rubber ball for forcing the air through the test tube. For making tests in inaccessible places, a 10 ft. extension tube is employed, which is fixed to the nozzle of the rubber ball.

This enables tests to be taken in trenches, cellars, etc. The hose is wound on a metal reel fitting into the lid of the container. The comparison tube is filled with three layers of finely granulated material of three shades of green, each denoting a different concentration of CO, and is marked with a scale showing this clearly. The whole apparatus, together with a supply of necessary refills, fits into a metal container for easy transport, and is secured to prevent damage.

In use, the first thing to be done is to insert the comparison tube. The ends are then broken from the test tube, which is

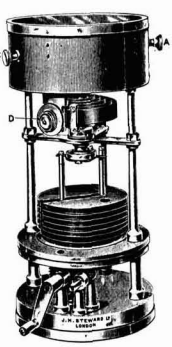


The Carbon Monoxide Detector Apparatus in Use.

also secured in the apparatus by a simple operation. Wearing a suitable gas-mask, the tester then advances into the suspected area. He slowly presses the rubber ball seven times; if carbon monoxide is present a change of colour will be observed in the test tube. This colour is then compared with the shades in the comparison tube, the scale at the side giving at a glance the concentration of carbon monoxide which is present. As it is impossible to detect the presence of carbon monoxide either by taste or smell, special emphasis is laid on the necessity of wearing an industrial form of gas-mask when using the carbon monoxide detector. The "Evertrusty Degea" mask affords protection against CO and all other gases, providing there is sufficient oxygen in the air for breathing purposes.

Friction Testing of Oils

THE Deeley friction machine marketed by J. H. Steward, Ltd., has been designed for easily and accurately ascertaining the oiliness or efficiency and lubricating value of oils by determining the static friction between any desired metals. Without the friction test, the chemist who specialises in lubricants cannot tell whether a liquid which fulfils all the other requirements of a lubricant is really a lubricant at all. The static frictional value of any particular mineral oil can be ascertained, to determine its suitability as regards oiliness for blending purposes. The blended oil can be tested for oiliness to ascertain if the required standard has been attained. Merchants and users of lubricating oils can also ascertain, by a quick test, whether the lubricating oils supplied or used are up to the quality specified, or the required standard. In scientific laboratories the machine will be found useful, as the chemical changes which take place on metallic and other surfaces, when brought into contact with various liquids and gases, reveal their actions by changing the oiliness of the surfaces.

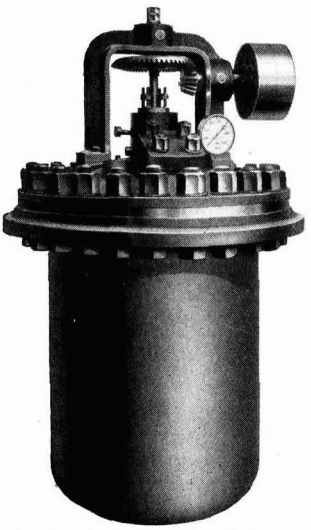


The Deeley Friction Machine, Laboratory Model.

In universities and technical schools it is installed for the purpose of demonstrating and studying both low-speed kinetic and static frictional laws. Tests of oiliness show that an oil which is good for using with some metals does not work so well with others. The engineer can, however, determine with the aid of the friction machine which is the best oil or metal to use in each particular kind of bearing.

High Pressure Autoclaves

THE accompanying illustration shows a cast steel autoclave having a capacity of 150 gallons, suitable for 750 lb. per sq. in. working pressure, but tested to 1,500 lb. per sq. in., as supplied by Meldrums, Ltd. This vessel is fitted with an agitator, pressure gauge and blow-out pipe, and is placed in a steel jacket, heat being supplied by gas burners. Similar vessels can be manufactured up to a capacity of 500 gallons and can be heated by means of gas burners, or by steam or oil jackets. The contents of the vessel are removed by blowing them out with compressed air, a special blow pipe being



Cast Steel Autoclave for Working Pressure of 750 lb. per sq. in.

fitted on the filling cover when the contents are ready to discharge. The heating gases from the gas burners below are caused to take a circular spiral passage round the vessel, thus giving a much increased heating surface. Meldrums, Ltd., also make a complete range of designs in "Meldrum" acid resisting metal which is proof against sulphuric, nitric, acetic and most other commercial acids of any strength or temperature.

Catalytic Oxidation of Ethylene

A PROCESS for the catalytic oxidation of ethylene with atmospheric oxygen has been worked out in the laboratory of the Société Française de Catalyse Généralisée and is described in the "Chemiker-Zeitung," May 6, 1933 (page 355). The most favourable results were obtained with a nine to elevenfold excess of air at a temperature of 400° C., using a gas mixture containing 82 per cent. ethylene, 1.6 per cent. methane and 1 per cent. hydrogen. A single exposure to the catalyst (the nature of which was not revealed) led to a 41.7 per cent. conversion of the ethylene into ethylene oxide. Impurities such as sulphur and phosphorus compounds, in addition to acetylene, which retarded the reaction when using ethylene derived from coke oven gas, are readily eliminated by passing the crude gas over copper oxide at 170 to 200° C. before mixing with air.

Spurious Degrees

Proposed Act to Prohibit Unauthorised Use

A BILL to prohibit the unauthorised use and issue of university degrees, a subject which has been taken up by the Association of Scientific Workers, was introduced into the House of Lords by Lord Jessel on May 3, and read a first time. The main part of the Bill, which, if passed, will be known as the University Spurious Degrees (Prohibition of Use and Issue) Act, proposes to make it a penal offence for any person to use letters after his name denoting a university degree unless he actually holds such a degree; and also it prohibits the conferment of degrees by any person or organisation other than a recognised university. The term "recognised university" is defined at length; briefly, it may be described as a university or similar institution granting academic degrees as a result of a prescribed course of at least three years' training or definitely recognised as a university by the government of the country where it is situated.

Trade Mark Infringement

Bottles of a Particular Shape

IN the Chancery Division on Friday, May 12, Mr. Justice Clauson had before him a motion by Ayrton Saunders and Co., Ltd., of Hanover Street, Liverpool, wholesale chemists, export druggists and druggists' sundriesmen, for an injunction restraining Jules Lang and Son, of Charlton Works, Islington, from infringing their trade mark "Ayrton Oval" for bottles of a particular shape, and from offering for sale under that name or any name so resembling it as to be calculated to deceive, bottles not of the plaintiffs' manufacture.

Mr. J. Mould, for the plaintiffs, said the name "Ayrton Oval" was registered as a trade mark in August, 1931. The defendants had told them that they were under the impression that they were entitled to sell the bottles complained of, and that the name was merely descriptive. They were, however, willing to submit to judgment in agreed terms, to a perpetual injunction, an order to deliver up all infringing bottles and offending advertising matter, and to pay £47 as agreed damages, and the taxed costs.

Mr. Whitehead, K.C., for the defendants, said the matter was due to a misunderstanding on their part.

His lordship made an order to the terms agreed upon.

Dead Sea Salts

A Concession Granted by the Sultan of Turkey

TWO actions relating to a concession granted by the Sultan of Turkey in 1913 to three Turkish subjects for the extraction of salts from the Dead Sea were mentioned in the Court of Appeal on May 16. The cases, which were listed as "Berloty v. Palestine Potash, Ltd.," came before the Court on interlocutory appeals from a decision of Mr. Justice Mackinnon, in Chambers, relating to an application for "discovery" which had been dealt with by a Master. The plaintiffs were dissatisfied with Mr. Justice Mackinnon's decision and appealed. They said there were documents that would be material to the trial of the actions that ought to be disclosed by the defendants.

Palestine Potash, Ltd., claimed that they had made full "discovery," and counsel on their behalf submitted that the actions should not be encumbered with a mass of documents which might be wholly irrelevant to the issue.

Lord Justice Scrutton, giving judgment, said the actions raised questions of enormous international importance, because the Dead Sea appeared to be the source of great potential wealth in the matter of salts. The Court thought there should be a further affidavit of documents, though this would not give all the "discovery" for which the plaintiffs asked. He thought the whole of the interlocutory litigation might have been avoided and there would be no costs on either side.

A NEW company has been established in Hamburg for the manufacture of a chlorinated rubber compound. The company has a nominal capital of 300,000 marks controlled by two firms—a rubber manufacturer and a chemical firm.

Lawn Tennis Tournament

Preliminary Round Results

RESULTS of matches in the preliminary round of the Chemical Industry Lawn Tennis Tournament should be forwarded to the Editor of THE CHEMICAL AGE by Monday next, May 22, in order that due notification may be given of the completed draws for the first round. There are twelve matches in the preliminary round of the men's singles and two in the preliminary round of the doubles, all of which are due to be played off not later than this week-end. Details of the preliminary and first round draws were published in THE CHEMICAL AGE of May 6, but nine of the 16 matches in the first round of the singles and two in the doubles cannot be proceeded with until the preliminary results are reported.

In cases where players find it necessary to delay preliminary matches beyond next Monday, we would ask the winners, in their own interests as well as those of their opponents, to communicate the results direct to those whom they are due to meet in the first round, as well as to the Editor of THE CHEMICAL AGE, so that no time may be wasted. In any event, the results should not be delayed beyond first post next Thursday morning, May 25.

Results received up to the time of going to press are as follows:—

SINGLES.

Match 2.—J. W. Urban (Monsanto Chemical Works, Ltd., London) beat R. W. Welsh (British Oxygen Co., Ltd.), 12—10, 6—2.

Match 5.—W. Backinsell (Le Grand, Sutcliff and Gell, Ltd.) beat K. L. Fuller (British Drug Houses, Ltd.), 7—5, 6—0.

Match 6.—C. G. Copp (Doulton and Co., Ltd.) beat R. F. Porter (Howards and Sons, Ltd.), 6—2, 6—4.

Match 8.—J. Wilson (British Celanese, Ltd., London) beat L. Seabrook (British Oxygen Co., Ltd.), 7—5, 6—4.

Match 9.—W. J. Sharman (Williams, Hounslow, Ltd.), walk-over, C. H. B. Jones (Anglo-Persian Oil Co., Ltd.), scratched.

Match 10.—D. B. Hodgson (George Scott and Son, Ltd.), walk-over, E. Cox (Anglo-Persian Oil Co., Ltd.) scratched.

DOUBLES.

Match A.—A. Collins and H. Sibley (British Oxygen Co., Ltd.) beat F. C. White and A. W. White (Howards and Sons, Ltd.), 6—2, 6—4.

In the first round the winners of the above matches will play as follows:—

SINGLES.

Urban, J. W. Monsanto Chemical Works, Ltd., Victoria Station House, London, S.W.1. (Victoria 1535.)	*v*	**Grape, L. F.** (Borax Consolidated) or **Trigg, G. H.** (Bovril Ltd.) (Match 1)
Backinsell, W. Le Grand Sutcliff & Gell, Ltd., The Green, Southall, Middlesex. (Southall 2211.)	*v*	**Law, R. S.** (Howards & Sons, Ltd.) or **Dauncey, W. J.** (G. A. Harvey & Co., Ltd.) (Match 4.)
Barningham, H. Monsanto Chemical Works, Ltd., Victoria Station House, London, S.W.1. (Victoria 1535.)	*v*	**Copp, C. G.** Doulton & Co., Ltd., 28, High Street, Lambeth, London, S.E.1. (Reliance 1241.)
Wilson, J. British Celanese, Ltd., 22/3, Hanover Square, London, W.1. (Mayfair 8000.)	*v*	**Mugridge, R. C.** Borax Consolidated, Ltd., 16, Eastcheap, London. (Royal 1450.)
Sharman, W. J. Williams (Hounslow), Ltd., Hounslow. (Hounslow 2929.)	*v*	**Keeley, E. C.** (Bovril, Ltd.) or **Fradin, L. R.** (British Drug Houses, Ltd.) (Match 3.)
Blow, D. The British Drug Houses, Ltd., Graham Street, City Road, London, N.1. (Clerkenwell 3000.)	*v*	**Hodgson, D. B.** George Scott & Son (London), Ltd., Bradfield Road, Silvertown, London. (Albert Dock 2026.)

DOUBLES.

Clarke, A. G. R., & **Browne, E.C.** G. A. Harvey & Co. (London), Ltd., Woolwich Road, London, S.E.7. (Greenwich 0020.)	*v*	**Collins, A.,** & **Sibley, H.** British Oxygen Co., Ltd., Angel Road, Edmonton, London, N.18. (Tottenham 2647 and 2488.)

New Fertiliser Factory in Greece

THE "Union Agricole d'Approvisionnement," Inc., of Athens, Greece, was formed in 1928 to handle imported fertilisers, agricultural implements, cattle feed, and agricultural insecticides. The imposition of an almost prohibitive import duty on foreign made fertilisers caused it to open in 1931 a plant in Piræus where imported materials are employed in the production of mixed fertilisers. It is planned to produce between 7,000 and 9,000 tons of mixtures during 1933.

News from the Allied Industries

Beet Sugar

WE ARE INFORMED that the Government will shortly announce the form and method by which it proposed "to continue the beet sugar industry in this country as a permanent branch of agriculture."

Cement

IT IS UNDERSTOOD that Associated Portland Cement Manufacturers, Ltd., are posting an offer of conversion, to the holders of £2,280,527 5 per cent. second debenture stock. In this connection, underwriting arrangements are in process in respect of an issue of £1,500,000 new 4½ per cent. debenture stock, which will be offered to the 5 per cent. second debenture stockholders. The balance required will be provided out of cash resources.

Artificial Silk

PRELIMINARY ESTIMATES of the world rayon production during the first quarter of the year give a figure of 62,550 metric tons, against 58,040 metric tons in the same quarter of 1932. It is, however, lower than in the last quarter of the year 1932. It is to be anticipated that output during the present quarter will be greater than in the March quarter, as there have been increases so far in Japan, the United Kingdom and America. In the period under review there were increases in output in Germany, Holland, and France, while decreases were shown in the case of America, Italy, Japan and Great Britain.

Mineral Oil

THE DIVERSION OF SOVIET OIL, amounting to 600,000 tons, from its usual export channels following the imposition of the British embargo on Soviet goods has complicated the work before the World Oil Conference. In addition, the fall of the dollar has been followed by marked excess of American oil production over the American quota, and it is rumoured here that the head of the Roumanian delegation to the World Oil Conference, which meets in Paris next month, has left his country for Paris in order to present an ultimatum to British, Dutch, and American producers to the effect that Roumania is prepared to withdraw from the conference unless the American output is regularised.

Fertilisers

BRITISH MANUFACTURERS of sulphate of ammonia are likely to lose one of their best markets if a project drafted by the Council of National Economy for the control of the nitrogen market is carried out. Drastic measures for the protection of the home industry are proposed, including the establishment of a quota, until foreign products are ousted. As a result of these measures it is estimated that fertilisers will cost farmers 65 per cent. more than they do to-day. Those who do not buy fertilisers made in Spain will have to pay dues to compensate national factories. Although Spain draws large supplies from England, the quotations of sulphate of ammonia on which the Council of National Economy bases its calculations are taken from German figures, which show much higher prices than the English.

China Clay

ONE OF THE OLDEST THREE-MASTED SCHOONERS, "Englishman," of Lancaster, which has been engaged in the coastal trade for over 70 years has foundered with a 200 ton cargo of china clay whilst at anchor in Musselwick Bay on the Pembrokeshire coast. She is reported to have struck some sunken object and is submerged at low water.

THE CHINA CLAY SHIPMENTS for April were down by 12,000 tons from the previous month. Shipments included: Fowey, 29,943 tons china clay, 963 tons of china stone, 100 tons ball clay; Par, 9,356 tons china clay, 1,123 tons of china stone; Charlestown, 6,466 tons of china clay, 743 tons of china stone; Penzance, 504 tons of china clay; Plymouth, 93 tons of china clay; Newham, 41 tons of china clay; by rail, 4,594 tons of china clay; a total of 50,977 tons of china clay, 2,829 tons of china stone, 100 tons of ball clay, against 62,825 tons of china clay, 2,969 tons of china stone, and 798 tons of ball clay in March.

By-Product Coking

STEWARTS AND LLOYDS, LTD., have, on the advice of their consulting engineers, H. A. Brassert and Co., Ltd., placed orders for a large modern by-product coking installation to be built at their new steelworks at Corby, Northamptonshire. The oven battery, coke screening and coke handling plant will be constructed by the Woodall-Duckham Co., London, the by-product recovery plant by W. C. Holmes and Co., Ltd., Huddersfield, and the coal washery and coal handling plant by Simon-Carves, Ltd., Stockport. The coke over battery will comprise 35 Becker ovens, this type of oven being the only one actually operating on biast furnace gas in Great Britain; coal storage bin, a complete set of oven machines and central quenching station. The coke screening and handling plant comprises wharf, screening station, and belt conveying systems. The by-product plant consists of gas exhausters, coolers, ammonia recovery plant for the production of sulphate of ammonia, and benzol recovery and rectification plant for the production of refined motor spirit. The coal washery and coal handling plant comprise a coal washery of 125-tons per hour capacity, with a dust extracting plant and coal storage, blending, handling and crushing plant.

New Dyestuffs

A NEW colour card issued by the Dyestuffs Group of Imperial Chemical Industries, Ltd., is likely to be of the greatest value as a book of reference on the dyeing of garments in different materials, and of coats and shoes. Information is given concerning the cleansing of garments before dyeing, and how to identify the various textile fibres.

* * *

A NEW dyestuff, Wool Fast Navy Blue FTL, is being placed on the market by the Geigy Colour Co., Ltd. It is dyed from a weakly acid bath, for the production of dark navy blue shades on wool piece goods, particularly ladies' and men's wear materials of every description, giving an attractive and bright over hand tone, very good fastness to light, good fastness to washing, water and perspiration and an exceptional shade in artificial light. Wool Fast Navy Blue FTL is unaffected by chrome. Cotton and artificial silk effects are only slightly blued, so that white effects are kept beautifully clear. As a result of a test of this colour an opinion from a neutral source stated that from the colouristic point of view there were no defects whatsoever to be found. Dyeing is carried out in the usual manner for weak acid dyestuffs with the addition of 10 per cent. Glauber's salt, 6-8 per cent. acetic acid 30 per cent., or 1-2 per cent. formic acid 85 per cent. The goods are entered at 30° C. raised to the boil in ½—¾ hour and boiled for ¾—1 hour, if necessary with the addition of further acid to obtain complete exhaustion of the dyebath.

* * *

DISPERSOL Fast Red RS Paste, introduced by Imperial Chemical Industries, Ltd., is suitable for dyeing all forms of acetate silk materials and gives bright yellowish red shades which are distinguished by their good fastness to light, washing and perspiration. It is applicable for producing both red and compound shades where fastness to hot pressing and marking-off is desired, and can be used for the direct printing of acetate silk fibres, showing practically no tendency to mark-off during the steaming process. It should also be of special interest for the dyeing of acetate silk goods for subsequent discharging as good whites are obtained by the Formosul-calcium sulphocyanide and the Formosul-zinc sulphocyanide processes. This paste also possesses very good affinity for the acetate silk fibre and can be dyed without the addition of assistants in the dyebath and the presence of soap or soluble oil only slightly retards the speed of dyeing. It is unaffected by the presence in the dyebath of assistants necessary for the dyeing of other textile fibres, *i.e.*, acids, alkalies, Glauber's salt, etc., and may be used in conjunction with other dyestuffs when dyeing shades on mixed goods containing acetate silk. Dyeing is carried out in the manner normal as for the Duranol and Dispersol dyestuffs, at a temperature of 175° to 185° F. from a bath containing, if desired, a little Turkey Red oil 50 per cent., or Lissapol A.

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 TREATMENT OF PRODUCTS OR ARTICLES MADE OF OR CONTAINING CELLULOSE DERIVATIVES.—H. Dreyfus. Sept. 26, 1931. 391,769.

FIXATION OF METAL COMPOUNDS ON TEXTILE MATERIALS.—British Celanese, Ltd., E. W. Kirk and G. H. Ellis. Oct. 15, 1931. 391,773.

REDUCTION OF NITROGEN CONTAINING ORGANIC COMPOUNDS.—H. Dreyfus. Oct. 22, 1931. 391,774.

RECOVERY OF PALE FATTY ACIDS FROM COTTON-SEED BLACK GREASE AND OTHER ACID OILS.—W. J. Tennant (Naamlooze Vennootschap Maatschappij Tot Exploitatie der Vereenigde Oliefabrieken Zwijndrecht). Oct. 28, 1931. 391,825.

SEPARATION OF WEAK ACIDS FROM GASEOUS MIXTURES.—J. Y. Johnson (I. G. Farbenindustrie). Oct. 30, 1931. 391,780.

REDUCTION OF THE LUSTRE OF CELLULOSE DERIVATIVES.—Imperial Chemical Industries, Ltd., C. Dunbar and L. G. Lawrie. Oct. 30, 1931. 391,847.

PRODUCTION OF CHROMIUM ALUMINIUM STEELS.—H. Gonschewski. Nov. 29, 1930. 391,848.

METHOD AND APPARATUS FOR CARRYING OUT CHEMICAL REACTIONS IN THE LIQUID PHASE.—F. E. Smith, and Imperial Chemical Industries, Ltd. Nov. 3, 1931. 391,800.

MANUFACTURE OF ALIPHATIC ANHYDRIDES.—H. Dreyfus. Nov. 3, 1931. 391,802.

SOLVENT TREATMENTS OF CELLULOSE DERIVATIVES.—H. Dreyfus. Nov. 5, 1931. 391,828.

MANUFACTURE AND PRODUCTION OF DYESTUFFS FOR DYEING CELLULOSE ESTERS AND ETHERS.—J. Y. Johnson (I. G. Farbenindustrie). Nov. 6, 1931. 391,859.

DISAZO DYESTUFFS AND THEIR APPLICATION.—Imperial Chemical Industries, Ltd., and A. H. Knight. Nov. 6, 1931. 391,862.

PHOSPHORESCENT OR LUMINOUS MASSES OR COMPOUNDS.—H. M. Mines and W. A. Beech. Jan. 19, 1932. 391,914.

DYEING OF CELLULOSE ESTERS AND ETHERS.—I. G. Farbenindustrie. May 26, 1931. 391,987.

CATALYSTS FOR THE HYDROGENATION OF ORGANIC MATERIALS.—R. A. A. Taylor. May 27, 1932. 391,988.

SEPARATION OF WEAK ACIDS FROM GASEOUS MIXTURES.—J. Y. Johnson (I. G. Farbenindustrie). Oct. 30, 1931. 391,786.

PROCESS FOR THE MANUFACTURE OF WATER INSOLUBLE DYESTUFFS.—I. G. Farbenindustrie. July 22, 1931. 392,011.

PROCESS FOR THE MANUFACTURE OF WATER INSOLUBLE DYESTUFFS.—I. G. Farbenindustrie. July 22, 1931. 392,012.

PRODUCTION OF SEXUAL HORMONES FROM URINE.—Laboratoires Francais de Chimiotherapie and A. Girard. Sept. 8, 1932. 392,039.

MANUFACTURE AND APPLICATION OF ACCELERATORS FOR VULCANISATION.—I. G. Farbenindustrie. Sept. 17, 1931. 392,046.

MANUFACTURE AND APPLICATION OF ACCELERATORS FOR VULCANISATION.—I. G. Farbenindustrie. Sept. 19, 1931. 392,047.

MANUFACTURE OF ACID WOOL DYESTUFFS OF THE ANTHRAQUINONE SERIES.—I. G. Farbenindustrie. Sept. 26, 1931. 392,056.

CONVERSION OF ALICYCLIC KETONES INTO UNSATURATED ALDEHYDES.—Soc. Anon. M. Naef et Cie. Oct. 30, 1931. 392,062.

PREPARATION OF CATALYSTS FOR HYDROGENATING AND OTHER REACTIONS.—E. I. Du Pont de Nemours and Co. Jan. 27, 1932. 392,134.

PRODUCTION OF GRANULAR MIXED FERTILISERS CONTAINING AMMONIUM PHOSPHATES.—Kali-Forschungs-Anstalt Ges., and O. Kaselitz. Sept. 25, 1931. 391,813.

Specifications Open to Public Inspection

PROCESS FOR THE MANUFACTURE OF COMPLEX DOUBLE COMPOUNDS OF ORGANIC HEAVY METAL MERCAPTO COMPOUNDS.—Schering-Kahlbaum Akt.-Ges. Nov. 7, 1931.

MANUFACTURE OF NEW INDOLE COMPOUNDS.—I. G. Farbenindustrie. Oct. 31, 1931.

STABILISATION OF AQUEOUS SOLUTIONS CONTAINING HYDROGEN PEROXIDE.—Roessler and Hasslacher Chemical Co. Nov. 2, 1931.

PROCESS OF, AND APPARATUS FOR, THE PRODUCTION OF BLEACHING POWDER.—I. G. Farbenindustrie. Nov. 2, 1931.

PRODUCTION OF FORMALDEHYDE.—Gutehoffnungshütte Oberhausen Akt.-Ges. Nov. 2, 1931.

PROCESS FOR THE PRODUCTION OF SYNTHETIC RESINS FROM PHENOLS AND ALDEHYDES.—Dr. Kurt Albert Ges. Chemische Fabriken. Nov. 7, 1931.

MANUFACTURE OF HYDROGEN PEROXIDE.—Deberag, Deutsche Beratungsges, für Chemische und Metallurgische Industrie. Nov. 3, 1931.

PROCESS FOR THE MANUFACTURE OF AMINO AZO COMPOUNDS.—I. G. Farbenindustrie. Nov. 7, 1931.

Applications for Patents

MANUFACTURE OF SOLID CHLORINATED RUBBER PRODUCTS.—J. P. Baxter and Imperial Chemical Industries. May 10. 13623.

MANUFACTURE OF ARTICLES OF SILICA, ETC.—British Thomson Houston Co., Ltd. May 8. (United States, May 10, '32.) 13366.

METHODS OF MAKING ARTICLES OF SILICA, ETC.—British Thomson-Houston Co., Ltd. May 9. (United States, May 10, '32.) 13484.

RECOVERY OF ALKALINE EARTH, ETC., METALS FROM DROSSES, ETC.—Calloy, Ltd., and G. N. Kirsebom. May 10. 13589.

MANUFACTURE OF SILICON CARBIDE REFRACTORIES, ETC.—Carborundum Co. May 8. (United States, June 30, '32.) 13376.

MANUFACTURE OF PREPARATIONS COMPRISING COMPOUNDS ACTING CHEMICALLY AS REDUCING AGENTS.—A. Carpmael (I. G. Farbenindustrie. May 9. 13492.

CELLULOID EMBOSSING PROCESS.—Celluloids, Ltd. May 11. (Canada, May 25, '32.) 13725.

MANUFACTURE OF SYNTHETIC RESINS, ETC.—J. M. Cooper, Imperial Chemical Industries, Ltd., and R. Renfrew. May 13. 13983.

MACHINES FOR CARBONATING LIQUIDS.—L. E. Cowey. May 11. 13712.

PRODUCTION OF ESTERS.—J. W. C. Crawford. May 13. 13986.

MANUFACTURE OF ORGANIC COMPOUNDS.—H. Dreyfus. May 13. 13970.

PRODUCTION OF CHLORINATED RUBBER.—Dunlop Rubber Co., Ltd., D. F. Twiss and J. A. Wilson. May 13. 13979.

PRODUCTION OF ESTERS, ETC.—E. I. Du Pont de Nemours and Co. May 8. (United States, May 7, '32.) 13367.

MANUFACTURE OF RESINOUS PRODUCTS.—E. I. Du Pont de Nemours and Co. May 11. (United States, May 16, '32.) 13765.

MANUFACTURE OF AZO DYESTUFFS.—E. I. Du Pont de Nemours and Co., I. Gubelmann and J. B. Oesch. May 12. 13908.

MANUFACTURE OF SYNTHETIC RESINS.—E. I. Du Pont de Nemours and Co. May 13. (United States, May 13, '32.) 13982.

PRODUCING FAST DYEINGS, ETC., ON ANIMAL FIBRES.—Durand and Huguenin. May 11. (Germany, May 12, '32.) 13761.

APPARATUS FOR TESTING LUBRICANTS.—H. D. Elkington (Naamlooze Vennootschap De Bataafsche Petroleum Maatschappij). May 10. 13599.

EXTRACTION OF OILS.—Ellerman's Arracan Rice and Trading Co., Ltd. (Peake). May 10. 13647.

APPARATUS FOR TREATING PLASTIC MATERIALS.—Firestone Tire and Rubber Co. May 11. 13741.

OIL-TREATING APPARATUS.—Foster Wheeler, Ltd. (Foster Wheeler Corporation). May 12. 13889.

PRESERVATIVE AND LUBRICANT COMPOSITIONS.—S. Fowler. May 10. 13658.

METHOD OF PRODUCING A LUMINESCENT INORGANIC GLASS.—Glaswerk G. Fischer. May 9. (Germany, May 9, '32.) 13515.

METHOD OF PRODUCING A LUMINESCENT INORGANIC GLASS.—Glaswerk G. Fischer. May 9. (Germany, May 9, '32.) 13516.

METHOD OF PRODUCING A LUMINESCENT INORGANIC GLASS.—Glaswerk G. Fischer. May 9. (Germany, Nov. 15, '32.) 13517.

MANUFACTURE OF DYESTUFFS.—I. G. Farbenindustrie. May 10. (Germany, May 10, '32.) 13601.

Forthcoming Events

May 22.—Institute of Fuel (London). "Pulverised Fuel and its many Industrial Applications." Dr. G. E. K. Blythe. 6 p.m. Institution of Mechanical Engineers, Storey's Gate, London. (By invitation of the Société des Ingenieurs Civils de France.)

May 23.—The British Chemical and Dyestuffs Traders' Association, Ltd. Tenth annual general meeting. 2.30 p.m. The Howard Hotel, Norfolk Street, Strand, London.

May 23.—Institute of Physics. "Physics in the Boot and Shoe Industry." H. Bradley. 5.15 p.m. Royal Institution, 21 Albemarle Street, London.

May 24.—Institution of Chemical Engineers. "The Mechanical Properties of Some Austenitic Stainless Steels at Low Temperatures." E. W. Colbeck, W. E. MacGillivray and W. R. D. Manning. 6 p.m. Burlington House, London, W.1.

May 25.—The Chemical Society. Hugo Muller Lecture. "Chemistry at the Cross Roads." Professor H. E. Armstrong. 5.30 p.m. Hall of Institution of Mechanical Engineers, Storey's Gate, London.

May 26.—Society of Chemical Industry (Food Group). Annual general meeting. Also joint meeting with the Society of Medical Officers of Health, Metropolitan Branch. "The Prevention of Industrial Diseases of the Skin." Dr. Haldin-Davis. 5 p.m. London School of Hygiene and Tropical Medicine.

Weekly Prices of British Chemical Products

Review of Current Market Conditions

THE following market report is based on information supplied by the British manufacturers concerned, and unless otherwise qualified the figures quoted apply to fair quantities, net and naked at makers' works. Where no locality is indicated, the prices are general for the United Kingdom. Particulars of the London chemical market are specially supplied to THE CHEMICAL AGE by R. W. Greeff and Co., Ltd., and Chas. Page and Co., Ltd., and those of the Scottish chemical market by Chas. Tennant and Co., Ltd.

THE improved demand for chemicals in the London market continues, with all prices firm. There is little business to report in the coal tar products market, and prices are unchanged from last week. The fall in the price of petrol, however, is likely to have an effect on the price of benzol and solvent naphtha, but the actual changes in the prices of these products had not been announced at the time of going to press. On the Manchester chemical market during the past week European political developments have had an unsettling effect so far as new business is concerned and relatively few orders of any weight have been reported. On the whole, however, deliveries of materials already on order are being taken fairly satisfactorily, and the recent slight aggregate improvement in this respect has been maintained. Values are being shaded occasionally but the tone of the market as a whole remains steady to firm. Buying remains steady in the Scottish heavy chemical market, and prices generally are unchanged.

General Chemicals

ACETONE.—LONDON: £65 to £68 per ton; SCOTLAND: £66 to £68 ex wharf, according to quantity.

ACID, ACETIC.—Tech. 80%, £38 5s. to £40 5s.; pure 80% £39 5s.; tech., 40%, £20 5s. 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 98/100%, £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, BORIC.—SCOTLAND: Granulated commercial, £26 10s. per ton; B.P. crystals, £35 10s.; B.P. powder, £36 10s. in 1-cwt. bags d/d free Great Britain in 1-ton lots upwards.

ACID, CHROMIC.—11d. per lb., less 2½%, d/d U.K.

ACID, CITRIC.—LONDON: 9½d. per lb.; less 5%. MANCHESTER: 9¼d. to 9¾d.

ACID, CRESYLIC.—97/99% 1s. 3d. to 1s. 7d. per gal.; 99/100% 1s. 7d. to 2s.

ACID, FORMIC.—LONDON: £50 per ton.

ACID, HYDROCHLORIC.—Spot, 3s. 9d. to 6s. carboy d/d according to purity, strength and locality. SCOTLAND: Arsenical quality, 4s.; dearsenicated, 5s. ex works, full wagon loads.

ACID, LACTIC.—LANCASHIRE: Dark tech., 50% by vol., £24 10s. per ton; 50% by weight, £28 10s.; 80% by weight, £48; pale tech., 50% by vol., £28; 50% by weight, £33; 80% by weight, £53; edible, 50% by vol., £41. One-ton lots ex works, barrels free.

ACID, NITRIC.—80° Tw. spot, £18 to £25 per ton makers' works, according to district and quality. SCOTLAND: 80°, £23 ex station full truck loads.

ACID, OXALIC.—LONDON: £47 7s. 6d. to £57 10s. per ton, according to packages and position. SCOTLAND: 98/100%, £49 to £52 ex store. MANCHESTER: £48 to £52 ex store.

ACID, SULPHURIC.—Average prices f.o.r. British makers' works, with slight variations owing to local considerations; 140° Tw. crude acid, £3 per ton; 168° Tw. arsenical £5 10s.; 168° Tw. non-arsenical, £6 15s. SCOTLAND: 144° quality, £3 12s. 6d.; 168°, £7; dearsenicated, 20s. per ton extra.

ACID, TARTARIC.—11d. per lb. SCOTLAND: B.P. crystals, 10¾d., carriage paid. MANCHESTER: 11¼d.

ALUM.—SCOTLAND: Lump potash, £9 per ton ex store.

ALUMINA SULPHATE.—LONDON. £8 5s. to £9 10s. per ton. SCOTLAND: £8 to £8 10s. ex store.

AMMONIA, ANHYDROUS.—Spot, 10d. per lb. d/d in cylinders. SCOTLAND: 10d. to 1s. containers extra and returnable.

AMMONIA LIQUID.—SCOTLAND: 80°, 2½d. to 3d. per lb., d/d.

AMMONIUM BICHROMATE.—8d. per lb. d/d U.K.

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

AMMONIUM CHLORIDE.—£37 to £45 per ton, carriage paid. LONDON: Fine white crystals, £19 to £20. (See also Salammoniac.)

AMMONIUM CHLORIDE (MURIATE).—SCOTLAND: British dog tooth crystals, £32 to £35 per ton carriage paid according to quantity. (See also Salammoniac.)

ANTIMONY OXIDE.—SCOTLAND: Spot, £24 per ton, c.i.f. U.K. ports.

ANTIMONY SULPHIDE.—Golden 6'd. to 1s. 1½d. per lb.; crimson, 1s. 3d. to 1s. 5d. per lb., according to quality.

ARSENIC.—LONDON: £19 c.i.f. main U.K. ports for imported material; Cornish nominal, £23 f.o.r. mines. SCOTLAND: White powdered, £24 ex wharf. MANCHESTER: White powdered Cornish, £23 at mines.

ARSENIC SULPHIDE.—Yellow, 1s. 5d. to 1s. 7d. per lb.

BARIUM CHLORIDE.—£11 per ton.

BISULPHITE OF LIME.—£6 10s. per ton f.o.r. London, packages free.

BLEACHING POWDER.—Spot 35/37% £7 19s. per ton d/d station in casks, special terms for contract. SCOTLAND: £8 15s. in 5/6 cwt. casks.

BORAX, COMMERCIAL.—Granulated, £15 10s. per ton; powder, £17 packed in 1-cwt. bags, carriage paid any station Great Britain. Prices are for 1-ton lots and upwards.

CADMIUM SULPHIDE.—3s. to 3s. 4d. per lb.

CALCIUM CHLORIDE.—Solid 70/75% spot, £5 5s. per ton d/d station in drums.

CARBON BISULPHIDE.—£30 to £32 per ton, drums extra.

CARBON BLACK.—3⅝d. to 5⅛d. per lb., ex wharf.

CARBON TETRACHLORIDE.—£41 to £46 per ton, drums extra.

CHROMIUM OXIDE.—10d. to 10½d. per lb., according to quantity d/d U.K. Green, 1s. 2d. per lb.

CHROMETAN.—Crystals, 3¼d. per lb. Liquor, £19 10s. per ton d/d

COPPERAS (GREEN).—SCOTLAND: £3 15s. per ton, f.o.r. or ex works.

CREAM OF TARTAR.—LONDON: £4 per cwt.

DIPHENYLGUANIDINE.—2s. 2d. per lb.

FORMALDEHYDE.—LONDON: £28 per ton. SCOTLAND: 40%, £28 ex store.

LAMPBLACK.—£45 to £48 per ton.

LEAD ACETATE.—LONDON: White, £34 per ton; brown, £1 per ton less. SCOTLAND: White crystals, £34 to £36; brown, £1 per ton less. MANCHESTER: White, £31 10s.; brown, £30.

LEAD NITRATE.—£28 per ton.

LEAD, RED.—SCOTLAND: £27 per ton d/d buyer's works.

LEAD, WHITE.—SCOTLAND: £39 per ton, carriage paid.

LITHOPONE.—30%, £17 10s. to £18 per ton.

MAGNESITE.—SCOTLAND: Ground Calcined £9 per ton ex store.

METHYLATED SPIRIT.—61 O.P. Industrial 1s. 8d. to 2s. 3d. per gal. Pyridinised Industrial, 1s. 10d. to 2s. 5d. Mineralised, 2s. 9d. to 3s. 3d. 64 O.P. 1d. extra in all cases. Prices according to quantities. SCOTLAND: Industrial 64 O.P., 1s. 9d. to 2s. 4d.

NICKEL AMMONIUM SULPHATE.—£49 per ton d/d.

NICKEL SULPHATE.—£49 per ton d/d.

PHENOL.—9d. to 10d. per lb. nominal.

POTASH, CAUSTIC.—LONDON: £42. MANCHESTER: £40 to £42.

POTASSIUM BICHROMATE.—Crystals and Granular, 5d. per lb. net d/d U.K. Discount according to quantity. Ground 5¾d. LONDON: 5d. per lb. with usual discounts for contracts. SCOTLAND: 5d. d/d U.K. or c.i.f. Irish Ports. MANCHESTER: 5d.

POTASSIUM CHLORATE.—3¾d. per lb. ex wharf London in 1-cwt. kegs. LONDON: £37 to £40 per ton. SCOTLAND: 99¾/100% powder, £37. MANCHESTER: £38.

POTASSIUM CHROMATE.—6¼d. per lb. d/d U.K.

POTASSIUM NITRATE.—SCOTLAND: Refined Granulated £29 per ton c.i.f. U.K. ports. Spot, £30 per ton ex store.

POTASSIUM PERMANGANATE.—LONDON: 8¾d. per lb. SCOTLAND: B.P. crystals, 9d. MANCHESTER: Commercial, 8¼d. B.P., 8¾d.

POTASSIUM PRUSSIATE.—LONDON: 8¼d. to 9d. per lb. SCOTLAND: Yellow spot material, 8¼d. ex store. MANCHESTER: Yellow, 8¼d.

SALAMMONIAC.—First lump spot, £42 17s. 6d. per ton d/d in barrels.

SODA ASH.—58% spot, £5 17s. 6d. per ton f.o.r. in bags, special terms for contracts.

SODA, CAUSTIC.—Solid 76/77° spot, £14 5s. 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.

SODA CRYSTALS.—Spot, £5 to £5 5s. per ton d/d station or ex depot in 2-cwt. bags.

SODIUM ACETATE.—£22 per ton. LONDON: £23 to £24.

SODIUM BICARBONATE.—Refined spot, £10 10s. per ton d/d station in bags. SCOTLAND: Refined recrystallised £10 10s. ex quay or station. MANCHESTER: £10 10s.

SODIUM BICHROMATE.—Crystals cake and powder 4d. per lb. net d/d U.K. discount according to quantity. Anhydrous, 5d. per lb. LONDON: 4d. per lb. with discounts for quantities. SCOTLAND: 4d. delivered buyer's premises with concession for contracts. MANCHESTER: 4d. less 1 to 3½% contracts, 4d. spot lots.

SODIUM BISULPHITE POWDER.—60/62%, £16 10s. per ton d/d 1-cwt. iron drums for home trade.

SODIUM CARBONATE (SODA CRYSTALS).—SCOTLAND : £5 to £5 5s. per ton ex quay or station. Powdered or pea quality 7s. 6d. per ton extra. Light Soda Ash £7 ex quay, min. 4-ton lots with reductions for contracts.
SODIUM CHLORATE.—£32 per ton.
SODIUM CHROMATE.—3½d. per lb. d/d U.K.
SODIUM HYPOSULPHITE.—SCOTLAND : Large crystals English manufacture, £9 5s. per ton ex stations, min. 4-ton lots. Pea crystals, £15 ex station, 4-ton lots. MANCHESTER : Commercial, £9 5s.; photographic, £15.
SODIUM NITRITE.—Spot, £19 to £22 per ton d/d station in drums.
SODIUM PERBORATE.—LONDON : 10d. per lb.
SODIUM PHOSPHATE.—£12 10s. per ton.
SODIUM PRUSSIATE.—LONDON : 5d. to 5½d. per lb. SCOTLAND : 5d. to 5¾d. ex store. MANCHESTER : 4¾d. to 5¾d.
SODIUM SILICATE.—140° Tw. Spot £8 5s. per ton d/d station, returnable drums.
SODIUM SULPHATE (GLAUBER SALTS).—£4 2s. 6d. per ton d/d. SCOTLAND : English material £3 15s.
SODIUM SULPHATE (SALT CAKE).—Unground Spot, £3 15s. per ton d/d station in bulk. SCOTLAND : Ground quality, £3 5s. per ton d/d. MANCHESTER : £3 2s. 6d.
SODIUM SULPHIDE.—Solid 60/62% Spot, £10 15s. per ton d/d in drums; crystals 30/32%, £8 per ton d/d in casks. SCOTLAND : For home consumption, Solid 60/62%, £10 5s.; broken 60/62%, £11 5s.; crystals, 30/32%, £8 2s. 6d. d/d buyer's works on contract, min. 4-ton lots. Spot solid 5s. per ton extra. Crystals, 2s. 6d. per ton extra. MANCHESTER : Concentrated solid, 60/62%, £11; commercial, £8.
SODIUM SULPHITE.—Pea crystals spot, £13 10s. per ton d/d station in kegs. Commercial spot, £9 10s. d/d station in bags.
SULPHATE OF COPPER.—MANCHESTER : £15 10s. to £16 per ton f.o.b.
SULPHUR.—£11 15s. per ton. SCOTLAND : Flowers, £11; roll, £10 10s.; rock, £9; ground American, £10 ex store.
SULPHUR CHLORIDE.—5d. to 7d. per lb., according to quality.
SULPHUR PRECIP.—B.P. £55 to £60 per ton according to quantity. Commercial, £50 to £55.
VERMILION.—Pale or deep, 4s. 1d. to 4s. 6d. per lb.
ZINC CHLORIDE.—SCOTLAND : British material, 98%, £18 10s. per ton f.o.b. U.K. ports.
ZINC SULPHATE.—LONDON AND SCOTLAND : £12 per ton.
ZINC SULPHIDE.—11d. to 1s. per lb.

Pharmaceutical and Fine Chemicals

ACID, TARTARIC.—11½d. per lb.
ACID, CITRIC.—9½d. per lb.
PHENACETIN.—4s. to 4s. 9d. per lb.
POTASSIUM BITARTRATE 99/100% (cream of tartar).—80s. per cwt.
SODIUM POTASSIUM TARTRATE (Rochelle Salt).—70s. per cwt.
TARTAR EMETIC B.P.—3s. 9d. to 4s. 6d. per lb.

Essential Oils

BERGAMOT.—6s. 6d. per lb.
CAMPHOR.—Brown, 80s. per cwt. White, 85s. per cwt.
CINNAMON.—3s. 9d. per lb.
CITRONELLA, JAVA.—2s. 9d. per lb. CEYLON : 2s. 3d. per lb.
LAVENDER, MONT BLANC, 38/40%.—10s. per lb.
LEMONGRASS.—3s. per lb.
PEPPERMINT, JAPANESE.—6s. 6d. per lb.
SANDALWOOD, AUSTRALIAN.—15s. 3d. per lb.

Intermediates and Dyes

IN the following list of intermediates delivered prices include packages except where otherwise stated :—
ACID, BENZOIC, 1914 B.P. (ex Toluol).—1s. 9½d. per lb.
ACID, GAMMA.—Spot, 4s. per lb. 100% d/d buyer's works.
ACID, H.—Spot, 2s. 4½d. per lb. 100% d/d buyer's works.
ACID, NEVILLE AND WINTHER.—Spot, 3s. per lb. 100% d/d buyer's works.
ACID, SULPHANILIC.—Spot, 8d. per lb. 100% d/d buyer's works.
ANILINE OIL.—Spot, 8d. per lb., drums extra, d/d buyer's works.
ANILINE SALTS.—Spot, 8d. per lb. d/d buyer's works, casks free.
BENZALDEHYDE.—Spot, 1s. 8d. per lb., packages extra.
BENZIDINE BASE.—Spot, 2s. 5d. per lb. 100% d/d buyer's works.
p-CRESOL 34-5° C.—1s. 9d. per lb. in ton lots.
m-CRESOL 98/100%.—2s. 3d. per lb. in ton lots.
DICHLORANILINE.—2s. 3d. per lb.
DIMETHYLANILINE.—Spot, 1s. 6d. per lb., package extra.
DINITROBENZENE.—8d. per lb.
DINITROTOLUENE.—48/50° C., 8d. per lb.; 66/68° C. 8¾d. per lb.
DIPHENYLAMINE.—Spot, 2s. per lb., d/d buyer's works.
α-NAPHTHOL.—Spot, 2s. 4d. per lb., d/d buyer's works.
β-NAPHTHOL.—Spot, £78 15s. per ton in paper bags; £79 15s. in casks, in 1-ton lots.
α-NAPHTHYLAMINE.—Spot, 11½d. per lb., d/d buyer's works.
β-NAPHTHYLAMINE.—Spot, 2s. 9d. per lb. d/d buyer's works.
o-NITRANILINE.—5s. 10d. per lb.
m-NITRANILINE.—Spot, 2s. 7d. per lb. d/d buyer's works.
p-NITRANILINE.—Spot, 1s. 8d. per lb. d/d buyer's works.
NITROBENZENE.—Spot, 4½d. per lb.; 5-cwt. lots, drums extra.
NITRONAPHTHALENE.—9d. per lb.
SODIUM NAPHTHIONATE.—Spot, 1s. 9d. per lb.
o-TOLUIDINE.—Spot, 9½d. per lb., drums extra, d/d buyer's works.
p-TOLUIDINE.—Spot, 1s. 11d. per lb., d/d buyer's works.
m-XYLIDINE ACETATE.—3s. 4d. per lb.

Coal Tar Products

ACID, CARBOLIC.—Crystals, 9d. to 10d. per lb.; crude, 60's, 1s. 11d. to 2s. per gal.; 2% water, 3s. 0¾d. MANCHESTER : Crystals, 9¼d. per lb.; crude, 2s. 6d. per gal. SCOTLAND : 60's, 1s. 7d. to 1s. 8d.
ACID, CRESYLIC.—99/100%, 11d. to 1s. 8d. per gal.; pale 95%, 11d. to 11¾d.; dark, 10d., all according to specification; refined, 1s. 7d. to 1s. 8d. LONDON : 98/100%, 1s. 3d.; dark, 95/97%, 11d. SCOTLAND : Pale 99/100%, 1s. 3d. to 1s. 4d.; 97/99%, 1s. to 1s. 1d.; dark 97/99%, 11d. to 1s.; high boiling acid, 2s. 6d. to 3s.
ANTHRACENE OIL.—Strained, 4½d. per gal.
BENZOL.—At works, crude, 10d. to 11d. per gal.; standard motor, 1s. 6½d. to 1s. 7d.; 90%, 1s. 7d. to 1s. 8d.; pure, 1s. 10d. to 1s. 11d. LONDON : Motor, 1s. 7½d. SCOTLAND : Motor, 1s. 6½d. to 1s. 7½d.; 90%, 2s. 0½d. to 2s. 1½d.
CREOSOTE.—B.S.I. Specification standard, 2½d. per gal. f.o.r. Home, 3¾d. d/d. LONDON : 3d. to 3½d. f.o.r. North; 4d. to 4½d. London. MANCHESTER : 2¼d. to 3½d. SCOTLAND : Specification oils, 3¾d. to 4¼d.; washed oil, 4d. to 4½d.; light, 3¾d. to 4¼d.; heavy, 4½d. to 5d.
NAPHTHA.—Solvent 90/160%, 9d. to 1s. 2d. per gal.; 95/160%, 1s. 7d. to 1s. 8d.; 90/160%, 1s. 1d. to 1s. 2d. LONDON : Solvent, 1s. 3½d. to 1s. 4d.; heavy, 11d. to 1s. 0½d. f.o.r. SCOTLAND : 90/160%, 1s. 3d. to 1s. 3½d.; 90/190%, 11d. to 1s. 2d.
NAPHTHALENE.—Crude, Hot-Pressed, £6 1s. 3d. per ton. Flaker, £10 per ton. Purified crystals, £9 10s. per ton in bags. LONDON : Fire lighter quality, £3 to £3 10s.; 74/76 quality, £4 to £4 10s.; 76/78 quality, £5 10s. to £6. SCOTLAND : 40s. to 50s.; whizzed, 65s. to 70s.
PITCH.—Medium soft, £4 5s. to £4 10s. per ton. MANCHESTER : £3 15s. to £4 f.o.b. LONDON : £4 to £4 2s. 6d. f.o.b. East Coast port.
PYRIDINE.—90/140, 3s. 9d. per gal.; 90/160, 4s. to 4s. 6d.; 90/180, 2s. to 2s. 6d. SCOTLAND : 90/160% 4s. to 5s.; 90/220%, 3s. to 4s.
REFINED COAL TAR.—SCOTLAND : 4¾d. to 5d. per gal.
XYLOL.—Common, 1s. 11d. to 2s. per gal.; pure, 2s. to 2s. 2d.
TOLUOL.—90%, 1s. 11d. to 2s. per gal.; pure, 2s. 3d.

Wood Distillation Products

ACETATE OF LIME.—Brown, £8 15s. to £9 per ton. Grey £14 to £15. Liquor, brown, 30° Tw., 6d. per gal. MANCHESTER : Brown, £9 10s.; grey £14 10s.
ACETIC ACID, TECHNICAL, 40%.—£17 to £18 per ton.
AMYL ACETATE, TECHNICAL.—95s. to 110s. per cwt.
CHARCOAL.—£6 to £11 per ton.
WOOD CREOSOTE.—6d. to 2s. per gal., unrefined.
WOOD NAPHTHA, MISCIBLE.—2s. 7d. to 4s. per gal. Solvent, 3s. 9d. to 4s. 9d. per gal.
WOOD TAR,—£2 to £6 per ton.

Nitrogen Fertilisers

SULPHATE OF AMMONIA.—Export, £6 per ton f.o.b. U.K. ports in single bags; home, £6 10s. per ton, delivered in 6-ton lots to consumer's nearest station.
NITRATE OF SODA.—£8 16s. per ton, delivered in 6-ton lots to consumer's nearest station.
CYANAMIDE.—£7 per ton, delivered in 6-ton lots to consumer's nearest station.
NITRO-CHALK.—£7 5s. per ton, delivered in 6-ton lots to consumer's nearest station.
CONCENTRATED COMPLETE FERTILISERS.—£10 9s. 6d. to £11 per ton according to percentage of constituents.

Latest Oil Prices

LONDON, May 17.—LINSEED OIL was firm. Spot, small quantities, £21; June, £18 2s. 6d.; July-Aug., £18 10s.; Sept.-Dec., £19, naked. RAPE OIL was quiet. Crude extracted, £28; technical refined, £29 10s. per ton, naked, ex wharf. COTTON OIL was steady. Egyptian crude, £19 10s.; refined common edible, £22, and deodorised, £24 per ton, naked, ex mill. TURPENTINE was quiet. American, spot, 60s. 6d. per cwt.
HULL.—LINSEED OIL, spot, quoted £18 per ton; May, £17 10s.; June, £17 17s. 6d.; July.-Aug., £18 15s.; Sept.-Dec., £18 15s. COTTON OIL.—Egyptian, crude, spot, £19; edible, refined, spot, £21 5s.; technical, spot, £21 5s.; deodorised, £23 5s., naked. PALM KERNEL OIL, crude, f.m.q., spot, £19, naked. GROUNDNUT OIL, extracted, spot, £23 10s.; deodorised, £27 10s. RAPE OIL, extracted, spot, £26 10s.; refined, £28. SOYA OIL, extracted, spot, £19; deodorised, £22 per ton. COD OIL, June, 17s. per cwt. CASTOR OIL, pharmaceutical, spot, 38s.; first, 33s.; second, 30s. per cwt. TURPENTINE, American, spot, 62s. per cwt.

Key Industry Duty

A New Schedule of Chemicals

SYNTHETIC organic chemicals (other than synthetic organic dyestuffs, colours and colouring matters imported for use as such, and organic intermediate products imported for their manufacture), analytical reagents, fine chemicals (except sulphate of quinine of vegetable origin) and chemicals manufactured by fermentation processes charged with duty under the Safeguarding of Industries Act are scheduled in the "Board of Trade Journal," May 11, page 732.

Synthetic organic dyestuffs, colours, and colouring matters imported for use as such and organic intermediate products imported for their manufacture are not liable to duty under Part I of the Safeguarding of Industries Act, 1921. Synthetic organic dystuffs, colours and colouring matters and organic intermediate products used in the manufacture thereof are, however, liable to duty under Part I of the Safeguarding of Industries Act, 1921, when not exempted in the circumstances indicated above. When any organic chemical in this list includes a simple or compound radical which is not qualified by mono, di, tri, tetra, etc., the list is to be read as including all forms of the chemical covered by the introduction of such qualifications of that radical. When any organic chemical in this list includes a simple or compound radical which is not qualified by ortho, meta, para, alpha, beta, iso, etc., the list is to be read as including all forms of the chemical covered by the introduction of such qualifications of that radical. This list, moreover, is to be read as also including the salts of any amino and other basic organic compounds named therein.

The list as scheduled includes acetyl butyl xylene, acetyl choline, acetyl naphthylamine, acid acetone di-carboxylic, acid aurine tricarboxylic, acid benzene azosalicylic, acid dioxy tartaric, acid iodo-oxyquinoline sulphonic, acid nitronaphthol sulphonic, acid nitrochlortoluene sulphonic, acid phenyl thiohydantoic, acid phenylenediamine sulphonic, aldehyle amylcinnamic, aluminium potassium fluoride, aminabrom methyl anthroquinone and other halogen substitution products of aminoalkyl anthraquinones, aminobrom toluido-anthraquinone and other amino halogen acyl anthraquinones, amino ethylglyoxaline, ammonium phoshate, tri-, ammonium bi-succinate, amyl alcohols (excluding fusel oil), analine silicofluoride, anisidine salts, ascaridole.

Barium dithionate, benzal bis-dimethyl dithiocarbamate, benzthiazyl nitro-aryl thio-ethers, benzyl cresol, benzylidine aminophenol, bromdimethylaniline, brom-naphthol, bromphenol indophenol, bulbocapnine, butylcresol methyl ether, butyl cresyl oxide, butyl xylene.

Cacotheline, cadmium lactate, calcium benzene, sulphonate, calcium bromate, calcium iodoricinoleate, calcium nucleate, calcium phosphotungstate, calcium sodiolactate, cellulose ethers, chloramethyl alcoholate, chlorphenol indophenol, cholesteryl stearate, chromium formate, cobalt lactate, conessine, copper propionate, cresol indophenol, cyclohexylamine, cyclohexyl ethylamine.

Dehydrothiotoluidine, dianisidine salts, dibromfluorescein and other halogenated fluoresceins, digitalin, digitonin, dimethyldihydroresorcin, dinaphthyl phenylene diamine, diphenyl ethylene diamine, diphenyl thiocarbazide, diphenyl thiocarbazone, diphenylene ketone, ditolyl ethylenediamine.

Egonine and derivatives thereof, ephedrine and isomers and homologues thereof, ergosterol and hydroergosterol and their esters, irradiated or not, ergotoxine salts, ethyl aminophenal, ethyl morphine, ethyl red, ethylenediamine copper nitrate, fluorescein-thallium, glutathione, glyceryl (including diglyceryl and triglyceryl) esters (excluding natural oils and fats, synthetic resins and ester gums), glyceryl cresyl ether and other glyceryl ethers and esters thereof, glycyrrhizin and its ammonium compound, harmaline and derivatives thereof, hexahydropyrocatechol and other hydrogenated phenols and hydrogenated oxynaphthalenes and oxyanthracenes, heptachlorpropane, hydrazine carbonate, hydronaphthalenes.

Lead hippurate, lead oxyiodide, lead selenide, linalyl esters, lithium bromate, manganese iron phosphate, menthone, mercury compounds other than mercuric oxide and mercuric sulphide, mesitylene, methoxy-iminobenzthiazoline, methyl benzyl pyrazolone, methyl naphthyl ketone, methyl stannic iodide, methyl toluidine and acyl derivatives thereof, naphthol sodium sulphonate indobromphenol, narcotine salts, nickel compounds other than nickel oxide, nitro acetanilide, nitro aniline salts, nitro benzaldehyde phenyl hydrazide, nitro dimethoxybenzene, nitro naphthylamine, nitro phenyl dimethyl dithiocarbonate.

Octyl esters, organo-arsenic compounds, oxy di-anilido-anthraquinone, oxy di-naphthyl sulphide, oxy di-phenyl sulphide, oxy hydrindamine, oxy phenol ethylamine, oxy toluidine anthraquinone, paramethyl red, phenol indodibromphenol, phenol indophenol, phenyl propionate, phenyl valerianate, potassium indigo sulphonates, potassium selenocyanate, propyl red, resorcin azo nitrobenzene, salicyl chloride, silver ammonio-nitrate, sodium azide, sodium calcium lactate, sodium cyanate, sodium tetrathionate.

Terpinyl esters, tetramethyl thiuram tetra-sulphide and other thiuram polysulphides, thallium formate, thebain salts, thymol-indophenol, toluquinaldine, toluylene blue, tolylene diamine, trypan blue, Xenylamine, Xenyl carbimide.

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).

Brazil.—A firm recently established in Ceara wishes to obtain the representation of United Kingdom manufacturers of chemical products for domestic use; drugs and chemists' sundries and dyestuffs, on a commission basis. (Ref. No. 724.)

Canada.—A well-established firm of wholesale iron, steel and metal merchants and manufacturers' agents in Montreal desires to supplement its existing lines of chemicals for the metal industry; ferro alloys and ingot metals, under the above heads, and offers to represent United Kingdom manufacturers throughout Canada, presumably on a purchase basis. (Ref. No. 688.)

Egypt.—A firm of commission agents established at Cairo wishes to represent British manufacturers of pharmaceuticals. (Ref. No. 725.)

Norway.—An agent established at Trondheim wishes to obtain the representation, on a commission basis, of United Kingdom exporters of sugar, coffee, vegetable oils, syrup and molasses, soya beans and meal. (Ref. No. 715.)

Portuguese West Africa.—A British merchant established at Lobito wishes to obtain the representation, on a commission basis, of United Kingdom manufacturers of petrol, paraffin and lubricating oil. He is also interested in obtaining a buying agency for beeswax. (Ref. No. 719.)

South Africa.—A Cape Town firm of agents desires to secure the representation of United Kingdom manufacturers of chemical specialities, essences and articles for the liquor, dairying and confectionery trades for South Africa. (Ref. No. 698.)

South Africa.—A firm of manufacturers' agents in Cape Town covering the whole of the Union of South Africa and Southern Rhodesia is desirous of securing the representation of United Kingdom manufacturers of cattle and sheep dips, tree and fruit sprays, insecticides, etc., on a consignment basis. (Ref. No. 699.)

Company News

Nitrate Railways Co., Ltd.—The year 1932 closed with a working loss of £47,961, and it is announced that no dividends are to be paid.

Tate and Lyle, Ltd.—An interim dividend of 4 per cent., less tax, is payable on June 15, on the ordinary shares of the company.

Chloride Electrical Storage Co., Ltd.—The directors recommend a final dividend of 6 per cent., less tax, on the "A" and "B" ordinary shares, making 12 per cent., less tax, against 10 per cent., tax free, last year.

British Oxygen Co., Ltd.—The report for the year 1932 states that the revenue, including a profit on sale of investments, totalled £101,442, against £75,673 in the previous year. After allowing for the distribution of 6½ per cent. on the ordinary shares, £54,491 is carried forward.

British Cotton and Wool Dyers' Association, Ltd.—The net profit for the year to March 31 was £87,780, against £60,174 in the previous year. A further £25,000 is transferred to depreciation fund, leaving £62,780, against £35,174. After allowing for dividend and transferring £18,920 to investment contingency fund, there remains to be carried forward £37,819, against £34,676 brought in. The ordinary dividend is 5 per cent., an increase on last year, when only 3½ per cent. was paid.

National Drug and Chemical Co. of Canada.—There was a loss for the year to January 31, 1933, of £7,286, after writing off expenses incurred in connection with the transfer of Winnipeg, Regina and Saskatoon branches to a subsidiary, and closing of Hamilton branch, but before providing for bad and doubtful debts and depreciation. The sum of £19,663 is reserved for debts and £3,505 for depreciation. The credit balance carried forward is reduced from £94,947 to £64,493.

De Beers Consolidated Mines, Ltd.—The accounts for the six months to December 31, 1932, show a total revenue of £64,333, against which expenses and debenture interest amounted to £280,038, so that the carry-forward is reduced from £992,982 to £777,277. In the year to June 30, 1932, the revenue was £753,338 and expenses, etc., £895,819. It is stated that the half-year was not a representative one so far as the accounts are concerned as they do not include anything on account of the usual dividend from African Explosives and Industries, Ltd., which is paid in April of each year,

From Week to Week

MR. ARTHUR HARTOG has been elected a director of Unilever, Ltd.

MR. JAMES DOW, senior chemist at Perth Corporation Gasworks, has been appointed chief technical assistant at Kirkcaldy Gasworks.

DR. R. W. GURNEY has resigned his position as assistant lecturer in physics at the University of Manchester, on his appointment as Research Fellow in the University of Bristol.

SHEFFIELD UNIVERSITY COUNCIL made two new appointments on May 12. Mr. W. R. Maddocks, B.Sc. (Wales) is to be lecturer in metallurgy with Mr. A. J. Macdougall as assistant lecturer.

THE FIRST LITHUANIAN SUGAR FACTORY, which was built and equipped by the Skoda works, of Plzen, Czecho-Slovakia, turned out 16,191 tons of sugar in the course of the 1931-32 campaign, compared with 6,612 tons in 1930-31.

CONTRACTS HAVE BEEN SECURED by G.V.D. Illuminators for the installation of direct G.V.D. units at the New Geological Museum for the World Economic Conference and the lighting of the whole of the windows of British Industries House, Marble Arch, formerly Gamages (West End), Ltd.

AS THE RESULT OF AN EXPLOSION while working in Jesus College laboratory at Oxford, Mr. P. R. Beavan, a graduate, received serious injury to an eye. He was working with a South African undergraduate, Mr. J. H. Pienaar, when a glass retort containing chemicals exploded. Mr. Beavan was taken to hospital, where his eye was X-rayed.

OLDBURY URBAN DISTRICT COUNCIL at a meeting last week placed on record its appreciation of a further gift from Mr. W. A. Albright, of Edgbaston, Birmingham, of the firm of Albright and Wilson, chemical manufacturers, the donor of Barnford Park, Langley. Mr. Albright has given six acres to extend the park and has contributed substantially to expenditure connected with the extension.

MR. W. HOYLE, OF WAKEFIELD, who has been appointed manager of Exeter's new sewage works, is a qualified chemist and part of his duties will be to make daily analyses of the sewage and effluent. The scheme, which has involved an expenditure of £160,000 and has been carried out under the direction and supervision of Mr. E. J. Silcock, consulting engineer, of Westminster and Leeds, and the city surveyor (Mr. R. H. Dymond), is now nearing completion.

CHEMICALS AND DRUGS to the value of £63,031 were imported into the Irish Free State during February, as against £96,798 in the corresponding month of last year. The imports of chemical fertilisers also fell sharply and the value in February was £24,054, which was £74,372 less than in February, 1932. The falling off in the importations of chemicals is attributed to the numerous factories which have been opened throughout the Irish Free State since the institution of protective tariffs.

MR. ALAN CHORLTON, C.B.E., M.P., president of the Institution of Mechanical Engineers, and Dr. F. S. Sinnatt, M.B.E., Director of Fuel Research, have been appointed by the Prime Minister to represent the British Government as official delegates at the sectional meeting of the World Power Conference to be held in Sweden, Denmark, and Norway between June 26 and July 8. The British National Committee of the World Power Conference is entitled to nominate three additional official delegates. Its choice has not yet been made.

AN IMPORT DUTY of 50 per cent. has been imposed on all soap and soap powders imported into the Irish Free State on and after May 11. An imperial preferential rate of two-thirds the full rate of duty will apply to imports from Great Britain. A similar duty has been imposed on heavy mineral hydrocarbon oil of a specific gravity of not less than 0.835 and not more than 0.950, with a flash point not lower than 285 and not higher than 410° F. Hitherto this duty has only been applicable to mineral hydrocarbon white oil. Oil for manufactures will be imported free of duty and in other cases the imperial preferential rate will apply.

REPRESENTATIONS HAVE BEEN MADE to the Board of Trade under Section 10 (5) of the Finance Act, 1926, for the exemption of ethyl cellulose and methyl cellulose from the duty imposed by section one of the Safeguarding of Industries Act, 1921, as amended by the 1925 Act, on the ground that such products are not made in any part of the dominions in quantities which are substantial having regard to the consumption for the time being in the United Kingdom, and that there is no reasonable probability that they will within a reasonable period be made in the dominions in such substantial quantities. Communications should be addressed to the Principal Assistant Secretary, Industries and Manufactures Department, Board of Trade, Great George Street, S.W.1, not later than June 15.

A PLANT for the manufacture of silicate of soda is to be put up near Toronto, Ontario, at a cost of £60,000.

THE OLDEST SMELTING FURNACE IN LANARKSHIRE, at the Excelsior Steelworks, Wishaw, of John Williams and Co., is to be dismantled.

PRINCE GEORGE concluded his industrial tour on May 10 by a visit to the bleaching and dyeing works of H. Kershaw and Son, Ltd., at Salford.

MR. G. R. CAMPBELL, F.I.C., of R. R. Tatlock and Thomson, consulting chemists, Glasgow, has been appointed gas examiner for the gas undertakings of Lanark County Council.

MR. H. J. HENBREY, OF BRADFORD, who has developed methods for producing new alloys from scrap, is arranging for a five-ton melt in Scotland in order to satisfy leading financiers and industrialists of the value of the methods concerned.

IT IS UNDERSTOOD that the Government of the Irish Free State is to consider the best means for the commercial development of an extensive deposit of kaolin in County Mayo. It is probable that a licence to work the deposit may be granted to an applicant company through the recently constituted Mining Board.

ONLY TWO GYPSUM DEPOSITS of any extent in the Irish Free State are known, at Magheracloone Lower, near Carrickmacross, County Monoghan, and Lisnaboe, near Kingscourt, County Cavan. These are being worked extensively at the present time and it is understood that further developments are to take place at these sites in the near future.

REPORTS to the Canadian Institute of Mining and Metallurgy state that pitch-blende from the Great Bear Lake district can readily be treated for the recovery of radium. Two distinct types of ore occur, and two separate processes are necessary for the most efficient and economical extraction of the radium. By the use of chemical processes a material saving in time is effected compared with the treatment methods employed for other kinds of radium-bearing ore.

THE MENACE TO THE PALM OIL TRADE of British West Africa by the uncontrolled competition of whale oil, was the subject of a resolution passed by the committee of the African Trade Section of the Liverpool Chamber of Commerce and transmitted to the president of the Board of Trade. The committee requested that the president should consider placing a duty on whale oil, with a view to encouraging a larger import of West African oil and oilseeds into the United Kingdom.

RECENT WILLS include :—Dr. William I .Clark, of Edinburgh, senior partner in Duncan, Flockhart and Co., manufacturing chemists, personal estate in Great Britain, £96,968; James Righton, of Southport, chemist and druggist, £15,702 (net personalty £6,641); George R. Campbell, of Darlington, iron ore merchant, member of Ferguson, Wild and Co., Middlesbrough, and a director of the Easton Galvanising Co., Ltd., and the Chemical and Insulating Co., Ltd., £42,292 (personal estate).

AMONGST THE PROFESSORS who have been dismissed from German Universities are : Professor Holde (chemistry), Fritz Frank (chemical research), Traube (colloid chemistry), and Professor Lehmann (photographic chemistry), from Berlin and Technical Hochschule; Professors W. Fränkel (metallurgy) and F. Mayor (chemistry), from Frankfort-on-Main; Professor Paneth (chemistry) from Konigsberg; Professor P. Roma (colloid chemistry) and H. Pringsheim (chemistry) from Berlin; and Professor Levy (organic chemistry) from Aachen Technical Hochschule.

DR. ISIDOR M. HEILBRON, D.Sc., F.R.S., Heath Harrison Professor of Organic Chemistry in the University of Liverpool, has accepted an invitation to a chair of organic chemistry in the University of Manchester. Dr. Heilbron was elected to a fellowship of the Royal Society in 1931. During recent years his investigations on naturally occurring products of bio-chemical interest have attracted great attention. These have included studies on the liver oils of elasmobranch fish, the fat-soluble vitamins, cholesterol, and other sterols. His work in this field has resulted in important advances in our knowledge of this group of substances.

MR. RAMSAY MACDONALD, the Prime Minister, will open the 1933 Advertising Convention on July 18. Major the Hon. J. J. Astor, M.P., will be in the chair. On the following day the morning session will deal with home trade, and will be organised by the Incorporated Sales Managers' Association. Sir Francis Goodenough will preside. On Thursday, July 20, the morning session will deal with overseas trade, when the chair will be occupied by the Lord Riddell. Every afternoon during the Convention group meetings will be held dealing with advertising and merchandising problems. The official banquet will be held on July 20 at Grosvenor House, at which the guest of honour will be Mr. Walter Runciman, President of the Board of Trade.

ADVERTISERS please note that the latest hour at which we can accept advertisements for insertion in these columns each week is 10 o'clock on Thursday morning.

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