

# The Chemical Age

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## Notes and Comments

### The British Industries Fair

A VISITOR who gave us his impressions of the Fair in last week's issue of THE CHEMICAL AGE had something to say which provokes comment here as it will doubtless do in other places. In the first place he calls attention to the fact that only two of the 48 member firms of the British Chemical Plant Manufacturers' Association feature in the list of exhibitors, a remark which immediately leads to the suggestion that the plant makers are not taking their opportunities. This is actually far from being so, and their absence is doubtless due to the fact that the manufacture of chemical plant is not and cannot be the sole activity of any firm. No engineering works of any size could exist upon orders from the chemical industry, partly because those orders are too few in number and partly because of the number of firms who are competing for the business. A large engineering works must supply a number of industries, and for such a firm to place an exhibit in the chemical section may involve too great expense or may cause it to be unrepresented in parts of the exhibition that will be visited by buyers of more importance by virtue of the orders they place. Most chemical plant makers are general engineers and not just chemical engineers, consequently their exhibit will be found later in the heavy engineering section at Birmingham. That is perhaps another reason for bringing the whole Fair to London and for holding it simultaneously.

If, however, the individual manufacturers cannot swell the ranks of the chemical exhibitors, the Plant Manufacturers' Association might be able in future years to do something as a whole to call attention to the possibilities that exist in this country for making chemical plant. The trade in chemical plant, properly handled, might be very considerable. When the chemical plant makers can evolve a *modus operandi* whereby research and plant design will be shared among them instead of leaving these things largely to go by default, the "fabricators" of this country will be able to turn out chemical plant that is second to none. Already we are building up an international reputation and that is no mean feat in view of the start that certain other countries have had. A comprehensive exhibition of photographs and models arranged by the Association without mention of any firm by name, save in the catalogue of members, might result in inquiries for plant reaching the Association as a body that now go to other countries, and might assist in the development of foreign trade in chemical plant. "The 'man-in-the-street' glances at the chemical section and

utterly fails to grasp any idea of the ramifications of the industry it represents." Possibly the same effect may be produced on the foreign buyer—and that would be serious. If our contributor's criticism is correct, it is time plans were made to remove that impression next year. "Surely the time has come," our contributor writes, when the whole chemical trade and allied industries should associate and produce an exhibition worthy of the industry . . . some real effort should be made to co-ordinate the different interests in order to present to the Empire an understandable panoramic picture of the services which the chemical and allied industries are waiting to render." This suggestion that the B.I.F. exhibit should take on a national aspect rather than that the exhibit should be left to the policy and whims of individual firms is worthy of careful consideration. Most of the firms that matter are now welded into national bodies and something could be done in this direction, preferably in addition to what is being done by individuals.

### Standardisation

AS an interesting addendum to our recent note upon standardisation, we have to record the issue of the 1935 handbook of the British Standards Institution. The chairman of the Chemical Divisional Council, Dr. E. F. Armstrong, is this year, chairman of the General Council of the Institution and has contributed a short review of the progress of standardisation in the chemical industry. It is now three years since the chemical industry, realising that it is better to have one standardising body for the whole country, threw in its lot with the British Standards Institution and those years have seen intense activity such that "the growth of the chemical work has been greater than was anticipated." Standardisation, carefully applied, can act as a powerful brake on progress, and having once laid down a specification, the Institution must be prepared to revise it frequently and upon the smallest justifiable provocation. It is, therefore, no light matter to embark on the preparation of a specification for it may mean continuous work as long as that substance or method is used. Fortunately the underlying principles of the work of the Institution are such that standardisation is used as a tool to assist industry, without being a brake to retard progress. It is laid down that standards shall be in accordance with the needs of industry and fulfill a generally recognised want; that the interest of the producer and consumer shall be maintained throughout the work; that the standardisation shall be arrived at by general consent; and that periodic review

and revision shall be undertaken to keep the work abreast of progress.

Practically every branch of the chemical industry co-operates in the work and all relevant organisations take part actively through representation on the committees. In all during the three years referred to some 44 specifications have been drawn up for the chemical industry, in addition to much preparatory work which will bear fruit in the future. The specifications issued comprise 19 dealing with solvent and allied materials, coal tar products, alcohols, acetates and organic acids, 10 with tar acids, three with chemicals for electroplating, four with laboratory ware and eight with coal and coke (methods of sampling and analysis). In all this list there is nothing about chemical plant.

### Standards for Plant

**T**HE purity and physical condition of chemicals are more easy to standardise than is the plant in which they are made. Whether a certain grade of crystal can be specified with that certainty that must underlie a national specification depends not only on whether the art of manufacture of that substance has reached the requisite stage but whether manufacturers generally are able to produce the quality specified; it depends on the provision of plant and on the invention of a process together with the disclosure of that process or an equivalent one for the use of manufacturers in general. It would clearly not be possible to specify a grade that could only be made by one manufacturer, even though he might be able to offer a better product than the (lower) specification demanded. Under these conditions it is not too difficult to lay down the analysis and qualities of a product in accordance with the known practice of the trade. To do so is not so much to provide a standard for the highest as a minimum which must be attained by all; regarded in this way standards are a potent incentive to works that do not willingly spend on improvements to keep themselves abreast of the times.

Difficult as is the provision of standards for chemical plant, the advantages of standardisation seem to warrant some attempt to lay down specifications for some of the more obviously standard pieces of chemical plant. When a chemical manufacturer decides to order plant or apparatus he more often than not does not design it himself but asks that the plant maker shall do so. If the maker is to design the whole character of the business changes, the chemical manufacturer is asking that the plant maker shall do for him what a consultant should be paid a considerable fee to do. Under these circumstances he cannot expect to buy chemical apparatus at "tank prices"—but often he does and is disappointed at the result! If, on the other hand, the simpler items of plant in common use were to be specified with full constructional details, the cost of designing would be eliminated largely and the plant maker would be able to take the work at considerably cheaper prices. In all the Chemical Divisional Council of the British Standards Institution there is only one representative of the British Chemical Plant Manufacturers' Association; in the published chart showing the scope of the division, among the manifold committees that are dealing with chemicals and laboratory work, there is not one that deals with plant, if we may except one that is designated: "Chemicals and chemical plant for electroplating." There may be some very

good reason for this omission, but in the absence of one it seems as though a start might be made in this direction.

### Training the Chemical Engineer

**I**N view of the references made by several of the speakers at the annual dinner of the Institution of Chemical Engineers in London last week to the development of facilities for training the chemical engineer, it is of interest to note what is happening in the United States. The Department of Chemical Engineering at Pittsburgh University, which had its origin in 1910, has steadily grown in enrolment and in importance as a department in the School of Engineering. The growth of the department has been particularly significant during the past seven years. In 1927-28 the matriculation in chemical engineering was 8 per cent. of the total engineering student registration. This percentage steadily increased to 23 per cent. of the total enrolment for the first half of the present educational year. The present number registered exceeds one hundred. The fundamentals of chemistry, physics and mathematics are stressed, and chemical processes applying these principles and laws are carefully chosen for detailed study. These fundamentals are applied in the development of the unit operations of chemical engineering. The students are required to solve many problems pertaining to, and to make designs of equipment for carrying out and controlling, the unit operations. The laboratory work consists of a study of these basic operations as such, and their application and co-ordination in typical unit processes. The students are given practice in analysis of problems, processes, and projects. There is stressed the value of a clear understanding of the chemical reactions and the energy relations, as well as the unit operations, involved in a unit process. The development of stoichiometric relations, equations of fluid flow, heat transfer, vaporisation and chemical affinities are properly emphasised and problems, designs and experiments are assigned to show their application and values. Attention is accorded especially to the value of the principles of economics and their application to problems of design, plant location, production, distribution and marketing of finished products.

One of the principal aims of the Department is to impart and encourage a desirable *esprit-de-corps* among the students. They are encouraged throughout their course to look upon the departmental faculty members as their professional advisers. The association of the students with specialists on the staff of the Mellon Institute is stimulating and exceptionally beneficial in other respects. This contact is principally valuable in demonstrating to all students the high importance of good personal qualities in addition to accurate technical knowledge and experimental ability. Throughout the chemical engineering student's course of training he has the unusual opportunity of acquiring an adequate conception of the high value of the professional aspects of his field and of its social phases. In particular, the paramount importance of correct thinking and doing, both professionally and socially, is emphasised and is constantly being put to practical application. The department maintains only a small library for reference purposes, because it has ready access to the Carnegie Library and the libraries of the Chemistry Department of Pittsburgh University and the Mellon Institute.

# The Institution of Chemical Engineers

## Thirteenth Annual Corporate Meeting

**T**HE thirteenth annual corporate meeting and annual dinner of the Institution of Chemical Engineers was held at the Hotel Victoria, London, on Friday, February 22, under the presidency of Mr. W. Macnab. In opening the meeting the president referred to the loss which the Institution had sustained during the past year in the death of a number of members and specially mentioned the late Professor W. E. Gibbs (Ramsay Professor of Chemical Engineering at University College, London) and Professor J. A. Wilkinson (Professor of Chemistry and Chemical Technology in the University of the Witwatersrand), the latter of whom was a corresponding member of the education committee of the Institution and had done an enormous amount of valuable work for the Institution in South Africa.

Mr. H. W. CREMER, hon. secretary, speaking on the annual report and accounts, said that although there had been nothing of a sensational character, the past year had been one of steady progress and the membership now exceeded 800. In connection with education, he said the task of compiling a bibliography of chemical engineering literature had been commenced and considerable progress had been made due to the response to the request to members for suggestions. The council appealed for further assistance in keeping the list up to date. The council also appealed for further gifts for the extension of the library. Referring to the Chemical Engineering Congress which is to be held in London from June 22 to June 27, 1936, Mr. Cremer said that considerable progress had been made with the arrangements by those concerned with its organisation.

Mr. F. A. GREENE, hon. treasurer, spoke of the satisfactory nature of the accounts, which showed a small credit balance, adding that the funds of the Institution were not a savings bank and that the object was to spend the money to the best advantage. Referring to the benevolent fund, which now has £250 to its credit, the hon. treasurer appealed for further assistance so that this fund could be placed on a really strong basis.

The following officers and members of council were elected for the coming year: President, Dr. H. Levinstein; vice-presidents, Dr. W. Cullen, Dr. F. S. Sinnatt; hon. secretary, H. W. Cremer; hon. treasurer, F. A. Greene; members of council, W. A. Damon, Dr. G. W. Himus, J. W. Napier; associate member of council, W. R. D. Manning.

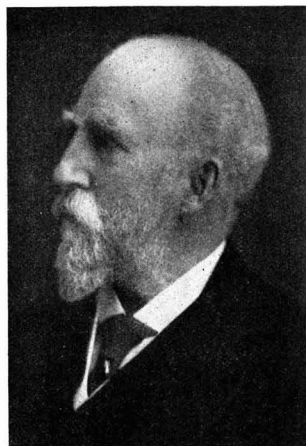
### Presentation of Medals

The PRESIDENT, in presenting the Osborne Reynolds Medal for 1934 to Mr. H. J. Pooley (general secretary of the Society of Chemical Industry), referred to the enthusiasm with which Mr. Pooley had carried on the work of the appointments bureau of the Institution since its establishment in 1925 and the valuable services he had rendered to the Institution generally for so many years. The Moulton Medal was then presented to Messrs. J. Davidson Pratt and G. S. W. Marlow for their paper before the Institution, on "Legal Pitfalls for the Chemical Engineer," and in making the presentation, the president pointed out that the council had considered this paper of such great value that it was decided to issue it as a separate pamphlet—the first occasion upon which this had been done in the history of the Institution. The Junior Moulton Medal and Prize was awarded to Mr. D. Gordon Bagg for his paper "Determination of the Efficiency of a Multi-Stage Washer."

A vote of thanks was passed to the assessors in connection with the awards, *viz.*, Messrs. W. A. S. Calder and H. Talbot.

On the motion of Dr. H. Levinstein, seconded by Mr. W. A. S. Calder, a vote of thanks was enthusiastically ac-

Mr. William  
[Macnab,  
President of the  
Institution of  
Chemical  
Engineers,  
1934-35.



corded to Mr. William Macnab, the retiring president, for his services during the past year.

Mr. MACNAB, acknowledging the vote of thanks, said his year of office had been made extremely pleasant and easy by the loyal support he had received from the members of the council and officers, and particularly Mr. C. J. T. Mackie, the assistant secretary, and his staff.

### Presidential Address

Mr. WILLIAM MACNAB, the retiring president, then delivered his presidential address, in which he dealt with "Chemical Engineering in Explosives Manufacture." In this, he did not enter into the details of the manufacture of explosives but rather indicated some of the different types and kind of plant and problems which are involved and which might be considered as coming within the scope of chemical engineering. He pointed out that in the manufacture of black gunpowder, grinding or pulverising is the most important operation, whilst the purification of the ingredients—charcoal, nitre and sulphur—involve carbonisation, crystallisation, filtration and distillation. The black powder of the present day is chiefly concerned with the preparation of charcoal from suitable wood and the subsequent grinding and incorporation of the ingredients under edge-runners. As in the manufacture of nitrocellulose, nitroglycerine and nitrohydrocarbons, corrosive and other liquids and vapours had to be dealt with, in addition to solids; it was clear, said the president, that the chemical engineer found plenty of scope for his knowledge and ingenuity.

After commenting on the fact that many of the operations have to be carried out under special conditions prescribed by law for the sake of safety, such as the limitation of the size of buildings and the quantity of material and number of workpeople allowed inside, which resulted in a large number of small buildings placed far apart or protected by high mounds, Mr. Macnab dealt with some of the processes involved. He recalled that during the war, the failure of the supply of acetone used for gelatinising gun cotton, nitroglycerine and vaseline for the manufacture of cordite, resulted in recourse being had to less highly nitrated nitrocellulose which could be gelatinised by ether-alcohol, but much research and experiment were necessary before the conditions of time of heating, temperature and pressure, and strength of lye in the kiers were found which uniformly gave nitrocotton of the desired degree of viscosity.

Referring to the next treatment of the cotton—after drying—by immersion in a mixture of nitric and sulphuric acid, and subsequent centrifuging; it was pointed out that the amount of acid remaining in the nitrocotton after centrifuging in the earlier days was about 50 per cent. and it was carried away in the drowning water. The displacement process, however, avoided this loss of acid but produced a more dilute spent acid. By means of a number of lantern slides, Mr. Macnab described the various subsequent operations for dealing with the charge of cotton and indicated how the use of pumps and acid eggs of acid-resisting materials call for

chemical engineering knowledge. Commenting on the removal of the major portion of the water from the pulp, it was pointed out that in some factories the drying is completed by exposure of the nitrocotton on shallow trays stacked in racks in a room through which warm air passes. There is, however, always a certain element of danger in this procedure owing to the sensitiveness of the dry dust, which has caused some explosions. To avoid this risk some factories adopt the method of spraying alcohol on to the water left in after the centrifuging process and the resultant effluent, after alcohol begins to come through, is collected and the alcohol in it is recovered by rectification. In other cases hydraulic presses are used, which leave a cake containing about 20 to 25 per cent. alcohol. Both these dehydration methods are suitable when the nitrocotton is to be gelatinised by ether-alcohol for conversion into smokeless powder.

### Refining and Distilling Plant at Gretna

The manufacture of nitroglycerine is simpler and requires much less plant than nitrocotton. "Dynamite" glycerine, *i. e.*, suitably refined glycerine, is generally used by the explosive maker, but at Gretna a large refining and distilling plant was installed for treating the crude glycerine from the soap works. When the nitroglycerine is to be used for blasting explosives, it is gelatinised by mixing it with a suitable nitrocotton in a kneading machine which can be kept at the correct temperature. The resulting gelatinous mass, with or without the addition of other materials, is extruded through a sort of sausage machine as a solid cylinder and cut into desired lengths.

In the early days of the war, the demand for nitroglycerine and nitrocotton explosives was met in the first instance by Government and private factories, but later there was the considerable enlargement of all the factories and the erection of the large cordite factory at Gretna. No radical changes, however, were made in the character of the plant. When TNT was called for, however, the case was totally different. The output of TNT in this country was only about 20 tons per week, the product was not very pure and the time taken for nitration was long. In developing and improving the production of TNT, the chemical engineer—and particularly Quinan—played a great part and these war factories proved a splendid school in chemical engineering for many of the young men who had the good fortune to be employed in them.

Speaking of the nitration of toluene, Mr. Macnab said this is usually carried out in three stages. When starting with toluene from gasworks, a suitable charge is run into the nitrator and the acid mixture of nitric and sulphuric acids is run in slowly under temperature control and the nitration to mononitrotoluene completed. When the nitrator has a strong cover it can be used as a blow cask and the contents sent to a settling tank where the MNT rises to the surface. The spent acid is run off from the bottom through a sight box and when the MNT appears it is directed to another nitrator.

### Procedure at Queens Ferry

A general description of the procedure adopted at Queens Ferry for the making of TNT was given as a good example of chemical engineering. The toluene used was obtained from two sources, the gasworks and the Asiatic Petroleum Co. The latter was a mixture of about 55 per cent. toluene and the remainder petrol which could not be separated by distillation. When the toluene-petrol mixture was used, the charge was placed in the nitrator and the acid mixture run in until the mononitration was completed, as in the case of the gas-tar toluene, after which the contents of the nitrator were blown to a lead-lined agitator or washing vessel. Here separation of the MNT and unattached petrol took place, the spent acid was run off and the MNT-petrol washed free from acid and after separation was pumped to a still where the petrol was driven off and pure MNT left behind.

In order to get a maximum yield of TNT, care had to be taken to keep the contents of the nitrator at definite rising temperatures for certain times by control in running in the DNT and regulating the flow of water in the cooling coils. After trinitration was completed, the contents were slightly diluted to throw out TNT dissolved in the strong sulphuric acid and then the contents of the nitrator were run to a separator when the spent acid was sent to the dinitrator, and the molten TNT after a preliminary washing with hot water in

a silicon iron vessel, was discharged through a pipe over a wooden vat partly filled with water. A jet of water was directed against the stream of TNT a few inches above the level of the water in the vat and this had the effect of solidifying and reducing the TNT to fine grains or pellets. The water was drained off, carrying away much of the acid in the TNT. The TNT had to be completely freed from acid by washing in hot water and the pellete, as it was called, was conveyed in small wagons and tipped into a vessel containing hot water heated with live steam where it melted and was then run either to washing vats where it was treated by agitation in successive changes of hot water, or, better still, to a continuous washer on the counter-current principle devised by Holley and Mott. In this ingenious and efficient plant there was a series of compartments each divided by a vertical plate into two chambers of unequal size. In each large chamber there was a mechanical stirrer, and the diaphragm between the small chamber was pierced with a horizontal row of holes near the top. The diaphragms at right angles, forming the sides of the smaller chambers, had a horizontal row of holes on opposite sides near the top and bottom respectively. Water entered the mixing chamber at one end of the plant and molten TNT at the other. The emulsion of TNT and water passed through the holes near the top of the diaphragm into the smaller chamber or separator where the TNT fell to the bottom and passed through the bottom holes to the next mixer, the water passing in the contrary direction through the upper holes to the mixer on the opposite side, and so on throughout the series, until clean water entered and TNT flowed at one end and acid TNT and acid water flowed out at the other. This continuous washer, said the president, worked admirably and effected economy both in water and time over the discontinuous process of batch washing.

### An Interesting Plant at Oldbury

A very interesting process for making ammonium nitrate was devised and successfully worked at Oldbury. A circular iron vessel was lined with acid-resisting bricks set in acid-resisting cement. It had stirring gear, a cover and large gate outlet at the bottom on one side. It was charged with 80 per cent. nitric acid, and ammonia gas bubbled in until saturation. The heat of reaction generated was sufficient to drive off excess water and fuse the ammonium nitrate which was then run out into shallow brick-lined pits and allowed to cool and crystallise.

The manufacture of nitro-explosives, continued the president, involves the production of nitric and sulphuric acids as well as plant for the absorption and recovery of nitric fumes, the denitration of spent acids and the concentration of the weakened sulphuric acid. Plant for the production of oleum, generally by the Grillo or Tentelow process, was usual.

Formerly the nitric acid in guncotton spent acid was recovered by distillation, with addition of sulphuric acid if necessary, in cast-iron retorts, but now the general practice is to denitrate all spent acids by passing them down a cylindrical steel tower lined with acid-resisting bricks and filled with broken quartz or earthenware rings. Steam is admitted at the bottom and drives off the nitric acid which is condensed, the sulphuric acid flowing out at the bottom of the tower being concentrated in plant of the Kessler or Gaillard type.

The manufacture of nitric acid by distillation from sodium nitrate and sulphuric acid is now being superseded by the oxidation of ammonia and in this connection it was mentioned that Staybrite steel is used in the construction of many of the vessels.

### The President's Modesty

Mr. J. DAVIDSON PRATT proposed a vote of thanks to the president for his address, and remarked that whilst to himself, who was once a chemist, the manufacture of explosives as such did not seem to be a very complicated subject, the chemical engineering of it most certainly was and if it had not been for the chemical engineer and all the ideas which he had produced, and the advice he had been able to give, it would not have been possible during the war to have produced with speed the large quantities of explosives that were required. The president had taken a large part in the development, but like all Scotsmen he was an extremely modest man and had said nothing of what he himself had done. There was also one thing which the president did after the war which did not get the publicity



it deserved, and that was the publication of the book, in conjunction with Mr. Cremer, in which was set forth the methods which should be used by the chemist and the chemical engineer in tackling large-scale works problems. That was a volume which every young chemical engineer should study continuously because it was absolutely full of ideas and suggestions for them.

Mr. R. N. STEWART seconded the vote of thanks to the president, and remarked that it was not too much to say that it was the work of the chemical engineer in providing munitions for our troops during the war which led to the recognition of the chemical engineer in this country.

In the afternoon Dr. A. J. V. Underwood read a paper on "The Historical Development of Distilling Plant." The discussion took the form of a few questions which enabled Dr. Underwood to amplify somewhat a few of the historical points dealt with in the paper, and he explained that he had not dealt with the more modern plant as information concerning that was readily available in various text-books.

### Speeches at the Annual Dinner

The annual dinner was held at the Hotel Victoria, London, on Friday, February 22. Mr. William Macnab—the retiring president—was in the chair, and among those present were Lord Macmillan, Air Marshal Sir Hugh Dowding, K.C.B. (Air Member for Research and Development, Air Ministry); Dr. B. Moutat Jones (principal, Manchester College of Technology); Mr. R. H. Goodsall (Prime Warden of the Dyers Company); Mr. J. A. Taylor (Master of the Founders' Company); Mr. H. F. Dixon (Master of the Salters' Company); Sir F. Gowland Hopkins (president, Royal Society); Mr. C. Valon Bennett (president, Institution of Gas Engineers); Mr. G. J. Greenfield (president, Coke Oven Managers' Association); Mr. E. Thompson (president, Society of Chemical Industry); Professor G. T. Morgan (president, Chemical Society, and superintendent, Chemical Research Laboratory, Teddington); Professor Jocelyn Thorpe (president, Institute of Chemistry); Lt.-Col. J. G. D. K. Restler (president, Institution of Engineers-in-Charge); Professor E. C. C. Baly (president, British Association of Chemists).

LORD MACMILLAN, proposing "The Institution of Chemical Engineers," said he confessed that the title of the Institution had rather puzzled him and at first sight the chemical engineer seemed a rather menacing combination. What sort of hybrid was the chemical engineer? However, the Institution, whose members combined both chemistry and engineering, was fitted to play an important part in our industrial recovery. By this combination of skill in the art of mechanics and the science of chemistry we were able to turn out, for example, the requisite plant for the great industries which were associated with Imperial Chemical Industries, Ltd., and other organisations concerned with the chemical and dye industries, which he ventured to think probably contained the best promise for the future of the industry of this country. The purpose of such an Institution was twofold. There was first the technical function of promoting the art which it professed, and to enable those engaged in this great branch of scientific work to meet together and exchange ideas and obtain all the benefits that may come from co-operation and association, and secondly, apart from the technical aspect, there was the educational side.

### A High Standard of Admission

The Institution had very wisely set a high standard of admission and he was happy to know that there were pleasing and friendly relations with the University of London, which had now passed from being merely an examining body and was becoming a great teaching institution in conjunction with the Imperial College of Science, King's College and University College, which were carrying on great developments in scientific training. New chairs had been instituted and it was hoped as time went on it would be possible to have in London a great clearing house for the whole Empire.

The PRESIDENT, responding, said the membership of the Institution was progressing satisfactorily but not rapidly, because the desire was to have quality rather than quantity. Nevertheless, those who had been associated with the work of the Institution since its commencement had every reason to feel that they were justified in starting a new corporate body. For the preparatory work the Institution was greatly indebted to the first president, the late Sir Arthur Duckham,

and the first hon. secretary, the late Professor Hinchley. Undoubtedly, the experiences during the war drove home the necessity for educating men both in the fundamentals of engineering and of chemistry so that they might be better qualified to conduct the many industries of the country. A great deal of research work had been and was being carried out by research associations and firms which presented problems in the handling of new materials and new compounds, and of the treatment of them under varying conditions of temperature and pressure which it was the peculiar province of the chemical engineer to solve. As a result of this work many new materials of construction had become available and many operations had been made possible which hitherto could not be carried out economically.

### Meeting Fresh Demands

Such developments, however, always brought fresh demands and therefore we must always be prepared to scrap old processes and plants and go forward courageously, not grumbling at the work and the trouble caused by such changes. The chemical engineer, as a matter of fact, had great joy in solving problems and overcoming difficulties and this went a long way to counteract the comparative monotony of some of the work he had to do in common with all other occupations. The chemical departments of the three colleges which had been mentioned by Lord Macmillan were doing excellent work, and the value of that work was recognised outside this country, because recently he had met a student at Helsingfors University who was anxious to take a course of chemical engineering in one of the London colleges. Speaking of the Graduates and Students Section of the Institution, the president said he had been impressed with the high standard of the papers that were read and discussed there, which suggested there would be no dearth of capable chemical engineers in the future.

Dr. H. LEVINESTEIN (president-elect) proposed "Our Guests," and coupled with the toast the names of Air-Marshal Sir Hugh C. T. Dowding (Member of the Air Council for Research and Development); Professor Jocelyn Thorpe, F.R.S. (President of the Institute of Chemistry) and Principal B. Moutat Jones (Manchester College of Technology).

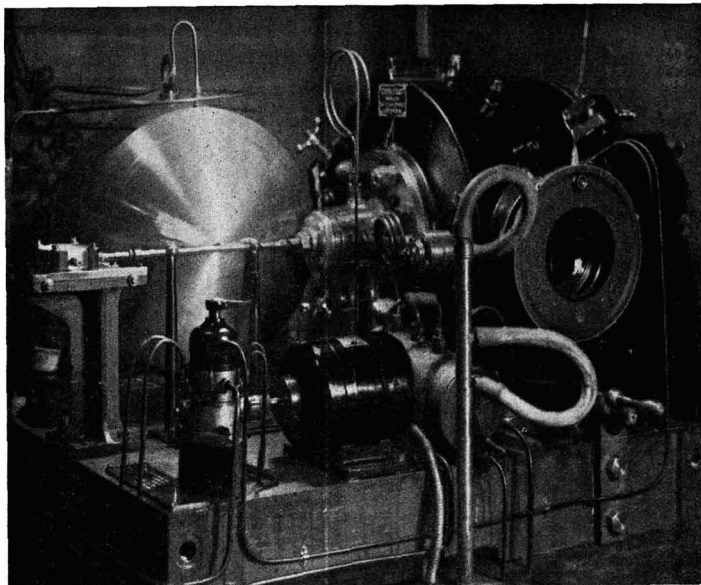
### Danger of Exaggerated Nationalism

Air-Marshal Sir HUGH DOWDING expressed his appreciation of the assistance which the Services always obtained from chemists and engineers and, indeed, from all scientists, in dealing with their problems which became increasingly scientific as time went on. He said he believed the original inventions which led to the aniline dye industry were made by an Englishman, but, owing to lack of commercial foresight or whatever it might have been before the war, the Germans had got a commanding lead in that respect which proved of the greatest value to them and a great handicap to us for a time. The problem was resolutely tackled, however, and before the end of the war it was correct to say that we had achieved pre-eminence in all departments of that industry and that we had maintained that pre-eminence since. He was sure the fighting services could equally rely upon the services of chemists and engineers in any future war, should, unhappily, one take place. He was not one of those who believed that war would necessarily or even probably occur in the lifetime of any of those present, but there was abroad an exaggerated nationalism which was not without its dangers. In the old days this nationalism was rather an attribute of the British race, but now other nations had adopted the same characteristic and were carrying it sometimes to perhaps unseemly lengths.

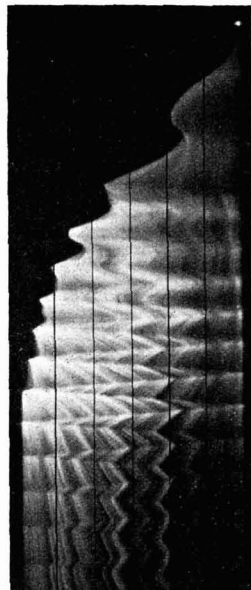
Professor Thorpe and Principal Moutat Jones also replied.

Sir Alexander Gibb proposed the final toast, that of "The President."

The PRESIDENT, responding, said his task as president during the year had been made quite easy by the great assistance he had received from the members of the council and the officers of the Institution. He rejoiced to think that the new president was a man of great experience in handling the affairs of associations and institutions and also in the chemical industry, and, whilst he himself gave up the duties of president with a certain amount of reluctance, he did so also with a certain amount of satisfaction at having additional freedom, but his year of office had been one of great enjoyment.



The Fraser High-Speed Mirror Camera giving 60,000 image rotations per minute, which is equal to  $\frac{1}{8}$  mile of film covered by the image per second.



Flame Photograph showing waves being reflected backwards and forwards within the flame envelope.

## Some "Long Distance" Problems of Industry

**T**HE Department of Chemical Technology at the Imperial College of Science was inaugurated in 1912 for post-graduate study and research in fuel technology, combustion, high-pressure gas reactions, chemical engineering and electrochemistry, under the leadership of Professor W. A. Bone, F.R.S., who still directs its activities. Practically all the research work carried out in the department is of a fundamental and pioneering character, bearing upon what may be termed the "long distance" problems of industry. Its objects are to explore new possibilities, develop new experimental techniques, to discover new facts and relationships, and to establish new data on a reliable basis.

Under the direction of Professor Bone, systematic investigations have been carried out on such subjects as (i) the combustion of carbonic oxide, (ii) the combustion of hydrocarbons, (iii) flame spectra, etc. Among the chief results may be mentioned further new evidence that carbonic oxide burns in two ways, one involving and the other *not* involving the intervention of steam; the proof that the initial oxidation product of a gaseous hydrocarbon is the corresponding alcohol, as well as the accumulation of much further evidence supporting the "hydroxylation" theory. New knowledge concerning the influence of pressure up to 100 atmospheres upon the flame spectra of hydrogen and carbon monoxide has also been obtained.

### Flame Propagation in Gaseous Explosions

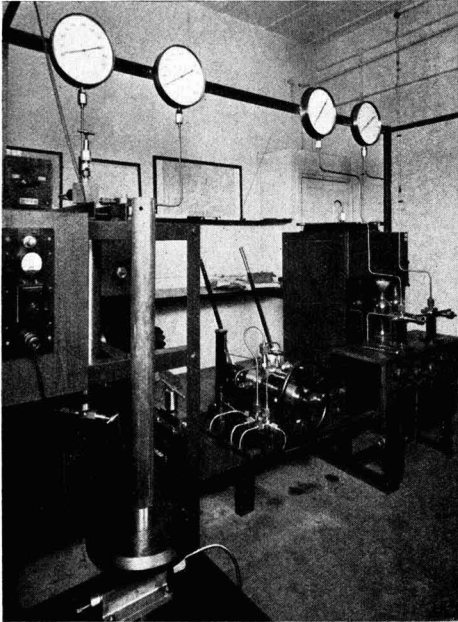
Work on the propagation of flame in gaseous explosions has mainly consisted of photographic researches throughout which Mr. R. P. Fraser has collaborated with Professor Bone, and has developed the present Fraser high-speed mirror camera, by means of which photographs of flame movements have been obtained, showing events occurring in short a time as one-millionth of a second. The whole movement of a gaseous explosion and the influence of compression waves thereon have been re-investigated. Important new knowledge regarding the "pre-detonation" stage of an explosion (*i.e.*, when the flame is travelling at a higher speed

### Research Work in the Department of Chemical Technology, Imperial College of Science, London

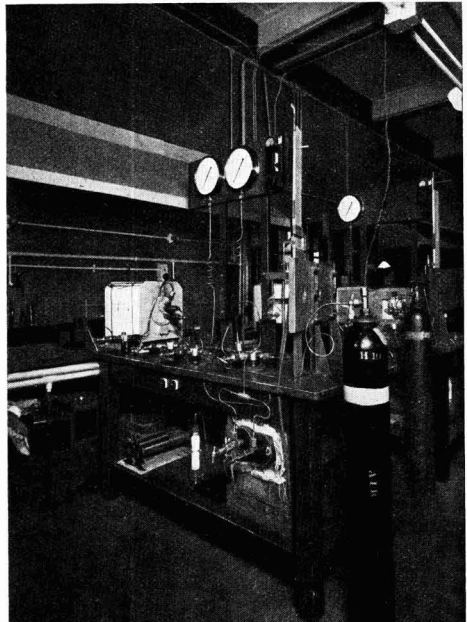
than compression waves in front of it) has been obtained, and the phenomena associated with "spin" in detonation, including the influence of powerful electric and magnetic fields thereon, have been thoroughly explored—with the result that a new conception of detonation has been arrived at.

The Fraser high-speed mirror camera was designed in 1931. It employs a simple spherically faced driving wheel on to the motor shaft for obtaining the desired speed, the film being held stationary and the image being rotated by means of a mirror. Two semi-circles of film are suspended within a circular casing, upon the circumference of which is fixed a large aperture lens. The double-sided steel mirror is rotated at the centre of the circle formed by the films so as to throw the image from the lens upon them. By this means the image of the flame in the horizontal tube is rotated at right angles to the direction of flame front, each side of the mirror in turn rotates the image, and the image rotates at twice the speed of the mirror. Rotating the mirror at 30,000 r.p.m. is equivalent to 60,000 image rotations per minute which in this machine is equal to  $\frac{1}{8}$  mile of film covered by the image per second. To obtain these high speeds it is necessary to evacuate the camera casing to avoid all undue windage.

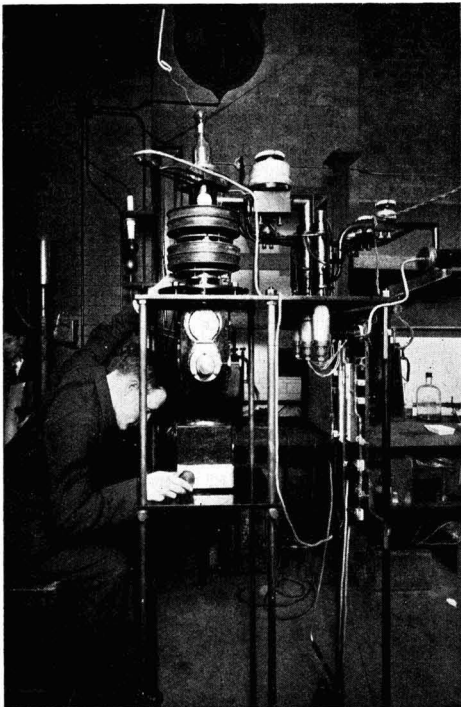
The work upon gaseous explosions at high pressures, with which Dr. D. M. Newitt and Dr. D. T. A. Townend have been specially associated, has been extended over initial pressures up to 1,000 atmospheres, the highest yet attempted in gaseous explosions. It has been shown that nitrogen-activation in CO-air explosions reaches a maximum at an initial pressure of about 350 atmospheres; also that as much as 6 per cent. of recoverable nitric oxide is produced in  $2\text{CO} + 3\text{O}_2 + 2\text{N}_2$  explosions at initial pressures of 75 atmospheres.



High Pressure Apparatus for study of Liquid Reactions at 5,000 atmospheres. Similar apparatus has now been installed to extend this work up to pressures ranging from 10,000 to 20,000 atmospheres.



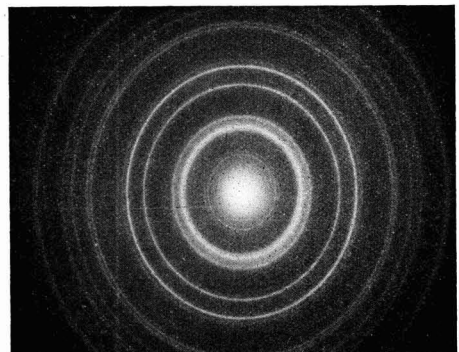
Apparatus for the Determination of Ignition Temperatures for Air-Gas Mixtures at High Pressures.



The Electron Diffraction Camera for the study of Surface Phenomena, such as the nature of corrosion resisting films.



Electron Diffraction Transmission Pattern of an Aluminium Single Crystal.



Electron Diffraction Transmission Pattern of Electro-deposited Silver.

Dr. D. M. Newitt has developed a new line of work on the pressure-oxidation of typical hydrocarbons (e.g., methane, ethane, ethylene, benzene, toluene, etc.), with a view to elucidating the mechanism of the process and of obtaining large yields of valuable intermediate products (e.g., alcohols or aldehydes). He has succeeded in obtaining a 50 per cent. yield of methyl alcohol from methane, a 60 per cent. yield of ethyl alcohol from ethane, and large yields of both benzyl alcohol and benzaldehyde from toluene.

In addition, investigations have been made upon various catalytic pressure reactions known or likely to yield products of commercial value, and for the past two years investigations have been carried out on certain liquid organic reactions at pressures of 5,000 atmospheres, with such success that apparatus has now been installed to extend the work up to pressures between 10,000 and 20,000 atmospheres.

### Ignition Temperature of Hydrocarbons

A study of the influence of pressure on the ignition temperature of hydrocarbons has been opened up by Dr. D. T. A. Townsend, in the course of which it has been discovered that the ignition temperatures of explosive mixtures of the paraffin hydrocarbons with air, etc., are located in two widely separated ranges, one usually above 500° C. for low pressures and the other usually below 350° C. for high pressures. Transference of an ignition temperature to the lower range occurs abruptly at a definite critical pressure, and it appears to depend upon the part played by pressure in stabilising certain products formed intermedially during combustion. This investigation is throwing considerable light on the problem of "knock" in internal combustion engines, for it now seems that this phenomenon is conditioned by a compression ratio adequate to induce spontaneous ignition in the lower temperature system.

It is thought that the lower group of ignition points is the outcome of the rapid oxidation of certain intermedially-formed oxygenated bodies, the survival of which is favoured by high pressures; the higher group results from ignitions of mainly the products of the thermal decompositions which are favoured by low pressures. This view is supported by the fact that aldehydes promote ignition in the lower temperature range, but hardly at all in the higher range; moreover, a normal paraffin is far more easily ignitable in the lower temperature system than a corresponding side-chain isomer, the oxidation of which is known to give rise to fewer aldehydes ("Proc. Royal Soc.," Ser. A., 1934, 146, 113).

Considerable advance has been made in the study of the catalytic action at surfaces. It has now been established

that the electrical condition, catalytic activity and structure of a surface catalyst are intimately related and further progress is now being made in correlating the specificity of action with structure. This great advance has been made possible in the main by the introduction of the electron diffraction method of structure analysis as an aid to the study of the mechanism of heterogeneous catalysis.

### Surface Phenomena

Since 1932 a new and much more accurate method of structure analysis by electron diffraction has been developed in the electro-chemistry laboratories by Professor G. I. Finch and Dr. A. G. Quarrell. This research opens up wide fields of application to the study of surface phenomena in general. The study of the surface structure of catalysis has clearly shown that electron diffraction has now become an indispensable instrument in the study of the mechanism of heterogeneous catalysis. The nature of the corrosion-resisting films formed on zinc and magnesium have been identified as oxides of normal composition, but of hitherto quite unsuspected structures, and recently the great possibilities of electron diffraction in determining the structure of organic compounds and the metrical arrangements of the atoms therein have been demonstrated.

Further systematic lines of research are now being actively prosecuted; they deal with (i) corrosion, (ii) electro-deposition and anodic and cathodic surface reactions, (iii) structure and thermionic and photo-electric emission, (iv) lubrication, (v) structure and properties of colloidal metals, (vi) structure and formation of surface compounds, (vii) crystal structure of organic compounds, (viii) structure and asymmetric conductivity, and (ix) the interaction of surfaces and molecular rays. Continual progress is also being made in perfecting and simplifying the methods of electron diffraction and in widening its scope, not only as an instrument of research but also for use in industrial laboratories.

Metal vapours (zinc, lead, silver and tin) have been condensed on polished and etched metal surfaces (copper, iron, zinc, lead or gold) under observation in an electron diffraction camera, and it has been found that (i) suitably polished surfaces gave rise solely to random electronic scattering, (ii) etched surfaces exhibited a crystalline structure, and (iii) the diffraction pattern yielded by a crystalline deposit disappeared more or less rapidly when the substrate was polished, but was permanent on an etched surface ("Proc. Royal Soc.," Ser. A., 1934, 145, 676). In general, a metal layer deposited on a polished substrate adhered far more firmly thereto than on the etched or crystalline surface.

## Hydrocarbon Gases

### Their Properties and Uses in Industry

It is in the United States that the use of gaseous hydrocarbons has received the most attention, chiefly due to the fact that methane and ethane are the main constituents of natural gas, the methane content ranging from 50 to 98 per cent. whilst the ethane content is anything up to 31 per cent. This gas is now piped over the larger part of the United States and at some of the wells small quantities of the constituent gases are isolated by fractional liquefaction and supplied to industry in the compressed state. Other sources of supply also exist, as in the refining and cracking of crude petroleum, whilst ethylene is made in commercial quantities by passing a mixture of carbon monoxide and hydrogen over finely divided platinum or nickel at 100° C.

Methane (CH<sub>4</sub>) is lighter than air (23.6 cu. ft. per lb.), and has a heating value of 1,010 B.Th.U. per cu. ft. It is the principal constituent of natural gas, mostly present to the extent of 80 to 90 per cent., and is used in the United States for testing and adapting gas appliances which are manufactured at points where natural gas is not available but which are to be used in natural gas areas.

Ethane (CH<sub>3</sub>CH<sub>3</sub>) is slightly heavier than air (12.4 cu. ft. per lb.). Like methane, it is relatively inactive and forms substitution products with the halogens. It may be used as a refrigerant in systems which are designed for extremely low temperatures. With a critical temperature of approxi-

mately 32° C. the gas is readily liquefied under pressure in water-cooled condensers; it boils at -126° F.

Ethane finds an important application as a fuel for lighter-than-air craft. This gas has practically the same density as air and does not appreciably alter the weight of the ship as it is consumed from storage in collapsible compartments or balloons. The use of ethane eliminates the necessity for recovering water from the exhaust gases of the motors by condensation in order to maintain the equilibrium on ships using liquid fuels. The heat of combustion is approximately 22,300 B.Th.U. per lb. (1,800 B.Th.U. per cu. ft.). The gas has marked anti-knock qualities and permits the use of motors with a high compression ratio. The Graf Zeppelin used ethane as a fuel on several stages of her trip around the world.

Ethylene (CH<sub>2</sub>CH<sub>2</sub>) also has practically the same density as air (13.4 cu. ft. per lb.), and consequently it diffuses readily; it boils at -155° F. It accelerates the colouring and ripening processes of fruits and vegetables and is extensively used in this connection for citrus fruits, tomatoes, bananas and melons, and for the blanching of celery and other vegetables. The use of ethylene not only shortens the time of ripening, but also lowers the acidity of early apples, plums, pineapples, and other fruits. Moreover, it eliminates shipping losses due to rot, fungus growths and uneven ripening. For



the ripening of fruits, the recommended concentration of ethylene is approximately one part per 1,000 parts of air at a room temperature of 65° to 70° F. The gas should be applied over a period of 48 hours or more in a fairly airtight compartment.

### Ethylene for Fruit Ripening

Ethylene is inflammable and forms an explosive mixture with air at a concentration of approximately 3 per cent., but as the concentration recommended for colouring and ripening fruit is only one part in 1,000, or one-tenth of one per cent., the resulting mixture is far below the explosive limit. Nevertheless, adequate safety precautions should be taken and no light or fire should be allowed in or adjacent to the room or the cylinder and measuring apparatus during the process.

Propane (CH<sub>3</sub>CH<sub>2</sub>CH<sub>3</sub>) is heavier than air (8.5 cu. ft. per lb.) It is particularly applicable to refrigerating systems where low temperatures are required, as it has no corrosive action on metals, and will not break down in the system. The condensing pressure is approximately 150 lb. gauge at 90° F. which corresponds closely to that of ammonia. As the boiling point of ammonia is approximately -29° F. as compared with -48° F. for propane, much lower temperatures can be produced with the latter at positive back pressures. Propane is chiefly used as a refrigerant in place of ammonia in certain work where the products to be cooled react with ammonia, as is the case in the purification of sulphur dioxide by liquefaction.

Butane (CH<sub>3</sub>CH<sub>2</sub>CH<sub>2</sub>CH<sub>3</sub>) is an excellent refrigerant for use in domestic refrigerating systems. It is heavier than propane (6.5 cu. ft. per lb.). It is also extremely stable and will not react with moisture; in consequence, it does not break down in the system to form foreign or non-condensable gases and has no corrosive action on metals. Since the boiling point is 31.3° F., the use of butane permits the production of temperatures usually required in systems of this type, without a high vacuum. Furthermore, the condensing pressure is low, approximately 30 lb. gauge at 90° F., a characteristic which makes it particularly applicable to machines employing air-cooled condensers.

Butane is also adapted as a low boiling extracting solvent.

Animal products which are readily affected by heat may be extracted without loss of flavour or potency. The very low boiling point of the gas assures also that no odour will remain in the extracted product. This use of butane holds much promise, especially in the extraction of vitamins, hormones, and glandular constituents.

### Butane for Enrichment of Gas

City gas plants in the United States find butane to be an efficient substitute for gas oil in the carburetting of water gas of low B.Th.U. value. Of particular interest is its use in the enrichment of gas after transmission at high pressure. Such transmission results in the loss by condensation of the less volatile constituents of the gas which can be readily made up with the minimum of equipment by the addition of butane. Another function of butane is to meet unusual peak load conditions occurring at gas plants during severe winter cold spells. The commercial gas may be used directly or mixed with air as a fuel for industrial atmospheric and blast burners. When burned under pressure with air or oxygen, flame temperatures of 2,400° F. and 3,300° F. respectively, are obtainable. Butane can also be advantageously substituted for gasoline in textile plants for singeing, calendaring and other purposes.

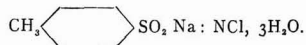
Isobutane (CH<sub>3</sub>CH<sub>2</sub>CH<sub>2</sub>CH<sub>3</sub>) is isomeric with normal butane, that is, both butane and isobutane have the same composition and empirical formula but possess different physical and chemical properties. It is particularly adapted for use as a refrigerant in small domestic refrigerating machines. Like normal butane it is entirely stable and does not react with water; it does not decompose to form foreign or non-condensable gases in the system and has no corrosive action on metals. The boiling point of 8.2° F. allows the production of the desired temperatures at atmospheric pressure with a positive back pressure. Its condensing pressure is approximately 49 lb. gauge at 90° F., which makes it especially applicable to machines employing air-cooled condensers. As the density of liquid isobutane is approximately one-half of other low pressure refrigerants, the required volume of charge may be obtained with a proportionately lower total weight of this refrigerant.

## Chloramine Antiseptics

### Water Sterilisation Problems

INFORMATION on "Chloramine Antiseptics" is given in a concise form in a booklet which has been issued by Boots Pure Drug Co., Ltd. This group of antiseptics has a wide sphere of usefulness.

Chloramine-T (sodium *para*-toluenesulphonchloramide) is a white crystalline substance containing about 12.5 per cent. of chemically combined chlorine in a form which is quite stable

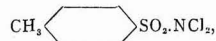


It is soluble in seven parts of cold water and two parts of boiling water. The solution, which is stable both to light and heat, is an antiseptic of the highest efficiency.

The sterilisation of water is a problem which has held the attention of chemists for some considerable time and there has been a definite need for a chemical substance which would effectively kill all bacteria and yet not have an objectionable taste. In chlorine there is a powerful disinfectant which is effective at a very low concentration. It has, however, numerous disadvantages such as the necessity for skill in use and the need for control. It is corrosive, and even at very low concentration has an unpleasant taste. Chloramine-T, a relatively stable, organic compound containing about 12½ per cent. chlorine in a very active form, was first introduced in 1915. This preparation, besides being a very potent antiseptic, has the advantage of being a crystalline powder and therefore much easier to handle than chlorine. It has not an objectionable taste in the concentrations necessary for effective sterilisation and it is non-poisonous in the doses usually employed.

With Chloramine-T the active chlorine is less rapidly used up than with free chlorine, so that the process of disinfection continues for a longer period. Chloramine-T has been found to be very much more effective if the water is first acidified with any acid, and drinking water may be effectively disinfected by the addition of 0.0004 per cent. Chloramine-T and 0.08 per cent. citric acid or sodium acid sulphate.

Although Chloramine-T is without the chemical faults of the hypochlorites, which are alkaline and irritant in action, it yields up its chlorine too rapidly to be quite ideal in all circumstances. Under certain conditions it is highly desirable to maintain a constantly renewed antiseptic action over a long period. This need impelled the seeking of a chlorine antiseptic of more prolonged action, and the search resulted in the production of Dichloramine-T



which is a white, crystalline substance containing 29.5 per cent. of active chlorine, and possesses a characteristic chlorinous odour. It is practically insoluble in water, and in order to prevent decomposition of the Dichloramine-T, it is necessary to use a chlorinated oil solvent.

Halazone is the name given to *para*-sulphondichloraminobenzoic acid



It is a most satisfactory chlorine compound for the sterilisation of small individual quantities of drinking water. 0.004 gm. is sufficient to sterilise one quart of water unless the water is very highly contaminated.

# Important Wool Dyeing Discovery

## New Technical Development Demonstrated at Bradford

A FIRST demonstration of a new process for wool dyeing, embodying the results of discoveries by the Dyestuffs Group of Imperial Chemical Industries, Ltd., was made at the Chemical Laboratory of the Bradford Technical College on February 25, in the presence of a number of people especially interested in the wool industries. It is claimed that the new process will revolutionise the dyeing processes in this industry, and Bradford was chosen for the demonstration because this city is the centre of wool dyeing. The chair was occupied by Mr. George Hopkinson, hon. secretary of the Society of Dyers and Colourists.

Mr. H. JACKSON, chief colourist of the British Dyestuffs Corporation, opened the proceedings and introduced Dr. H. A. Thomas, of the I.C.I. Dyehouse Laboratories. Mr. Jackson said that the results which were being demonstrated were the consequence of an organised attack on problems of dyeing in all industries. This discovery in regard to wool dyeing was the first egg that had come out of the basket and they were hoping to get quite a number of other eggs later on. This new technique in wool dyeing had demonstrated the fact that they could not take long-established practice as being the last word in this matter, and having attacked the subject from an entirely different angle they had got most promising results. The result was that they had been able to get quite a range of dyestuffs which had not previously been available to the wool dyers generally. They were now looking forward to big developments which would enable the textile people of this country to hold their own against all competitors. One fundamental factor that was in mind was, that what was the success of the dye investigator was the success also of the dye user.

Dr. THOMAS said he and his colleagues were continually seeking new methods of dyeing. They had, among other things, to regard as of first importance the effect of the dyeing process on fabric, and that especially applied to wool. The discovery which the Dyestuffs Group of Imperial Chemical Industries, Ltd., in Manchester, had made was bound to be of paramount importance, and he emphasised the point that what had thus been done indicated that the group was not content merely to follow in the wake of foreign developments. Dr. Thomas's detailed exposition of the conditions which had led to the development which he was demonstrating is summarised in the following precis of his address, and the demonstrations were all carried out with water at 80° C. The dyes employed were 5BS, 12BS, 2RNS, Coomassie blue, neolan blue, lissamine green and neolan violet.

The customary method of dyeing wool at the boil at approximately 100° C. is detrimental to the condition of the wool, and it has now been found possible by means of the new discovery to dye wool at lower temperatures, such as 60° C. to 80° C. Moreover, the dyeing takes place much more rapidly, and the penetration of thick fabrics, such as wool felt, is, at the same time, more thorough. These factors should therefore tend to reduce the cost of dyeing with many wool dyes, and ensure the dyed wool being in a superior condition, particularly from the point of view of strength. A number of dyes, which hitherto have not been employed for dyeing thick fabrics, owing to the poor penetration of colour by the customary method of dyeing at the boil, can now be employed satisfactorily for this purpose by the new technique. Since many of these difficulty-penetrating dyestuffs possess valuable fastness properties, the utility of thick wool fabrics dyed with these dyes should be extended.

### New Principle Established

The important fundamental principle discovered is that a turbulence of the dyeliquor during the dyeing of wool is essential for rapid dyeing and good penetration of the wool. A controlled turbulence is therefore applied so that the wool is bombarded by dyeliquor. This action results in a reciprocating pumping of liquor through the wool fabric and a vibration of the individual fibres which causes them to "breathe in" the dye. This effect on the individual fibres was detected with the aid of a high-powered microscope. The principle was established as a result of some 2,000 dyeing experiments with a large number of representative dyestuffs.

The discovery is a triumph resulting from an organised attack by British investigators in the dyestuffs field on the subject of wool dyeing. It also demonstrates the fact that discoveries in the chemical field are more often due to patient team-work than to the sudden inspiration of any one man. The new technique owed its inception first to the fact that Mr. H. Jackson, chief colourist, and Mr. D. Carter, assistant chief colourist, considered that it was desirable to know whether 100° C. represented the best temperature for dyeing wool. It was felt that it was rather an extraordinary coincidence that the boiling point of water should be the ideal temperature for dyeing wool. It was naturally anticipated that if wool could be dyed at lower temperatures than 100° C. it would be of superior quality, since normal boiling admittedly deteriorates wool, particularly from the point of view of strength. Mr. Carter suggested that dyeing in a partial vacuum should be employed in order to achieve a boiling of the dyeliquor at temperatures below 100° C. Experimental work demonstrated that a superior rate of dyeing and penetration of felt by colour was achieved by dyeing with some acid and chrome dyestuffs at 80° C. at a diminished pressure of 280 millimetres. Dyeing experiments at 60° C. and 40° C. in dyeliquors boiling at low pressures were also successful with some acid dyestuffs.

### "Bombardment" of the Wool

Dr. Thomas, whilst working on this subject, then discovered that by drawing air through the dyeliquor during dyeing, or by bubbling compressed air into the dyebath so that a vigorous turbulence of the liquor was achieved, improved dyeing results were obtained at atmospheric pressure, at temperatures below the boil. Thick wool fabrics, including felt, were satisfactorily dyed in the laboratory at temperatures of 80° C., and also with some acid dyestuffs at as low a temperature as 40° C. A comprehensive investigation showed that the improved rate of dyeing and penetration of fabrics was due to the turbulence in the dyeliquor, which caused a bombardment of the wool by dye. This produces the effect of pumping the dyeliquor into the wool fabric, and also a vibration of the individual wool fibres which can be said to "breathe in" the dye.

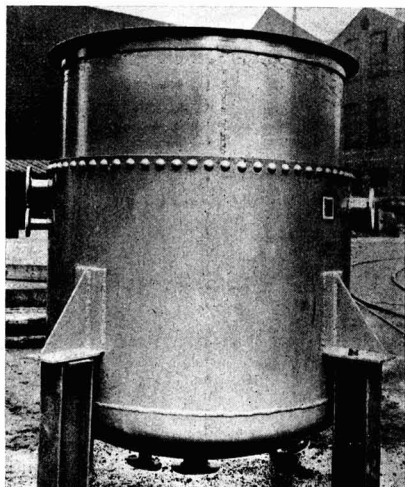
Mr. A. G. Cuthbert-Smith, also of the Dyehouse Department, demonstrated that this vibration effect was beneficial in dyeing, by connecting the wool fabric during dyeing to an electrical vibrating machine. It is expected that the discovery of the importance of a turbulent effect in dyeing will lead to the wide use of new mechanical devices for obtaining a controlled bombardment of the wool with dyeliquor. The simplest application of the principle appears to be by a controlled air-bubbling, and Mr. L. P. Rendell has shown how the method could be advantageously applied in winch machines, chiefly for the dyeing of wool piece, especially thick felted fabrics.

In answer to a question as to whether the new method had been applied to yarn and fabrics it was stated by Mr. L. P. Rendell that it had not yet been applied, but it would be so applied. It was certain that the method was successful with any mass of wool fabric, though, perhaps, there would be more difficulty with a mass of loose wool than with fabric. The mechanical difficulties would be greater with loose wool. The experiments had all been made with felt simply because the thickness of felt made it the best material for experimental work. The results showed the enormous difference in penetration. There was complete penetration in 12 minutes by comparison with the hours of boiling sometimes required to get such penetration.

Mr. HOPKINSON expressed the thanks of the meeting to the demonstrator for bringing to their attention a discovery of a most revolutionary kind. As a wool dyer of a quarter of a century's standing, he had no hesitation in stating that this was one of the most revolutionary discoveries that had ever happened in the history of dyeing—that they could drop 20 per cent. of heat and at the same time get something better. He felt, as hon. secretary of the Society of Dyers and Colourists, that the Society and the Technical College, and, indeed, the city of Bradford, were greatly honoured by the action of I.C.I. in putting this matter before them.

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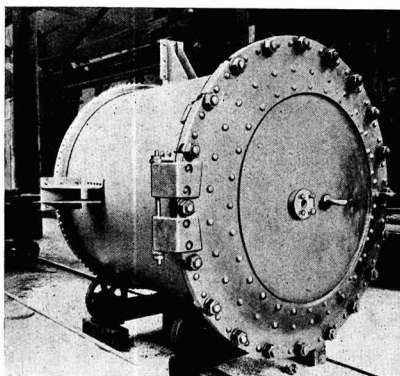
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## Notes and Reports from the Societies

### Society of Dyers and Colourists

#### Manchester Section : Sulphonated Fatty Alcohols

A MEETING of the Manchester Section of the Society of Dyers and Colourists was held in the Lecture Hall of the Literary and Philosophical Society, Manchester, on February 15, when Dr. A. F. Kertess gave a lecture on "Sulphonated Fatty Alcohols." Mr. L. G. Lawrie presided.

Dr. Kertess, in dealing with the application of sulphonated fatty alcohols in the cotton and rayon industry, said they served a useful purpose in the wetting and dyeing of raw stock cotton. They were of assistance in the wetting and dyeing in the circulating type of machine, and the following softening with one of the brilliant avriols in the additional softening and lubricating treatment assisted in the carding and spinning of raw stock. In dyeing cotton yarn on the beam, the addition of one per cent. of gardinol on the beam would assure perfect circulation during the dyeing process, and would prevent the deposit of any sediment on the outside of the beam.

For the soaping process after dyeing, especially in closed machines, gardinol was of great advantage. It would give better shades and would also correct bronziens. In treating knitted or hosiery goods, a special product, lanacarin L.M., had been found most useful because scouring and dyeing could be done in the same bath. In treating piece goods, these newer bodies could be applied in the scouring process, on account of their better emulsifying and cleansing action; in the dyeing process they showed considerable action on account of their wetting-out, dispersing and levelling action. The goods could also be after-soaped with the sulphonated fatty alcohols alone or in conjunction with soap.

#### The Finishing Process

Turning to the finishing process, the sulphonated fatty alcohols, like gardinol or lorol, showed a remarkable advantage; special brands of these sulphonated fatty alcohols like brilliant aviril L.142 and L.168, manufactured by sulphonating technical stearyl alcohol, or L.144, a derivative of technical oleyl alcohol, were mostly applicable. It should be borne in mind that these products showed a big advantage over the sulphonated oils previously used, as they were based on an absolutely different basis, and therefore they did not turn rancid when the goods were stored, the shades did not alter, and they gave a fine softness to the material. In mixing these products with any kind of size or filling, they did not separate regardless of the  $\rho$ H-value of the finish. An important feature of the sulphonated fatty alcohols lay also in the fact that they did not smell and represented a pure white powder.

In regard to the dyeing and finishing of yarn the improved winding qualities of the art silk yarn were especially noticeable. In the desizing and scouring of silk yarn, the presence of sulphonated fatty alcohols prevented the separation of the sizing oils and no lime soap was formed in the presence of hard water. Lower temperatures could be applied when using these products for scouring purposes. For the preliminary creping and scouring bath, an addition of 4 to 8 ounces of gardinol W.A. conc. paste per 100 gal. to the bath, in addition to soap and a small amount of phenol, enabled the work to be done at lower temperatures, the process to be finished in a shorter time, and not only did no objectionable scum appear on the surface of the liquor, but the material itself underwent an easier treatment and the original structure was more protected.

In dyeing rayon piece goods, which was often done with soap, the gardinol and also the brilliant avriols showed a certain retarding action, improving at the same time the levelling of the dyestuff. This was especially useful in dyeing mixtures of cotton and viscose, where the colour rushed on to the artificial silk fibre and left the cotton threads lighter.

The products were also applied in the treatment of pure silk. They could be used for soaking the silk with the addition of a sulphonated fatty alcohol product, in soaking the silk over to the degumming with gardinol, when it gave a better dispersion of the broken soap, and they were applicable also in dyeing and finishing silk fibre and fabrics.

### Institute of Chemistry

#### Edinburgh Section : The Work of the Laundry

THE work of a modern laundry was described by Mr. A. P. Mieras in a paper read before the Edinburgh and East of Scotland Section of the Institute of Chemistry at Edinburgh on February 19. Having explained the identification of articles that was carried out prior to washing, Mr. Mieras described the washhouses and said that the work comes from the hydro-extractors to the ironing departments with a moisture content of about 50 lb. water per 100 lb. dry fabric. That figure depends on the efficiency of the hydro and may be as low as 30 per cent. of the weight of the dry fabric. The starching is done in the washing machine using a combined starch made up of wheat, maize and other starches combined with fillers like French chalk and a lubricant like beeswax or castille soap. These articles are ironed in calenders, generally a machine with one roller running in a steam-heated polished bed over which the roller draws the article being ironed.

As no one detergent solution will attack all classes of dirt simultaneously, there has been evolved the graded wash. A load of 100 lb. of sheets is weighed into the machine and water is run in the machine until the water level indicator shows a dip of 8 in. in the cage and 2 oz. of sodium carbonate (solution) are added. This is run for 4 to 5 minutes, the temperature rising to 90° F. removing water-soluble substances which, at the higher temperatures of the succeeding washes, might set and produce stains very difficult to remove. The machine is drained and fresh cold water added to a dip of 6 in., and 5 oz. of sodium carbonate and 10½ oz. of soap is added. This wash is run for 10 minutes, the temperature rising to 120° F. at the end. The liquor is then run out, warm water is added to a dip of 4½ in. with 3 oz. of sodium carbonate and 3 oz. of soap. To this wash is added sodium hypochlorite to an amount of 280 grains equivalent to a strength of 4 gr./gall. in the liquor in the machine.

The normal course of action of bleach (NaOCl) in this wash is (1) it attacks the stains, (2) the soap and what is left, (3) attacks the cotton. The bleach is added at the beginning of the wash and it is found that all activity of the bleach has ceased after the expiry of three minutes, after which the temperature of the wash is raised to 140° F. For the third wash fresh hot water is added to a dip of 3½ in. with 8 oz. of sodium carbonate and 2½ oz. of soap. The temperature is raised to 200° F. and is maintained for at least 7 minutes. White work is blued by the addition of a small quantity of ultramarine or some other blue in the second last rinse to neutralise the yellow in the cotton.

Mr. Mieras concluded by saying that suggestions regarding the spread of infection at laundries were entirely unjustifiable, disinfection taking place both during bleaching and during all periods of high temperature.

#### Leeds Section : Advances in Colloid Chemistry

A LECTURE covering advances in colloid chemistry was delivered to the Leeds Section of the Institute of Chemistry by Dr. F. L. Usher, on February 18. In order to present a coherent picture of this subject it was necessary to delimit it, and the method adopted was to follow the narrow path of progress in what may be considered the central problems of "pure" colloid chemistry. These may be defined as (1) mechanism of formation of colloidal systems; (2) causes of stability; (3) mechanism of transformation into non-colloidal systems; (4) relation of colloidal to molecular dispersions; and (5) structure and behaviour of highly complex molecules.

The production of colloidal systems by "dispersion" methods raises practical rather than theoretical problems, and the chief recent advances have been in the construction of improved machinery for making sprays and emulsions. The recent work of Taylor (October, 1934) has for the first time given an insight into the hydrodynamical conditions under which an emulsion can be formed. An interesting novelty in the application of "condensation" methods is the production of solutions of colloidal air which, under suitable conditions, are stable for 50 days. Progress in our understanding of the origin of colloidal particles is typified by the work of Zsigmondy and his school on colloidal gold. Freundlich, Zocher and others have shown, in their investigations on the



shape of colloidal particles, the great value of observations made with the aid of polarised light.

The conditions of stability of lyophobic sols have long been known in a general sense, but the quantitative studies of typical sols by the Vienna school under Pauli, to whom we largely owe the fruitful idea of "surface dissociation," have greatly enriched the subject by improving our understanding of the nature and behaviour of stabilising ions. A recent contribution of fundamental significance is due to Verwey and Kruyt (1933), who have found that stabilising ions may have a linear rather than a superficial distribution. The extension to much greater depths of Perrin's work on the gravitational distribution of particles has shown that under ordinary conditions lyophobic sols owe their uniform concentration to the continuous disturbance of the "Perrin" equilibrium by convection currents.

A new field of investigation has been opened up by the researches of Whytlaw-Gray and his collaborators on smokes, and their experiments on the kinetics of coagulation, together with those of Tuorila on gold sols, have provided confirmation of the essential correctness of the theory of von Smoluchowski. Problems concerning the relation of colloidal to true solutions have been greatly illuminated by detailed studies of lyophilic substances, such as soaps (McBain) and other colloidal electrolytes, and by the application of modern theories of electrolytic dissociation. Other important advances are the recent development of the theory of membrane equilibrium so as to include non-ideal systems (Donnan), and the studies by Standinger, Meyer and Mark, Astbury and others of the formation, behaviour and structure of highly polymerised compounds.

## Society of Glass Technology

### Analysis of Glass in Thin Films

THE analysis of glass by the treatment of a thin film in an autoclave was the subject of a paper which Mr. A. R. Wood read at a meeting of the Society of Glass Technology, held in Sheffield on February 20. He said a glass which was blown into exceedingly thin film from a platinum alloy tube, had a thickness of only about  $1\mu$  and showed bright interference colours. In this form the glass exposed an extremely large surface to a liquid reagent. Glasses ranging in soda content from 9 per cent. to 22 per cent. were treated in this form in autoclave at temperatures up to  $217^{\circ}$ , that is, up to pressures of 300 lb. per sq. inch. Water and aqueous solutions of caustic soda, sodium carbonate, borate and phosphate, and calcium and barium hydroxides were used as reagents. The soda extracted was determined by titration. Methyl orange was the most satisfactory indicator.

It was found possible to determine the soda content of any commercial window glass by treatment of the film with water for one hour at  $200^{\circ}$ . It was remarkable that this could be done while the film still retained much of its original form and sometimes some of its interference colours. The method was found to be accurate to 0.2 per cent. of soda for window glasses, but to attain this accuracy it was necessary to follow the technique exactly and to use about 0.08 gm. of film in 50 ml. of water, filtering very rapidly to free the solution from contact with the solid silicates. The film should always be freshly blown.

### Batch Constituents and Colour

Discussing the influence of some batch constituents on the colour of glass, Mr. E. J. C. Bowmaker, B.Sc., said that in certain experimental meltings in open sillimanite pots of about 1 lb. capacity it was found that the substitution of about 2 per cent. of barium oxide for an equivalent amount of lime necessitated an increase in the selenium of about 30 per cent. to decolorise the resulting glass. It was also found that cullet and borax had opposite effects on colour; a 30 per cent. addition of the former required an increase of about 25 per cent. of selenium, whereas an addition of borax in the ratio 40 lb. borax per 1,000 lb. sand required a 25 per cent. decrease in the amount of selenium used.

An investigation of selenium decolorising for soda-lime-silica glass was reported by Mr. E. J. Gooding, B.Sc., Ph.D., and Mr. J. B. Murgatroyd. Standardised melting and cooling conditions were worked out and a series of melts were obtained from which the effects of the addition of minor constituents on selenium colours were recorded. A number of

the glasses were subjected to reheating and sunlight treatment. As a result of these experiments a theory was proposed to the effect that the iron in glass was present as ferric oxide which decomposed with increasing temperature to ferrous-ferric oxide with the loss of oxygen. The reaction was irreversible unless oxidising agents remained in the glass. Selenium reacted with the ferrosferric oxide, forming a ferrous selenide. Arsenic combined with ferrosferric oxide formed ferrous arsenate, which was ionised by the action of sunlight. Sunlight had no effect on selenium or selenium compounds in glass. At high temperatures arsenic also probably combined with selenium to form a complex which decomposed at about  $700^{\circ}$ .

## University Chemical Societies

### Birmingham: Applications of Silica Gel

SOME industrial applications of silica gel were described by Professor S. Lee in a lecture delivered to the Birmingham University Chemical Society on February 18. He dealt with (a) adsorption in the vapour phase, *e.g.*, air- and gas-drying plants, solvent recovery plants, refrigeration plants; (b) adsorption in the liquid phase, *e.g.*, oil refining (the object being to remove gum-forming unsaturated compounds from cracked petrol or from light oil from coke ovens); and (c) the use of silica gel as mass of a catalyst (*e.g.*, finely divided platinum) for the contact process of making sulphuric acid. Slides were shown illustrating the processes.

In the later portion of the lecture the problems arising in gel bed theory were discussed. He stated that in his opinion the problem of fluid friction (*i.e.*, pressure drop) in a more or less uniform gel bed was reduced to law and order, but the general theory of the processes of adsorption, activation and cooling was difficult. Assuming that the gel grains in an air-drying plant were small, so that temperature and water concentrations in the gel could be treated as continuously varying in the bed, it was possible to write down equations representing (1) gel equilibrium between, say, water vapour and gel, (2) conservation of mass, and (3) conservation of energy (for adiabatic dynamic adsorption). If complete equilibrium in both temperature and humidity be assumed between the air passing a gel grain and the grain itself, a marked simplification in the results follows. Whilst the assumption mentioned may be approximately true in certain extreme cases it is not true generally.

Giving reasons for this lack of equilibrium Professor Lees mentioned a tentative theory. The difference in temperature between a gel grain and the air scrubbing it was easy to understand. The difficulty was to fix precisely how the concentration of water in a gel grain changed with time, taking into account the humidity of the air passing it and the temperatures of air and gel. That the time element entered into the question seemed fairly certain, but whether the mechanism of the time element was to be sought for in the differences in humidity in the cross-section of a tiny air stream passing between gel grains (so that the onus was placed on diffusion), or whether the gel itself was also a material factor, the lecturer did not offer to say. A tentative method of treatment similar to that sometimes used in the theory of evaporation of water on a wet-bulb thermometer was suggested.

## United States Chemical Exports

### Some Notable Increases in 1934

MR. C. T. MURCHISON, director of the United States Bureau of Foreign and Domestic Commerce, reports that exports of chemicals and allied products were maintained at relatively high levels in 1934, particularly industrial chemicals, paint products and fertilisers. During the first eleven months of the year calcium chloride shipments increased 90 per cent. to 58,000,000 lb. and sodium compounds increased 10 per cent. to 439,000,000 lb. Potassium compounds, organic and inorganic acids, aluminium sulphate, and copper sulphate were among other items increasing both in quantity and value. Industrial chemicals were followed in importance by naval stores, gums and resins, exports of which were valued at \$13,315,000, a value almost identical with exports of these products during the 1933 period. In this group gum rosin exports totalled \$5,962,000 in value, showing little or no change from the first eleven months of 1933, but the volume

declined from 914,000 to 714,000 barrels. Gum spirits of turpentine shipments were lower both in quantity and value, the quantity declining 25 per cent. to 9,000,000 gal., and the value from \$5,260,000 to \$4,511,000.

Export shipments of paints, pigments and varnishes attained satisfactory levels during the year, being valued at \$12,652,000 during the first eleven months of the year, a gain of approximately 24 per cent. over the 1933 period. In this group exports of ready mixed paints, stains and enamels, accounted for 1,665,000 gal., valued at about \$3,000,000, and represented an increase of approximately 55 per cent., both in quantity and value, over the first eleven months of 1933. Carbon black shipments were somewhat lower in volume, but the value increased about \$75,000 to a total of \$4,631,000 for the first eleven months of the year. Due to heavier exports of phosphate rock, superphosphates, and other fertilisers and fertiliser materials, this group advanced 25 per cent. in quantity to 1,180,000 tons, and 55 per cent. in value to \$11,439,000

during the first eleven months of 1934, compared with the corresponding period of the preceding year, it was stated.

Other groups of importance among chemical and allied products exports showing gains in 1934 were industrial chemical specialities which increased 12 per cent. to \$10,767,000; toilet preparations, 18 per cent. to \$4,770,000; essential oils 29 per cent. to \$1,875,000; crude drugs, largely ginseng, 37 per cent. to \$1,442,000; coal tar products 8 per cent. to \$12,037,000; industrial explosives, 41 per cent. to \$2,000,000; and pyroxylin products 42 per cent. to almost \$4,000,000. Sulphur exports declined \$400,000 in value to \$9,100,000 for the first eleven months of 1934.

The outlook for chemical and allied products exports for 1935 is good, Mr. Murchison states. Dollar exchange is favourable and improved conditions in many of foreign markets should lead to heavier demand for American chemical products, particularly chemical specialities, phosphate and other fertilisers, paint products, and heavy chemicals.

## Personal Notes

MR. W. A. S. CALDER has been unanimously nominated by the Council of the Society of Chemical Industry as the next

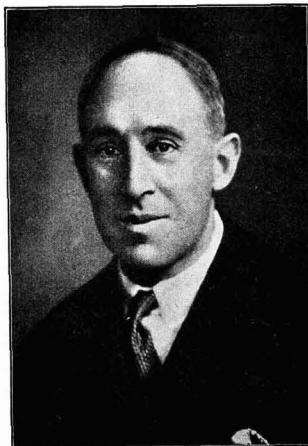


Mr. W. A. S. Calder.

president of the Society, to succeed Mr. Edwin Thompson at the annual meeting at Glasgow in July. Mr. Calder, who was president of the Institution of Chemical Engineers in 1932, was formerly general manager and afterwards a director of Chance and Hunt, Ltd. The company is now part of Imperial Chemical Industries, Ltd., and Mr. Calder is a member of the executive board of the General Chemical Group of I.C.I. and chairman of the committee specially concerned with the general chemical activities in the midlands and South Wales.

MR. F. PICKWORTH, secretary of the English Steel Corporation, and Mr. A. G. E. Briggs, sales manager, have been appointed special directors of the Corporation.

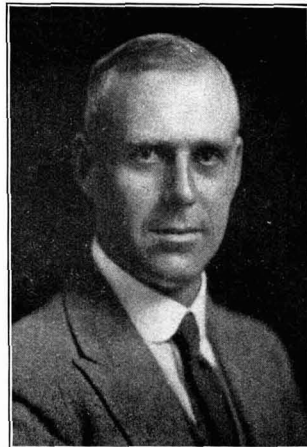
SIR WILLIAM CUNDIFF a director of Baker and Co. (Manchester), chemical manufacturers, and a former Lord Mayor of Manchester, died at his home, Greystones, Lytham Road, Blackpool, on February 19, at the age of 73.



Dr. Herbert Levinstein.

DR. HERBERT LEVINSTEIN (left), who was elected president of the Institution of Chemical Engineers at the annual meeting on February 22, was president of the Society of Chemical Industry in 1929-30 and the Society Medallist in 1931. Born in 1878 and educated at Rugby, Owens College, Manchester and Zurich, Dr. Levinstein has devoted twenty-five years to the dyestuffs industry, and became managing director of the British Dyestuffs Corporation in 1918.

MR. H. J. POOLEY (right), general secretary of the Society of Chemical Industry, the first student to go through a course of chemical engineering at a British university—Liverpool, 1894-98—has been awarded the Osborne Reynolds medal for meritorious contribution to the progress of the Institution of Chemical Engineers. Previous recipients include Sir Alexander Gibb, Sir Frederic Lewis Nathan, Sir Arthur Duckham, Professor J. W. Hinchley, J. Arthur Reavell, H. Talbot, S. G. M. Ure, and H. W. Cremer.



Mr. H. J. Pooley.

MR. JOHN E. BENTLEY, chairman of directors of Ridalex (Chemists), Ltd., Lytham Road, Blackpool, died last week.

THE EARL OF DUDLEY was, on February 21, elected president of the British Iron and Steel Federation.

MR. GEORGE IMLAH, who for the past nine years has been in charge of the Anglo-American Oil Co.'s Dufftown depot, has died at his home.

MR. JOHN C. BATTLE, manager for 33 years of the Chemical Works, Pontardulais, West Wales, has died.

MR. GEORGE TULLO, of Edinburgh, joint managing director of Thornton and Co., Ltd., india-rubber manufacturers, left estate valued at £28,874.

PROFESSOR G. T. MORGAN, director of the Chemical Research Laboratory, Teddington, and formerly Professor of the Faculty of Applied Chemistry at the Royal College of Science, Dublin, has been given the degree of Sc.D. (honoris causa) by the Senate of Trinity College, Dublin.

LIVERPOOL UNIVERSITY CHEMICAL SOCIETY has presented its medal to Professor H. Bassett, of Reading University. This medal is awarded to distinguished old members of the society. Previous recipients have included Professor W. H. Roberts, Liverpool City Analyst, and Mr. W. R. Hardwick, also a Liverpool analyst.

HIS MAJESTY THE KING has been graciously pleased to accord his patronage to the Institute of Chemistry of Great Britain and Ireland. The Institute, which was founded in October, 1877, celebrates this year its Charter Jubilee, having been incorporated by Royal Charter granted by Queen Victoria in June, 1885.

## Continental Chemical Notes

### Finland

THE GOVERNMENT OF FINLAND has decided to purchase 400 milligrams of radium, to the value of 1,000,000 Finnish marks, from the Brussels firm, Radium Belge.

### Hungary

THE CITY OF BUDAPEST is considering the extraction of methane from the city's sewage, a daily production of 1,000 cubic metres gas with a 75 per cent. methane content being anticipated.

### Yugoslavia

A DAILY OUTPUT OF 3 TONS OF ANTIMONY METAL is anticipated from the smelting plant shortly to be erected by the Metalokemika Company in association with the antimony mining concern of Lisanski-Rudnici. The antimony ore is arsenic-free.

### Russia

PLANT FOR PRODUCTION OF FORMALDEHYDE from methyl alcohol has been erected at the Baumann works at Kuskovo. Other products now being manufactured here are chlorine, phosphorus pentoxide and tricresyl phosphate.

FOLLOWING PRELIMINARY WORK on electrolytic production of cadmium, the manufacture of this metal is being planned for the current year at the Ridder Combine.

DEVELOPMENTS IN THE RUSSIAN DYESTUFFS INDUSTRY is reviewed by J. D. Tyschkowsky in the "Moscow Journal of Chemical Industry." Under the Second Five-Year Plan (1933-37) the annual production of azo dyes should reach 9,500 tons in 1937. Outputs of other important classes envisaged for 1937 are 24,000 tons sulphur black, 2,250 tons other sulphur dyes, 200 tons alizarine and 800 tons nigrosine dyes. In all, a sum of 267 million roubles is expected to be spent on the synthetic dye industry during the five years.

### Germany

STATE ENCOURAGEMENT FOR THE AMBER INDUSTRY resulted last year in a considerable increase in output, the sales increasing to 1,000,000 marks from the 1933 figure of 600,000 marks.

THE METALLGESELLSCHAFT A.G., in their 1934 report, make reference to the success achieved by the firm's aluminium alloy, silumin, which has proved a satisfactory substitute for metals formerly imported. Manufacture of 99.99 per cent. zinc has also been successfully commenced at the Duisburg smelting plant.

### France

INSOLUBLE SALTS OF MINERAL ACIDS which vitreify on heating have been put forward as flame-proofing agents for rubber products. Preference is given to a borate containing water of crystallisation, the latter acting as an additional aid to fire extinction, while the glassy mass formed in contact with flame cuts off the supply of air to the burning rubber. A typical composition which can be prepared in the usual rubber mixing mill comprises 20 to 50 per cent. rubber, 24 to 70 per cent. borocalcite, 20 to 25 per cent. incombustible wax and 5 to 6 per cent. usual vulcanising ingredients (French Pat. 774,630).

IMPROVED YIELDS OF ETHYLENE GLYCOL from hydrolysis of dichlorethane ( $C_2H_4Cl_2$ ) are claimed to result from operation at high temperature and pressure in the presence of an ammonium salt or ammonia. The latter serves to combine with the hydrochloric acid formed during the process and which otherwise retards the rate of conversion to ethylene glycol. A yield of more than 80 per cent. ethylene glycol is obtained, for example, by treating 200 parts dichlorethane at 160 to 170° C. for 3 to 4 hours in a stirring autoclave in the presence of 200 parts of calcium carbonate and 1,500 parts water with the gradual addition of 270 parts ammonia sulphate dissolved in 600 parts water. After completion of hydrolysis the calcium sulphate is filtered off and the ethylene glycol separated from the ammonium chloride by distillation (French Pat. 774,186).

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## Better Prospects for the China Clay Trade

### Annual Meeting of English Clays, Lovering, Pochin and Co., Ltd.

ENGLISH CLAYS, LOVERING, POCHIN AND CO., LTD., held their annual meeting at St. Austell on Wednesday, February 13, presided over by the chairman, Lord Aberconway.

In addressing the shareholders, Lord Aberconway said that "In the china clay industry a very large proportion of the production is for sale abroad. When trade is bad in foreign countries the Governments concerned, very naturally perhaps, establish quota systems and duties so as to further their own production of domestic clays. Fortunately the china clays found in that part of the country are still the best in the world and are comparatively cheaply won; they are found close to port and, under fair competitive conditions, could rapidly regain a large proportion of their pre-war markets abroad. They had endeavoured to popularise their clays among their consumers, by very carefully attending to the routine of production, to the elimination of grit, to the reduction of moisture content, and to the improvement of the colour. The company had been helped in this matter by their own research department set up some months ago, which has displayed great resourcefulness in overcoming difficulties in production, in devising new methods of treatment and also in assisting our customers to select the right type of clay for specific purpose. When it is realised that there are many hundreds of brands of china clay differing very remarkably one from another in their characteristics, the selection of the right clay for a particular process is a most important matter for all users.

Investigations have been made into the physical properties of clays which enable the company to predict with certainty the behaviour of a clay in many of the processes in which

it is used. The company have also given attention to the development of service and have an efficient chain of stores both in this country and abroad, where stocks of type of clay required by their various customers are kept in reserve. The research department have proved beyond doubt that certain industries at present only using small quantities of china clay, or even those not using it at all, could become substantial customers for special prepared clays. In addition, many economies have been effected by the closing down of certain uneconomic clay pits to the advantage of the remainder. A better distribution of electric power and of water that is so essential in their operations and a fuller use of their drying facilities, which are most accessible to rail and port, have all contributed to the reduction of costs.

The balance sheet called for little comment, said Lord Aberconway. The profit for the year, subject to depreciation and income tax, amounted to £120,352 as compared with £28,417 in 1933. Out of these profits, provision had been made for the income tax which would be assessed on the basis of the 1934 figures, and which would be payable in 1936. £26,000 had been placed to reserves and the Board had been able, after paying the preference dividend to date, to recommend a small dividend of 1 per cent. upon the company's 2,211,753 ordinary shares. On the assets side the amount for stocks was estimated on a fair and conservative basis.

The reports and accounts were heartily adopted, and Lord Aberconway, Lt.-Col. R. G. Ritson, and Mr. A. C. Rouse, who retired in the due course of rotation, were unanimously re-elected. The auditors, Messrs. Bournier, Bullock and Co., were also reappointed.

# Weekly Prices of British Chemical Products

## Review of Current Market Conditions

WITH the exception of slight adjustments in Manchester and Glasgow, there are no price changes to report in the market for general heavy chemicals, rubber chemicals, wood distillation products, perfumery chemicals, essential oils and intermediates. In the coal tar products section there have been slight reductions in solvent naphtha and medium soft pitch, while a number of changes are reported in the pharmaceutical chemical section. Unless otherwise stated the prices below cover fair quantities net and naked at sellers' works.

LONDON.—Prices still continue steady with fair general demand. Prices of coal tar products are unchanged from last week. Pitch is quoted at about 40s. to 42s. 6d. per ton f.o.b. East Coast part.

MANCHESTER.—Traders on the Manchester chemical market during the past week have reported a fairly satisfactory maintenance

of interest among consumers in there the quantities being taken

contract deliveries. Here and up tend to expand slightly and altogether specifications are covering a reasonably good bulk in the aggregate. New orders this week have been neither numerous nor important from the point of view of quantities involved. For the most part, they have related to near delivery dates, with an occasional contract extending over the next two or three months. Textile chemicals are being called for fairly well, though this is by no means the strongest section of the trade. The demand for some of the by-products is a little brisker than it has been, but so far as the light sections are concerned there has been little improvement in the position.

SCOTLAND.—Business remains fairly steady in the Scottish heavy chemical market.

### Price Changes

**General Chemicals.**—NITRIC ACID, 80° (Scotland), £24 per ton; ARSENIC, white powdered Cornish (Manchester), £22 per ton; CAUSTIC POTASH (Manchester), £38 10s. per ton; CAUSTIC SODA, 76/77° (Scotland), £14 12s. 6d. per ton; SODIUM ACETATE (Scotland), £20 per ton; SODIUM SULPHIDE, crystals 30/32% (Scotland), £8 7s. 6d. per ton.

**Coal Tar Products.**—SOLVENT NAPHTHA, 95/160, 1s. 6d. per gal.; PITCH, medium soft, 42s. to 45s. per ton.

**Pharmaceutical and Photographic Chemicals.**—AMMONIUM BENZOATE, 2s. 9d. to 3s. 3d. per lb.; CALCIUM HYPOPHOSPHITES, 2s. 4d.; POTASSIUM HYPOPHOSPHITES, 2s. 10d.; SODIUM HYPOPHOSPHITES, 2s. 6d.; IRON AMMONIUM CITRATE B.P., 1s. 11d.; POTASSIUM CITRATE B.P., 1s. 9.; SODIUM CITRATE B.P.C., 1932, U.S.P., 1s. 10d.

All other prices remain 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.—Commercial granulated, £25 10s. per ton; crystal, £26 10s.; powdered, £27 10s.; extra finely powdered, £29 10s. packed in 1-cwt. bags, carriage paid home to buyers' premises within the United Kingdom in 1-ton lots.

ACID, CHROMIC.—10½d. per lb., less 2½% d/d U.K.

ACID, CITRIC.—11½d. per lb. less 5%. MANCHESTER: 11½d.

ACID, CRESYLIC.—97/99%, 1s. 8d. to 1s. 9d. per gal.; 98/100%, 2s. to 2s. 2d.

ACID, FORMIC.—LONDON: £40 to £45 per ton.

ACID, HYDROCHLORIC.—Spot, 4s. 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, SCOTLAND: 80°, £24 ex station full truck loads.

ACID, OXALIC.—LONDON: £47 17s. 6d. to £57 10s. per ton, according to packages and position. SCOTLAND: 98/100%, £48 to £50 ex store. MANCHESTER: £49 to £55 ex store.

ACID, SULPHURIC.—SCOTLAND: 144° quality, £3 12s. 6d.; 168°, £7; dearsenicated, 20s. per ton extra.

ACID, TARTARIC.—1s. per lb. less 5%, carriage paid for lots of 5 cwt. and upwards. MANCHESTER: 1s. 0½d. to 1s. 0¾d. per lb.

ALUM.—SCOTLAND: Lump potash, £3 10s. per ton ex store.

ALUMINA SULPHATE.—LONDON: £7 10s. to £8 per ton. SCOTLAND: £7 to £8 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 BICROMATE.—8d. per lb. d/d U.K.

AMMONIUM CARBONATE, SCOTLAND: Lump, £30 per ton; powdered, £33, in 5-cwt. casks d/d buyers' premises U.K.

AMMONIUM CHLORIDE.—LONDON: Fine white crystals, £18 to £19. (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, £34 per ton, c.i.f. U.K. ports.

ANTIMONY SULPHIDE.—Golden, 6½d. to 1s. 2d. per lb.; crimson, 1s. 5d. to 1s. 7d. per lb., according to quality.

ARSENIC.—LONDON: £16 10s. per ton c.i.f. main U.K. ports for imported material; Cornish nominal, £22 10s. f.o.r. mines. SCOTLAND: White powdered, £23 ex wharf. MANCHESTER: White powdered Cornish, £22, ex store.

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

BARIUM CHLORIDE.—£11 per ton. SCOTLAND: £10 10s.

BARYTES.—£6 10s. to £8 per ton.

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

BLEACHING POWDER.—Spot, 35/37%, £7 19s. per ton d/d station in casks, special terms for contract. SCOTLAND: £8 in 5/6 cwt. casks for contracts over 1934/1935.

BORAX, COMMERCIAL.—Granulated, £14 10s. per ton; crystal, £15 10s.; powdered, £16; finely powdered, £17; packed in 1-cwt. bags, carriage paid home to buyer's premises within the United Kingdom in 1-ton lots.

CADMIUM SULPHIDE.—2s. 4d. to 2s. 8d.

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.—3½d. to 4½d. per lb. LONDON: 4½d. to 5d.

CARBON TETRACHLORIDE.—SCOTLAND: £41 to £43 per ton, drums extra.

CERORIUM OXIDE.—10½d. per lb., according to quantity d/d U.K.; green, 1s. 2d. per lb.

CHROMETAN.—Crystals, 3½d. 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 2s. 6d. per cwt. SCOTLAND: £4 2s. less 2½ per cent.

DINITROTOLUENE.—66/68° C., 9d. per lb.

DIPHENYLGUANIDINE.—2s. 2d. per lb.

FORMALDEHYDE.—LONDON: £25 10s. per ton. SCOTLAND: 40%, £25 to £28 ex store.

IODINE.—Resublimed B.P., 6s. 3d. to 8s. 4d. per lb.

LAMPBLACK.—£45 to £48 per ton.

LEAD ACETATE.—LONDON: White, £34 10s. per ton; brown, £1 per ton less. SCOTLAND: White crystals, £33 to £35; brown, £1 per ton less. MANCHESTER: White, £34; brown, £32.

LEAD NITRATE.—£27 10s. per ton.

LEAD, RED.—SCOTLAND: £24 to £26 per ton less 2½%; d/d buyer's works.

LEAD, WHITE.—SCOTLAND: £39 per ton, carriage paid. LONDON: £36 10s.

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

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

METHYLATED SPIRIT.—61 O.P. industrial, 1s. 5d. to 2s. per gal.; pyridinised industrial, 1s. 7d. to 2s. 2d.; mineralised, 2s. 6d. to 3s. Spirit 64 O.P. is 1d. more in all cases and the range of prices is 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.—7½d. to 8½d. per lb. for delivery up to June 30.

POTASH, CAUSTIC.—LONDON: £42 per ton. MANCHESTER: £38 10s.

POTASSIUM BICROMATE.—Crystals and Granular, 5d. per lb. less 5% d/d U.K. Discount according to quantity. Ground, 5½d. LONDON: 5d. per lb. less 5%, with discounts for contracts. SCOTLAND: 5d. d/d U.K. or c.i.f. Irish Ports. MANCHESTER: 5d.

POTASSIUM CHLORATE.—LONDON: £37 to £40 per ton. SCOTLAND: 99½/100%, powder, £37. MANCHESTER: £38.

POTASSIUM CHROMATE.—6½d. per lb. d/d U.K.

POTASSIUM IODIDE.—B.P., 5s. 2d. per lb.

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



**POTASSIUM PERMANGANATE**.—LONDON: 9½d. per lb. SCOTLAND: B.P. crystals, 9d. MANCHESTER: B.P., 10½d.

**POTASSIUM PRUSSIATE**.—LONDON: Yellow, 8½d. to 8½d. per lb. SCOTLAND: Yellow spot, 8½d. ex store. MANCHESTER: Yellow, 8½d.

**SALAMMONIAC**.—First lump spot, £41 17s. 6d. per ton d/d in barrels.

**SODA ASH**.—58% spot, £5 12s. 6d. per ton f.o.r. in bags.

**SODA CAUSTIC**.—Solid 76/77% spot, £13 17s. 6d. per ton d/d station. SCOTLAND: Powdered 98/99%, £17 10s. in drums, £18 5s. in casks, Solid 76/77%, £14 12s. 6d. 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 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. SCOTLAND: £20.

**SODIUM BICARBONATE**.—Refined spot, £10 10s. per ton d/d station in bags. SCOTLAND: Refined recrystallised £10 15s. 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. less 5% for spot lots and 4d. per lb. with discounts for contract quantities. MANCHESTER: 4d. per lb. basis. SCOTLAND: 4d. delivered buyer's premises with concession for contracts.

**SODIUM BISULPHITE POWDER**.—60/62%, £18 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 10s. per ton.

**SODIUM CHROMATE**.—4d. 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, £14 10s. ex station, 4-ton lots. MANCHESTER: Commercial, £10 5s.; photographic, £15.

**SODIUM META SILICATE**.—£16 per ton, d/d U.K. in cwt. bags.

**SODIUM IODIDE**.—B.P., 6s. per lb.

**SODIUM NITRITE**.—LONDON. Spot, £18 to £20 per ton d/d station in drums.

**SODIUM PERBORATE**.—LONDON: 10d. per lb.

**SODIUM PHOSPHATE**.—£13 per ton.

**SODIUM PRUSSIATE**.—LONDON: 5d. to 5½d. per lb. SCOTLAND: 5d. to 5½d. ex store. MANCHESTER: 5d. to 5½d.

**SULPHUR**.—£9 15s. to £10 7s. per ton. SCOTLAND: £8 to £9.

**SODIUM SILICATE**.—140° T.W. Spot £8 per ton. SCOTLAND: £8 10s.

**SODIUM SULPHATE (GLAUBER SALTS)**.—£4 2s. 6d. per ton d/d SCOTLAND: English material £3 15s.

**SODIUM SULPHATE (SALT CAKE)**.—Unground spot, £3 12s. 6d. per ton d/d station in bulk. SCOTLAND: Ground quality, £3 5s. per ton d/d. MANCHESTER: £3 5s.

**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 7s. 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 2s. 6d.

**SODIUM SULPHITE**.—Pea crystals spot, £13 10s. per ton d/d station in kegs. Commercial spot, £8 15s. d/d station in bags.

**SULPHATE OF COPPER**.—MANCHESTER: £14 per ton f.o.b.

**SULPHUR CHLORIDE**.—5d. to 7d. per lb. according to quality.

**SULPHUR PRICIP.**.—B.P. £55 to £60 per ton according to quantity. Commercial, £50 to £55.

**VERMILION**.—Pale or deep, 4s. 3d. to 4s. 5d. per lb.

**ZINC CHLORIDE**.—SCOTLAND: British material, 98%, £18 10s. per ton f.o.b. U.K. ports.

**ZINC SULPHATE**.—LONDON: £12 per ton. SCOTLAND: £10 10s.

**ZINC SULPHIDE**.—11d. to 1s. per lb.

### Intermediates and Dyes

**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 NAPHTHIONIC**.—1s. 8d. per lb.

**ACID, NEVILLE AND WINTER**.—Spot, 3s. per lb. 100%.

**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

**BENZIDINE HCL**.—2s. 5d. per lb.

**p-CRESOL 34.5° C.**.—2s. per lb. in ton lots.

**m-CRESOL 98/100%**.—2s. 3d. per lb. in ton lots.

**DICHLORANILINE**.—1s. 1½d. to 2s. 3d. per lb.

**DIMETHYLANILINE**.—Spot, 1s. 6d. per lb., package extra.

**DINITROBENZENE**.—8d. per lb.

**DINITROTOLUENE**.—48/50° C., 9d. per lb.; 66/68° C., 0½d.

**DINITROCHLOROBENZENE, SOLID**.—£72 per ton.

**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.

**α-NAPHTHYLAMINE**.—Spot, 1½d. per lb., d/d buyer's works.

**β-NAPHTHYLAMINE**.—Spot, 2s. 9d. per lb., d/d buyer's works.

**o-NITRANILINE**.—3ss. 1½d. 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. to 5d. per lb.; 5-cwt. lots, drums extra.

**NITRONAPHTHALENE**.—9d. per lb.; P.G., 1s. 0½d. per lb.

**SODIUM NAPHTHONATE**.—Spot, 1s. 9d. per lb.

**o-TOLUIDINE**.—9½d. to 1½d. per lb.

**p-TOLUIDINE**.—1½s. 1½d. per lb.

### Wood Distillation Products

**ACETATE OF LIME**.—Brown, £9 to £10. Grey, £12 to £14. Liquor, brown, 30° Tw., 8d. per gal. MANCHESTER: Brown, £11; grey, £13 10s.

**ACETIC ACID, TECHNICAL, 40%**.—£17 to £18 per ton.

**AMYL ACETATE, TECHNICAL**.—95s. to 110s. per cwt.

**CHARCOAL**.—£5 15s. to £10 per ton.

**WOOD CREOSOTE**.—Unrefined, 3d. to 1s. 6d. per gal.

**WOOD NAPHTHA, MISCIBLE**.—2s. 6d. to 3s. 6d. per gal.; solvent, 3s. 6d. to 4s. per gal.

**WOOD TAR**.—£2 to £4 per ton.

### Coal Tar Products

**ACID, CARBOLIC**.—Crystals, 7½d. to 8½d. per lb.; crude, 60's, 1s. 1½d. to 2s. 2½d. per gal. MANCHESTER: Crystals, 7½d. per lb.; crude, 2s. to 2s. 1d. per gal. SCOTLAND: 60's, 2s. 6d. to 2s. 7d.

**ACID, CRESYLIC**.—90/100%, 1s. 6d. to 2s. 3d. per gal.; pale 98%, 1s. 6d. to 1s. 7d.; according to specification. LONDON: 98/100%, 1s. 4d.; dark, 95/97%, 1s. SCOTLAND: Pale, 99/100%, 1s. 3d. to 1s. 4d.; dark, 97/99%, 1s. to 1s. 1d.; high boiling acid, 2s. 6d. to 3s.

**BENZOL**.—At works, crude, 9d. to 9½d. per gal.; standard motor, 1s. 3½d. to 1s. 4d.; 90%, 1s. 4d. to 1s. 4½d.; pure, 1s. 7½d. to 1s. 8d. LONDON: Motor, 1s. 5½d. SCOTLAND: Motor, 1s. 6½d.

**CREOSOTE**.—B.S.I. Specification standard, 5½d. to 5½d. per gal. f.o.r. Home, 3½d. d/d. LONDON: 4½d. f.o.r. North; 5d. London. MANCHESTER: 4½d. to 5½d. SCOTLAND: Specification oils, 4d.; washed oil, 4½d. to 4½d.; light, 4½d.; heavy, 4½d. to 4½d.

**NAPHTHA**.—Solvent, 90/160%, 1s. 6d. to 1s. 7d. per gal.; 95/160%, 1s. 6d.; 99%, 1½d. to 1s. 1d. LONDON: Solvent, 1s. 2½d. to 1s. 3½d.; heavy, 1½d. to 1s. 0½d. f.o.r. SCOTLAND: 90/160%, 1s. 3d. to 1s. 3½d.; 90/190%, 1½d. to 1s. 2d.

**NAPHTHALENE**.—Purified crystals, £10 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, 70s. to 75s.

**PITCH**.—Medium soft, 42s. to 45s. per ton. LONDON: 45s. per ton, f.o.b. East Coast port.

**PYRIDINE**.—90/140, 6s. 6d. to 8s. 6d. per gal.; 90/180, 2s. 3d.

**TOLUOL**.—90%, 1s. 10d. to 1s. 1½d. per gal.; pure, 2s. 2d. to 2s. 3d.

**XYLOL**.—Commercial, 1s. 1½d. to 2s. per gal.; pure, 2s. 1d. to 2s. 2d.

### Nitrogen Fertilisers

**SULPHATE OF AMMONIA**.—£7 5s. per ton; for neutral quality basis 20.6% nitrogen delivered in 6-ton lots to farmer's nearest station.

**CYANAMIDE**.—Mar., £7 3s. 9d. per ton; Apr./June, £7 5s.; delivered in 4-ton lots to farmer's nearest station.

**NITRATE OF SODA**.—£7 12s. 6d. per ton for delivery to June, 1935, in 6-ton lots, carriage paid to farmer's nearest station for material basis 15.5% or 16% nitrogen.

**NITRO-CHALK**.—£7 5s. per ton to June, 1935, in 6-ton lots carriage paid for material basis 15.5% nitrogen.

**CONCENTRATED COMPLETE FERTILISERS**.—£10 5s. to £10 17s. 6d. per ton according to percentage of constituents, for delivery up to June, 1935, in 6-ton lots carriage paid.

**NITROGEN PHOSPHATE FERTILISERS**.—£10 5s. to £13 15s. per ton.

### Latest Oil Prices

**LONDON, Feb. 27**.—LINSEED OIL was steady. Spot, £22 15s. (small quantities 30s. extra); March and April, £21 7s. 6d.; May-Aug., £21 17s. 6d.; Sept.-Dec., £22 7s. 6d., naked.

**SOYA BEAN OIL** was quiet. Oriental (bulk), Feb.-March shipment, £25 per ton. RAPE OIL was quiet. Crude extracted, £32; technical refined, £33 10s., naked, ex wharf. COTTON OIL was steady. Egyptian crude, £27 10s.; refined common edible, £32; and deodorised, £33 10s., naked, ex mill (small lots 30s. extra). TURPENTINE was quiet. American, spot, 48s. per ton.

**HULL**.—LINSEED OIL, spot, quoted £22 2s. 6d. per ton; Feb., £21 12s. 6d.; March-April, £21 17s. 6d.; May-Aug., £22 2s. 6d.; Sept.-Dec., £22 7s. 6d. COTTON OIL.—Egyptian, crude, spot, £28; edible, refined, spot, £30; technical, spot, £30; deodorised, £32 10s., naked. PALM KERNEL OIL, crude, f.m.q., spot, £21, naked. GROUNDNUIT OIL, extracted, spot, £33 10s.; deodorised, £36 10s. RAPE OIL, extracted, spot, £31; refined, £32 10s. SOYA OIL, extracted, spot, £27 10s.; deodorised, £30 10s. per ton. CASTOR OIL.—Pharmaceutical, f.o.r. or f.a.s., 25s. per cwt. in barrels. TURPENTINE, American, spot, 50s. per cwt.

# Inventions in the Chemical Industry

## Patent Specifications and Applications

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.

### Complete Specifications Open to Public Inspection

ANTHRAQUINONE DYESTUFFS, and process for their manufacture. Chemical Works, formerly Sandoz. Aug. 17, 1933. 18174/34.  
 PRODUCTION OF LUBRICATING OILS by the heat-treatment of solid carbonaceous materials in the presence of hydrogenatory gases.—International Hydrogenation Patents Co., Ltd. Aug. 15, 1933. 20536/34.  
 ABRASIVES, manufacture.—I. G. Farbenindustrie. Aug. 12, 1933. 23246/34.  
 PRODUCTION OF ALKALI and alkaline earth-metal nitrates.—Atmospheric Nitrogen Corporation. Aug. 12, 1933. 23333/34.  
 AZO DYESTUFFS, manufacture.—I. G. Farbenindustrie. Aug. 12, 1933. 23341/34.  
 AZO DYESTUFFS, manufacture.—I. G. Farbenindustrie. Aug. 15, 1933. 23475/34.  
 COATING AND PLASTIC COMPOSITIONS.—E. I. du Pont de Nemours and Co. Aug. 15, 1933. 23597/34.  
 AZO DYES in substance and on the fibre, manufacture.—Imperial Chemical Industries, Ltd. Aug. 15, 1933. 23598/34.  
 AZO DYESTUFFS, manufacture.—I. G. Farbenindustrie. Aug. 18, 1933. 23670/34.  
 AZO COMPOUNDS and their application, and compositions containing the same.—E. I. du Pont de Nemours and Co. Aug. 17, 1933. 23744/34.  
 PICKLING AND CLEANING OF METALS, substance for use.—Imperial Chemical Industries, Ltd. Aug. 17, 1933. 23747/34.  
 FLEXIBLE SHEET MATERIALS having a sticky surface, manufacture and production.—I. G. Farbenindustrie. July 8, 1933. 5188/35.

### Specifications Accepted with Dates of Application

CASEIN.—Straw Fibres, Ltd., and L. R. Tiraferri. May 15, 1933. 424,189.  
 PIGMENTED CELLULOSE ESTER COMPOSITIONS and solutions, process for preparing.—Brevolite Laequer Co. July 14, 1932. 424,125.  
 FLUORESCENT SUBSTANCES.—L. A. Levy, D. W. West and Ilford, Ltd. July 11, 1933. 424,195.  
 REFINING OF MINERAL OIL, and the preparation of lubricating oil.—M. B. Miller and Co., Inc. July 20, 1932. 424,000.  
 QUATERNARY AMMONIUM COMPOUNDS, manufacture and application.—A. Carpmael (I. G. Farbenindustrie). Aug. 2, 1933. 423,933.  
 INHIBITION OF DETERIORATION in olefinic oils and spirits.—E. W. J. Mardles and W. Helmore. Aug. 10, 1933. 423,938.  
 CHLORINATED RUBBER, manufacture.—J. A. M. W. Mitchell, W. D. Spencer and Imperial Chemical Industries, Ltd. Aug. 11, 1933. 424,061.  
 VOLATILE COMPOUNDS BY FERMENTATION, production.—H. Dreyfus. Aug. 15, 1933. 424,134.  
 ORGANIC COMPOUNDS BY FERMENTATION, production.—H. Dreyfus. Aug. 15, 1933. 424,135.  
 OXYGENOUS NICKEL or nickel-copper compounds, reduction.—Falconberg Nikkelfabrik Aktieselskap. Aug. 27, 1932. 423,951.  
 TREATMENT OF OILS to improve their colour.—J. W. Orelup. Aug. 17, 1932. 424,205.  
 FERTILISERS, production.—Compagnie Belge des Fertilisants. Aug. 19, 1932. 424,008.  
 RESINOUS CONDENSATION PRODUCTS, manufacture and production.—J. Y. Johnson (I. G. Farbenindustrie). Oct. 14, 1933. 424,076.  
 ORGANIC OXIDATION PRODUCTS of fatty matter, process for preparing.—J. R. Short Milling Co. Dec. 27, 1932. 423,971.  
 WOOL-LIKE ARTIFICIAL FIBRES, manufacture.—I. G. Farbenindustrie. Jan. 17, 1933. 424,229.  
 PURE ZINC OXIDE, process for obtaining.—E. Sterkers and L. C. Humbert. Feb. 10, 1933. 424,146.  
 APPARATUS FOR REVAPORISING and dispensing liquefied gases.—Linde Air Products Co. March 3, 1933. 424,101.  
 THERAPEUTIC AGENTS, manufacture.—Chemische Fabrik von Heyden A.-G. March 8, 1933. 424,032.  
 PHOSPHATIC FERTILISERS, production.—Kali-Chemie A.-G. Aug. 29, 1933. 424,045.  
 DICHLORACETIC ACID, preparation.—Compagnie de Produits Chimiques et Electrometallurgiques Alais, Froges, et Camargue. Aug. 17, 1933. 424,047.  
 HYDROCARBON OILS, treatment.—Gasoline Products Co., Inc. Inc. Oct. 5, 1933. 424,050.

### Applications for Patents

(February 7 to 13 inclusive.)

HYDROCARBON OILS, refining.—Naamlooze Vennootschap de Bataafsche Petroleum Maatschappij. (Holland, March 19, '34.) 4403.  
 NICKELIFEROUS WROUGHT IRON, manufacturing.—C. E. Pearson, H. W. G. Ferguson Raine and Co., Ltd. 4668.  
 PURIFYING PRODUCTS containing intermediary ferments of metabolism.—Schering-Kahlbaum, A.-G. (Germany, Feb. 10, '34.) 4394. (Germany, Feb. 10, '34.) 4395.  
 CELLULOSE ESTERS, manufacture.—H. P. Staudinger. 4029.

(February 14 to 20, inclusive.)

AZO DYESTUFFS, manufacture.—M. J. G. Badier. 4990.  
 REMOVAL OF CHLORINE, etc., from waste gases.—E. Berl. 5159.  
 ARSENATE-ALUMINATED CEMENT, production.—Bolidens Gruvaktiebolag. (Sweden, Feb. 19, '34.) 5116.  
 ORGANIC DERIVATIVES of arsenic, production.—Boot's Pure Drug Co., Ltd., L. Anderson, B. Garforth, and F. L. Pyman. 5099.  
 LAMINATED MATERIALS, manufacture.—British Xylonite Co., Ltd., and E. G. Couzens. 5031.  
 PRODUCTS DISPLAYING VITAMINE-B<sub>2</sub>-ACTION.—A. Carpmael (I. G. Farbenindustrie). 4796.  
 SULPHENE AMIDES, manufacture.—A. Carpmael (I. G. Farbenindustrie). 5090.  
 DIBENZANTHRONE DERIVATIVES, manufacture.—E. I. du Pont de Nemours and Co., and W. H. Lycan. 4827.  
 DYESTUFFS, etc.—E. I. du Pont de Nemours and Co. and F. B. Holmes. 5002.  
 MIXED ACID ANHYDRIDES, manufacture.—E. I. du Pont de Nemours and Co. and G. D. Graves. 5004.  
 POLYMERISED DRYING OILS, manufacture.—E. W. Fawcett, Imperial Chemical Industries, Ltd., R. O. Gibson and M. W. Perrin. 5003.  
 POLYVINYL CHLORIDES, manufacture.—W. W. Groves (I. G. Farbenindustrie). 5084.  
 DYESTUFFS, manufacture.—W. W. Groves (I. G. Farbenindustrie). 5086.  
 CHLORINATED BENZOTRIFLUORIDE, manufacture.—W. W. Groves (I. G. Farbenindustrie). 5196.  
 VAPORISING SULPHUR, apparatus.—E. F. Guba. (United States, Feb. 19, '34.) 5233.  
 DYEING AND PRINTING PREPARATIONS.—I. G. Farbenindustrie. (Germany, Feb. 15, '34.) 4797.  
 WATER-INSOLUBLE AZO DYESTUFFS on cellulose fibres, manufacture.—I. G. Farbenindustrie. (Germany, Feb. 15, '34.) 4798.  
 DYESTUFFS OF DIOXAZINE SERIES, manufacture.—I. G. Farbenindustrie. (Germany, Feb. 15, '34.) 4928.  
 ACETALS, manufacture.—I. G. Farbenindustrie. (Germany, Feb. 17, '34.) 5191. (Germany, Aug. 25, '34.) 5192.  
 TANNING AGENTS, manufacture.—I. G. Farbenindustrie. (Germany, Feb. 17, '34.) 5193.  
 ARSENOBENZENE-MONO-SULPHOXALATES, manufacture.—I. G. Farbenindustrie. (Germany, March 10, '34.) 5194.  
 SULPHUR COMPOUNDS, manufacture.—I. G. Farbenindustrie. (Germany, Feb. 17, '34.) 5235. (Germany, May 26, '34.) 5236.  
 GASEOUS UNSATURATED HYDROCARBONS, manufacture.—J. Y. Johnson (I. G. Farbenindustrie). 4945.  
 DYESTUFF MIXTURES.—J. Y. Johnson (I. G. Farbenindustrie). 4946.  
 ORGANIC SULPHUR COMPOUNDS, manufacture.—J. Y. Johnson (I. G. Farbenindustrie). 4947, 4948.  
 VAT DYESTUFFS, manufacture.—J. Y. Johnson (I. G. Farbenindustrie). 4949.  
 STRUCTURES FROM CELLULOSE DERIVATIVES, manufacture.—L. Lilienfeld. 4779.  
 CAUSTIC SODA SOLUTIONS, purification.—Pennsylvania Salt Manufacturing Co. (United States, Feb. 17, '34.) 5252.  
 CAUSTIC SODA SOLUTIONS, purification.—Pennsylvania Soda Manufacturing Co. (United States, Feb. 17, '34.) 5253.  
 BENZINES FROM HYDROCARBONS, production.—H. E. Potts. 5136.  
 BENZENES FROM MIDDLE OILS, production.—H. E. Potts. 5399.  
 OLEFINES, hydration.—Standard Oil Development Co. (United States, July 28, '34.) 4999.

## From Week to Week

IN THE COMPANIES COURT on Monday, Mr. Justice Bennett made an order for the compulsory winding-up of Merry & Bright, Ltd., manufacturing chemists. There was no opposition.

THE SHIRLEY INSTITUTE, Manchester, has decided to install gas-fired furnaces instead of coal-fired boilers in the new extensions to its premises at Didsbury which were recently authorised by the Manchester City Council.

AN INFORMAL DISCUSSION on "Modern Magnetic Materials and their Applications" was held by the Institute of Physics on February 20 in the Science Museum, South Kensington. The opening speakers were Mr. W. F. Randall, on "High Permeability Alloys," and Mr. J. C. Swan on "Materials for Permanent Magnets." A general discussion followed.

SCULCOATES RURAL COUNCIL, at Hull on February 26, approved plans for a lead smelting factory to be built at Melton, near Hull, by Capper Pass and Son, Ltd., Bristol, who first made inquiries in the area in 1928. In view of the specialised nature of the work about thirty of the firm's workpeople will be moved to Melton to instruct local labour and about twice that number to start up the plant.

A FORMAL VERDICT was returned in the case of the inquiry into the death of Patrick M'Dade, leather works labourer, who died in the Royal Infirmary, Glasgow, from the effects of immersion in a chemical cesspool at the leather works of W. and J. Martin, Glasgow, where he was employed. Mr. James Arthur Martin, a partner of the firm, said that the tannery was constructed in 1900, and that there had never been any difficulty with fumes from the cesspool since that year.

THE IMPORT DUTIES ADVISORY COMMITTEE has received an application for drawback under Section 9 of the Finance Act, 1932, in respect of solid insoluble quebracho extract used in the manufacture of soluble quebracho extract, whether or not mixed with other tanning extracts. Any representations which interested parties may desire to make in regard to this application should be addressed in writing to the Secretary, Import Duties Advisory Committee, Caxton House (West Block), Tothill Street, Westminster, London, S.W.1, not later than March 14.

NEW STEELS are constantly being required by the chemical industry, stated Mr. F. E. Smith, chief engineer of the Billingham works of Imperial Chemical Industries, speaking to the Cleveland Institution of Engineers at their annual dinner in Middlesbrough on February 22. Demands for new steel made on both Teesside and Sheffield during the last two years, which have never been made before in this country, and in many instances never made before in the world, have been met in an amazing manner. Without that help new developments, particularly hydrogenation, would have been impossible.

THE UNITED KINGDOM SUGAR INDUSTRY COMMITTEE announces that the five groups of home-grown sugar factories have issued to the growers for their seventeen factories in England a beet contract for the present season which guarantees to the grower a fixed price 1s. lower than the fixed price contracts of last year.

THE IRISH FREE STATE GOVERNMENT is to engage five assistant managers for service in the industrial alcohol factories which are to be established by the Department of Industry and Commerce of that country. The successful candidates, who will receive a salary of £200 per annum, will undergo four months' training on the Continent at the expense of the Government.

THE VACUUM DRIER AND CHEMICAL EQUIPMENT CO., LTD., 66 Victoria Street, London, S.W.1, has recently been registered for the manufacture of vacuum pumps, condensers, vacuum driers and evaporators of all types, crystallising cradles, colloid mills, impregnating plant, distillation and extraction plant, and equipment for process work in the chemical, electro-technical and food packing industries generally. They work in conjunction with the Deutsche Vacuumapparate G.m.b.H., of Erfurt, and their plant is based upon the designs, patents, and experience of that company as well as those of the late Emil Passburg, the original inventor of vacuum drying work generally, and whose successor they are. The whole of the material will be British made henceforth, and will be made in the shops of the Mirreles Watson Co., Ltd., Glasgow.

THE BRITISH STANDARDS INSTITUTION'S Handbook of Information and Indexed List of British Standard Specifications (C.D. 5050), January, 1935, has been published (price 1s.). Special reports on standardisation in the chemical industry, by the chairman, Dr. E. F. Armstrong, on standardisation in the building industry, and on industrial standardisation as viewed by the Imperial Economic Conference are included, and it is of interest to note that there are now 726 technical and subcommittees in the three existing divisions of the work—engineering, building and chemical. Sections showing the current list of B.S. specifications, the new specifications recently issued and those in course of preparation, are followed by a complete subject index of 26 pages. Copies of the new handbook are available from the British Standards Institution, Publications Department, 28 Victoria Street, London, S.W.1, price 1s. 2d., post free.

EXTENSIVE DAMAGE has been caused by a fire at the Phillips-hill Works, near Busby, of Young and Strang, gum manufacturers.

THE TREASURY has made an Order under Section 10 (5) of the Finance Act, 1926, continuing the exemption of oxalic acid from Key Industry Duty till December 31, 1935.

A DRUM CONTAINING OXY-ACETYLENE GAS exploded in a motor-repairing shop in Calcutta on February 23. An Indian doctor had his legs blown off, a coolie in the works had a leg blown off, and the repair shop and adjoining houses were destroyed.

A NEW LOW-TEMPERATURE RECORD, it is reported, has been attained by Professor Haar at his Leyden laboratory, where he has succeeded in reaching a temperature of 0.0002 of a degree below absolute zero.

A PETITION for confirmation of reduction of capital of Continental Tintex and Dye Products, Ltd., from £200,000 to £20,000 by cancelling paid-up capital which has been lost or is not represented by available assets, will be heard by Mr. Justice Eve in the Chancery Division on March 19.

FOUR HUNDRED EMPLOYEES of the Upper Hulme Mill, Staffs, arriving at their work on February 20, found the mill destroyed by fire. The mill was built on piles over a stream and collapsed during the blaze despite the efforts of the fire brigade. Forty men who were working on the night shift escaped without injury, but damage estimated at £50,000 was done to the mill which is owned by William Taton, Ltd.

THE UNIVERSITY OF LEEDS has just issued its thirtieth annual report which includes, as well as an historical outline of its growth, particulars of the officers of the University, the Council, and the Advisory Committees. The report itself deals with the progress that has been made at the University during the last year and the changes that have occurred in the staff. The booklet concludes with appendices giving information on scholarships, examinations, and recent legacies and donations.

THE SOUTH-STAFFORDSHIRE AND WARWICKSHIRE INSTITUTE OF MINING ENGINEERS held a meeting in Birmingham on February 25 at which Mr. J. Ivon Graham read a paper on "The self-heating of coal and its control underground." The time had come, he said, when there should be a review and further investigation of the subject of spontaneous combustion in mines, a matter upon which a departmental committee reported in 1921. That investigation should include a record of the use of scientific methods for the detection of heatings and their control.

THE IMPORT DUTIES (EXEMPTIONS) (No. 4) ORDER, 1935, issued by the Treasury on the recommendation of the Import Duties Advisory Committee provides for the addition to the Free List as from March 1, of the following raw materials mainly required in the manufacture of drugs and medicinal preparations:—aloes; balsam of tolu; cassia pods and pulp; cochineal; damiana leaves; digitalis leaves and seeds, ergot of rye; ephedra stems and branches; gentian root; hembane (*hyoscyamus muticus*) leaves, stems and roots; henna leaves; hydrastis rhizomes; ipomoea (*orizaba jalap*) root; jaborandi leaves; jalap root; leptandra root; liquorice root; lobelia; orris root; podophyllum and Indian podophyllum rhizomes; quillaia bark; saffron (*crocus sativus*) stigmas and styles; sarsaparilla root; scammony root; senna leaves and pods; slippery elm bark; squills; stramonium leaves; tonquin beans; uva ursi (bearberry) leaves; valerian root; witch hazel (*hamamelis*) bark and leaves.

## New Chemical Trade Marks

Compiled from official sources by Gee and Co., patent and trade mark agents, Staple House, 51 and 52 Chancery Lane, London, W.C.2.

Opposition to the registration of the following trade marks can be lodged up to March 6, 1935.

**Rustine.** 556,253. Class 1. Anti-corrosives. The Vigzol Oil Refining Co. (London), Ltd., 14 Eastney Street, Greenwich, London, S.E.10. December 8, 1934.

Opposition to the registration of the following trade marks can be lodged up to March 13, 1935.

**Brenthamine.** 548,511. Class 1. Chemical substances, used in manufactures photography, or philosophical research, and anti-corrosives all being goods containing amines. British Dyestuffs Corporation, Ltd., Imperial Chemical House, Millbank, London, S.W.1. February 8, 1934.

**Stonifex.** 555,273. Class 4. Raw, or partly prepared, vegetable, animal and mineral substances used in manufactures, not included in other Classes. D. Anderson & Son, Ltd., Park Road Works, Park Road, Stretford, Manchester; and Lagan Felt Works, 62 Short Strand, Belfast, Northern Ireland. November 2, 1934.

## Forthcoming Events

### LONDON

- Mar. 4.**—Royal Society of Arts. "Factory Accidents—Their Principal Causes." G. Stevenson Taylor. 8 p.m. John Street, Adelphi, London.
- Mar. 4.**—Society of Dyers and Colourists (London Section). "History of the Worshipful Company of Dyers." A. H. Brevin.
- Mar. 4.**—Society of Chemical Industry (London Section). "A Review of the Technical Aspects of Industrial Solvents." Dr. T. H. Durrans. 8 p.m. Burlington House, London.
- Mar. 5.**—Pharmaceutical Society of Great Britain. "The Work of the Poisons Board." 8.30 p.m. 17 Bloomsbury Square, London.
- Mar. 6.**—Society of Glass Technology (London Section). "Stoppers, Caps and Closures." Symposium. London.
- Mar. 6.**—Society of Public Analysts. Annual general meeting. Dr. Bernard Dyer will deliver an address, giving reminiscences of the Society. 8 p.m. Burlington House, Piccadilly, London.
- Mar. 6.**—Institute of Metals. 26th Annual general meeting. 10 a.m. Hall of the Institution of Mechanical Engineers, Storey's Gate, London. Annual dinner and dance 7 p.m. Trocadero Restaurant, Piccadilly, London. Mar. 7. Annual meeting continued 10 a.m.
- Mar. 7.**—Chemical Society. Ordinary scientific meeting. 8 p.m. Burlington House, Piccadilly, London.
- Mar. 8.**—Institution of Petroleum Technologists (Students Section). "The Structural Conditions of Oil Accumulation in Europe." Symposium. 6.15 p.m. Aldine House, Bedford Street, Strand, London.
- Mar. 8.**—Royal Institution. "The Future of British Agriculture." Sir John Russell. 9 p.m. 21 Albemarle Street, London, W.1.
- Apr. 1.**—Society of Chemical Industry (London Section). "Developments in Non-ferrous Alloys." Dr. H. Moore. 8 p.m. Burlington House, London.

### BIRMINGHAM

- Mar. 7.**—Midland Metallurgical Societies. "Modern Super Hard Cutting Materials." H. Beeny. 7 p.m. James Watt Memorial Institute, Great Charles Street, Birmingham.

### BRISTOL

- Mar. 7.**—Society of Chemical Industry (Bristol Section). Annual meeting. Chairman's address. 7.30 p.m. University, Bristol.

### GLASGOW

- Mar. 8.**—British Association of Chemists. "Pages from an Analyst's Notebook." A. R. Jamieson. 7.30 p.m. Glasgow.

### LEEDS

- Mar. 4.**—Society of Chemical Industry. Joint meeting of Yorkshire Section and the Food Group. "The Physiological Aspects of Additions to Foodstuffs." Professor J. C. Drummond, E. B. Tughe, A. S. G. Huggett, A. Wormall. 7.15 p.m. Annual general meeting of the Yorkshire Section at 7 p.m. University, Leeds.
- Mar. 9.**—International Society of Leather Trades' Chemists (British Section). "Sampling of Sole, Belting and Harness Leathers." M. C. Lamb. "The Chemical, Physical and Colloidal Properties of Lecithin." Dr. Bruno Rewald. "Refractive Index of the Fibres of Vegetable Tanned Leather." Dr. R. H. Marriott. "Sulphuric Acid in Vegetable Tanned Leather." R. F. Innes. 10 a.m. University, Leeds.

### LEICESTER

- Mar. 8.**—Leicester Literary and Philosophical Society (Chemistry Section). "The Art of Pottery Making, Yesterday and To-day." Dr. John Thomas. 7.30 p.m. College of Technology, Leicester.

### LIVERPOOL

- Mar. 8.**—Society of Chemical Industry (Food Group) Joint meeting with the Liverpool Section. Symposium on "Meat." "The Proteins of Meat." Dr. E. C. Smith. "The Constituents of Meat Acting as Pointers of Change." L. C. Baker. "Post Mortem and Refrigeration Changes in Meat." Dr. T. Moran. 6 p.m. University, Liverpool.

### MANCHESTER

- Mar. 8.**—Oil and Colour Chemists' Association (Manchester Section). "Solvents and Plasticizers." Dr. T. H. Durrans. College of Technology, Manchester.

### NEWCASTLE-ON-TYNE

- Mar. 7.**—Annual joint dinner of Chemical and Allied Societies. Newcastle-on-Tyne.

### PRESTON

- Mar. 4.**—Institution of the Rubber Industry. "Cotton and the Rubber Industry." Fletcher Chadwick. Victoria and Station Hotel, Preston.

### SHEFFIELD

- Mar. 8.**—Institute of Metals (Sheffield Section). "Electric Annealing and Heat Treatment Furnaces." A. G. Lobley. 7.30 p.m. University, Sheffield.

### TROWBRIDGE

- Mar. 6.**—Institution of the Rubber Industry (West of England Section). "The Measurement of the Permeability of Rubber to Gases." Dr. S. Buchan. Town Hall, Trowbridge.

## Company News

**North Broken Hill.**—The payment is announced of 1s. 6d. per share, or  $7\frac{1}{2}$  per cent. This makes a total of  $27\frac{1}{2}$  per cent. to date for the year to June 30, 1935. For the whole of the year to June 30, 1934, a total dividend of  $27\frac{1}{2}$  per cent. was paid.

**New Transvaal Chemical Co.**—The report for the year to June 30 last shows a profit of £27,520, after charging expenses and adjusting subsidiary results (against £12,391 in 1932-33). After payment of the preference dividends and payment to board of £525, the balance forward is £7,462. There has been no ordinary payment since 1931.

**International Paint and Compositions.**—A preliminary profit statement for the year to December 31, 1934, shows that profits amounted to £102,434. Last year there was a profit of £91,209, after writing off bad debts and providing for tax and depreciation. A final dividend of 7 per cent. is to be paid on the ordinary shares, making 10 per cent. for the year, compared with 9 per cent. for 1933. Total dividends of 9 per cent. were also paid for each of the years 1932 and 1931.

**Du Pont de Nemours and Co.**—It is reported that in 1934 the turnover was 18 per cent. greater than in 1933, when in turn it had been 24 per cent. higher than in 1932. The gross profit was \$43,800,000, against \$37,260,000. Mainly owing to bigger dividends from the General Motors participation, the total profit was \$51,580,000, against \$42,420,000, or over 20 per cent. greater, permitting an increase in the dividend on the common stock from \$2.75 per share to \$3.10 per share.

**Monsanto Chemicals, Ltd.**—The first annual report and accounts covering the period from the date of incorporation (September 10, 1934), to December 31, 1934, show that the company took over the undertaking of Monsanto Holdings, Ltd., as from July 1, 1934. The profit for the six months to December 31, 1934, after providing for depreciation and taxation, was £41,999. Out of this there has been set aside to a capital reserve, representing the proportion of the profits earned prior to the date of incorporation, £16,336, and provision has been made for the proportion of the preference dividend accrued December 31, 1934 (£3,829), leaving a balance of £21,833, which the directors recommend be carried forward.

**United Water Softeners.**—The report for the year 1934 states that the profit for the year, after charging expenses, depreciation, fees, and tax is £15,078, against £8,892 for 1933. Balance brought forward from last year was £5,694, from which is deducted amounts written off sums due by former subsidiary companies, viz., £5,337, reducing it to £357. The directors recommend dividend of 6 per cent., less tax, on ordinary shares; write off patents and licences, £2,572; to tax reserve, £1,200, leaving to carry forward, £3,043. Associated Company (from which no income has yet been received) shows a profit for 1934, against loss for 1933. Investment in this company represents half of issued ordinary capital. The directors have disposed of interests in subsidiaries. Proceeds will strengthen resources of company and provide additional funds for expansion.

## Chemical Trade Inquiries

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

**British India.**—A Parsi firm of manufacturers' representatives in Bombay are desirous of securing commission agencies for pure glycerine, medicinal drugs, chemicals, perfumery and toilet requisites, for the Presidency of Bombay. (Ref. No. 179.)

**France.**—An agent established at St. Amand-les-Eaux (Nord) wishes to obtain the representation, on a commission basis, of United Kingdom manufacturers of paints, dyes, enamel, etc. (Ref. No. 187.)

**United States.**—A firm in New York desires to get into touch with United Kingdom suppliers of malt and other raw materials for the brewing industry; also starch, peat and dextrine. Business is proposed on a basis of outright purchase or on commission. (Ref. No. 195.)

## Books Received

**Industrial Reorganisation.** Report of a discussion. British Chemical Plant Manufacturers' Association, London. Pp. 54.

### Official Publications Received

**The Yorkshire, Nottinghamshire and Derbyshire Coalfield.** West Yorkshire Area. The Beeston Group of Coals. Upper Beeston Seam—Part 1. London: H.M. Stationery Office. Pp. 104. 2s. 6d.

**Economic and Trade Conditions in the United States of America, December, 1934.** Report by H. O. Chalkley. London: H.M. Stationery Office. Pp. 174. 5s.