The Chemical Age

VOL. LXXVII No. 1956

5 January 1957

NEW YEAR HONOURS

(See page 10)

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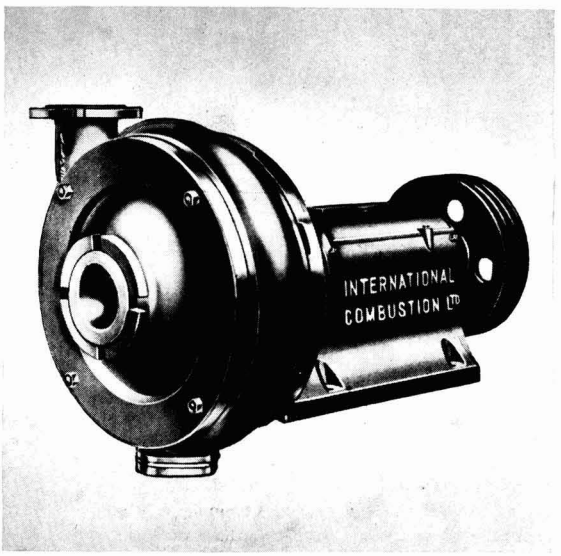

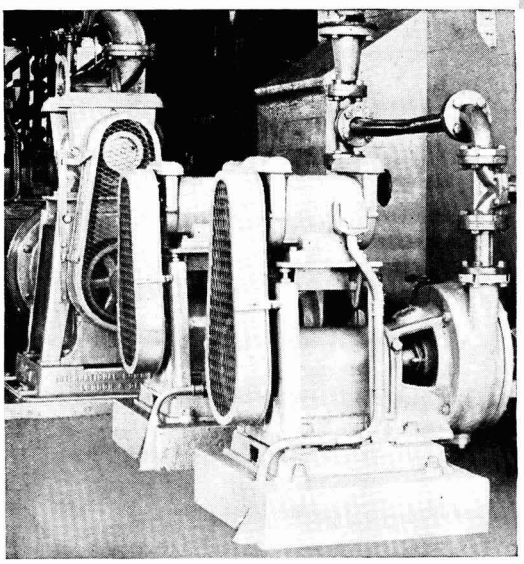

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TGA. V.10

INDEX TO ADVERTISERS

The first figures refer to advertisement in **The Chemical Age Year Book**, *the second to the current issue*

[*continued on page 4*

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VOL. LXXVII No. 1956

5 JANUARY 1957

The international weekly chemical journal covering every aspect of industrial chemistry and chemical engineering

OVERSEAS AGENTS

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THE CHEMICAL AGE

NEWS of the WEEK

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The annual subscription is 52s 6d ($7.40), single copies 1s 3d (by post 1s 6d). Overseas subscribers may send their subscriptions direct to London, or remit through any of our agents.

VIEWPOINT

Chemical Trade in Europe

RECENTLY PUBLISHED is the third study on 'The Chemical Industry in Europe' prepared by the OEEC Chemical Products Committee. It is based on the situation of the chemical industry as a whole in member countries and in certain sectors during 1955 and the first six months of 1956.

The report shows that chemical production in OEEC countries increased by 11.5 per cent in 1955 as compared with 1954, and the first six months of 1956 showed an increase of 6 per cent over the corresponding period of 1955. Also included is an analysis of the European situation in 1955 and the first six months of 1956.

Expansion of the chemical industry in 1955 continued at a higher rate than that of industry as a whole, the rates of increase of production being 11.5 per cent and 8.6 per cent respectively as compared with 1954. Compared with previous years, however, chemical industry's rate of increase as well as the difference between this rate and that of industrial activity as a whole showed a slight decline. This trend was most noticeable in the first half of 1956 when production was 6 per cent higher than in the same period in 1955 (as against 5 per cent for industry as a whole).

It is of interest to note that in the US, chemical production was 13 per cent higher in 1955 than in 1954, and 10 per cent higher in the first six months of 1956 than in the corresponding period of 1955. The difference between the rates of increase in US chemical industry and in industry as a whole, however, remains appreciable.

Employment of the chemical industry labour force (1,350,000) increased by only 5 per cent. This appears to indicate a marked increase in productivity when compared with the rise in production.

Chemical industry investments in 1955 amounted to about $1,100 million (2.8 per cent of the total invested by member countries that year), and were 23 per cent higher than in 1954.

International trade in chemical products increased (imports: + 15 per cent; exports: + 14 per cent) but liberalisation of trade between OEEC countries (+ 8 per cent) varied very little between 1 January 1955 and 1 January 1956. Prices did not vary greatly in 1955. Export prices in particular tended to decline in view of keen competition on world markets and this trend persisted at the beginning of 1956.

In trade with the dollar area, for which, incidentally, the balance sheet still shows a deficit on the European side, imports of the OEEC countries rose by 17 per cent and exports by 8 per cent. On the other hand, export trade with the other non-member countries increased by 16 per cent and imports by 12 per cent.

Use of production capacity was in most instances satisfactory, but in some industries, in particular that of soap, superphosphates and dyestuffs, only part of available capacity was used. In the soap industry in 1955, only 50 per cent of the capacity of member countries as a whole was taken up. The production ratio was normal, however, in the synthetic detergents industry. Production capacity for ordinary dyestuffs was inadequately employed in some countries and capacity for high-grade products was not kept as busy as in 1954. For OEEC countries as a whole, 70 to 75 per cent of phosphatic fertiliser capacity is used on the average. With increasing steel production, it appears there is little hope that sales of single superphosphates will markedly improve in the near future in those countries where competition from basic slag is strong.

Supplies of raw materials were not difficult for 1955 but there was some reversal at the beginning of 1956. What does appear to have given rise to special concern is the shortage of skilled labour and of highly qualified scientific and technical personnel.

Trends in the different sectors of European chemical industry show that greatest expansion occurred in the petroleum chemical industry in 1955, production then being one-third higher than in 1954. The industry in Europe plans to increase its size (measured by the investment represented by plants in operation) some one and a half times between 1956 and 1958. This, it is stated, should lead to the production annually in terms of total carbon content or about 557,000 metric tons of petroleum chemicals, in addition to the 1956 production of 509,000 metric tons. Important in the petroleum chemical expansion will be the new synthetic rubber plant as well as polythene, ethylene oxide derivatives, glycerine, aromatics and raw materials for plastics and detergents.

Continued increase in production has been less spectacular in the inorganic sector. For 1955 chlorine headed the list of all products studies (+ 12 per cent over 1954 figure). In the different groups of products, plastics materials and synthetic detergents increased in production in 1955 by over 20 per cent compared with 1954 production. In paints, varnishes, printing inks and related products, the rise in production was 10 per cent and for mastics, 33 per cent.

Last year, the progress expected in petroleum chemicals, plastics materials, synthetic detergents, nitrogenous fertilisers and paints and varnishes continued.

Conclusions drawn by the report are that in the near future, the chemical industry of Europe will continue to expand, although at a slower pace than in previous years, provided the general economic situation does not worsen.

NEW YEAR HONOURS

Chemical Industry Personalities Named by the Queen

AMONG those whose names appear in the New Year Honours list are: SIR JOHN COCKCROFT, *director*, AERE, Harwell (**O.M.**); DAVID S. ANDERSON, *director*, Royal College of Science & Technology, Glasgow, and FRANK G. C. FISON, *chairman*, Fisons Ltd., Ipswich (**Knights Bachelor**); R. H. PURCELL, *chief scientific adviser*, Home Office, London (**C.B.**); SIR CHRISTOPHER HINTON, *member*, UKAEA board (**K.B.E.**); S. CAHN, *managing director*, Goodlass Wall & Lead Industries Ltd., C. M. CAWLEY, *deputy chief scientific officer*, DSIR, A. T. GREEN, *director of research*, British Ceramic Research Association, O. W. HUMPHREYS, *director*, research laboratories, GEC Ltd., PROFESSOR R. E. LANE, *member*, Industrial Health Advisory Committee, I. F. LOUTIT, *director*, radiobiological research unit, Harwell, PROFESSOR W. V. MAYNEORD, London University and E. J. STURGESS, *chief engineer*, Shell Petroleum Co. Ltd. (**C.B.E.**); SIR HAROLD HARTLEY, *past president*, Institution of Chemical Engineers (**G.C.V.O.**); PROFESSOR E. W. TITTERTON, Australian National University (Nuclear Physics Department), Canberra (**C.M.G.**); C. BRIDE, *inspector of alkali and works*, Ministry of Housing & Local Government, J. W. CHRISTELOW, *SPSO*, National Physical Laboratory, DSIR, H. PHILLIPS, *director of research*, British Leather Manufacturers' Research Association and J. S. WILLIAMS, *director*, Coal Utilisation Council (**O.B.E.**); W. C. CROPPER, *group leader*, research laboratories, GEC Ltd. and H. I. W. GORDON, *test house manager*, Colvilles Ltd., Motherwell (**M.B.E.**); J. H. MATTHEWS, *labour officer*, Monsanto Chemicals Ltd. (**B.E.M.**).

Sir Harold Hartley, past president, Institution of Chemical Engineers, who receives the G.C.V.O.

UNION CARBIDE RESEARCH INSTITUTE

FORMATION of the Union Carbide Research Institute to engage in basic scientific research was announced on 13 December by Morse G. Dial, president of Union Carbide & Carbon Corporation. It will be located on the Corporation's Westchester property near Tarrytown, New York.

The Institute will be under the administration of Dr. Augustus Kinzel, vice-president — research — of Union Carbide. Dr. E. R. Jette, formerly head of the chemistry and metallurgy division at Los Alamos Scientific Laboratory, New Mexico, has been appointed director of the Institute.

Assisting Staff

Assistants are: Dr. S. R. Aspinall, formerly with the US Office of Naval Research, and Dr. A. J. Stosick, formerly division chief of the rockets and material division of the Jet Propulsion Laboratories at the California Institute of Technology.

A major purpose of the new Research Institute will be to contribute to the store of fundamental knowledge by studying the physical and chemical behaviour of matter under ordinary as well as extreme conditions of pressure and temperature. This work at the Institute will complement and extend the basic research now being carried on in the existing research laboratories of Union Carbide & Carbon Corporation. Facilities for the Institute are expected to be completed by spring of 1958, according to Mr. Dial's statement.

New Atomic Process

A POSSIBLE source of atomic power, requiring neither uranium nor the high temperatures of present thermonuclear reactions, has been reported by scientists at the University of California.

It has been found that a negative mu-meson has the power of pulling together nuclei of heavy hydrogen atoms and light hydrogen atoms to form helium atoms with the release of a large amount of energy.

The mu-meson at present used has too short a life to produce sufficient conversions for practical applications. If a similar particle having a comparatively long life, about 20 minutes, could be discovered, it might be possible to produce atomic energy on a commercial scale by the method.

Anti-Freeze Mixture

Scale Preventative and Eliminator Claim Makers

AN ANTI-FREEZE mixture (Amber anti-freeze 104), claimed both to prevent and eliminate deposits of scale, removing also at the same time all types of corrosion in the cooling system, is now being produced by Amber Industrial Chemical Treatments, 11a Albemarle Street, London W1.

The corrosive nature of ethylene glycols has long been known and all government and commercial compounds contain an inhibitor. In spite of this inhibitor, corrosion occurs in cooling systems and also at times scale deposits form.

Corrosion in Diesel cooling systems has been found to be due not only to the corrosive constituents of the anti-freeze and of the water, but also to vagrant currents which are generated from many sources, often when two different metals are joined, or from electricity generated by the motor. Corrosion due to these and similar factors causes pitting and opens the way for corrosion and metal failure.

Amber anti-freeze 104 is a solution of ethylene glycol, together with scale and corrosion preventive chemicals, which it is stated completely solve the corrosion problem by sequestration and *p*H correction.

Acrylate Ester Plant

CONSTRUCTION of a new acrylate ester plant at Pampa, Texas, has been started by Celanese Corporation of America.

With a capacity of 15 million pounds of acrylic acid esters per year, the plant is expected to begin production during the last quarter of 1957. Acrylic acid esters are raw material components for a wide range of end products, including paints, plastics, adhesives, synthetic rubber and finishes for paper, textiles and leathers.

The new facilities at Pampa represent the latest step in the Celanese chemical expansion programme, which also includes the recent completion of a new plasticiser and functional fluid plant in Point Pleasant, West Virginia, and construction of a new polyol production unit in Bishop, Texas.

Alcohols and other materials currently in large volume production by Celanese will provide raw material for the Pampa acrylate plant. The plant output will include a wide range of acrylic acid esters of maximum commercial importance, including methyl, ethyl and butyl acrylates.

NOTE & COMMENT

NERVE GASES

THE PROBLEM of detecting the nerve gases Tabun (dimethylamido ethyl phosphorocyanidate) and Sarin (isopropyl methylphosphoro fluoridate) which might be used in general chemical warfare, has recently been considered by J. Epstein, chief of the Sanitary Chemistry Branch, Biochemical Research Division of the US Chemical Warfare Laboratories (*Public Health Reports*, p. 955). Very small quantities of these gases on ingestion produce toxic symptoms. These gases can, therefore, be considered potential water contaminants. Tabun can be easily detected in water by taste, odour and chlorine-demand test, but specific detection methods are necessary with Sarin.

Dangerous concentrations of Sarin can remain undetected if only non-specific *p*H and chlorine-demand tests and tests for fluoride ion and phosphorus are used. However, correlation of these tests with others such as *p*H and the alteration of *p*H of water noted at various time intervals is considered helpful in the detection and estimation of the gas.

In the presence of their hydrolysis products, Sarin and Tabun can be detected and estimated rapidly, and in low concentrations by their reactions with benzidine or *o*-tolidine and alkaline peroxide solutions. By this reaction, quantitative estimation of as little as 0.1 p.p.m of Sarin in water is possible and it is considered that the method can probably be modified to increase sensitivity. This test has been adapted for field use and is now included in two Chemical Corp. water testing kits.

Three small species of fish, the fathead minnow (*Pimephales promelas*), the green sunfish (*Lepomis cyanella*) and the goldfish (*Carassius auratus*) are sensitive to Sarin and Babun and can be used to detect and, in some cases, estimate small concentrations of these nerve gases in water.

Destruction of the two gases in water can be accomplished by two methods, both of which are based upon an acceleration of the normal hydrolysis rate and involve chlorination or alkalinisation.

RUSSIAN ADVANCE

A RECENT number of *Science News Letter*, a publication of the US Institution for the Popularisation of Science, was largely devoted to studies of Soviet science. Russian scientists now have greater freedom than at any time since the 1930s. Twice as many students in science are graduating each year as in the US. The making of scientists begins early—in primary grades of elementary schools 30 per cent of the curriculum is devoted to science, 40 per cent in secondary schools. Last year 63,000 engineers graduated compared with 30,000 in 1952. In the same period, figures for Western nations have either fallen back or stayed at about the same level.

The new University of Moscow, a 32 storey skyscraper opened in 1953, has a staff of 2,300 teaching more than 9,000 students a year. It has 1,693 laboratories! Nor is Russian science isolationist. Russia translates from other languages more scientific texts than any other country. A permanent force of 1,800 translators and abstractors is aided by 13,000 scientists and engineers in part-time work in specialised fields. Thirteen abstracting journals in Russian are published—last year these journals together contained 400,000 abstracts, derived from 10,000 journals from 80 different countries. Special express services get news to industry within two or three weeks of receiving the foreign paper or article. Russian scientists are provided with complete translations of any foreign paper on request.

Scientists are better paid than most workers—better than other professional classes such as lawyers and doctors. They enjoy privileges usually given only to people in key Government posts. Insistence upon communist party membership or sympathy has been considerably eased in recent years. One restriction is that chemistry graduates must take and keep jobs allocated to them for the first three years after graduation. There is much less transition by Russian scientists to other kinds of work during their careers than in Western countries—scientists usually remain scientists and it is rare for them to change to business or administrative posts in industry.

Russia, says the Moscow reporter of *Science News Letter*, is determined to become the world's leading scientific and technological power—and her mass attack on this objective is greater than anything being done in the West.

Oil in Nigeria

AN exploration well near Afam, 20 miles east of Port Harcourt, Nigeria, has encountered oil and gas during the first stages of testing. Up to now, only the lowest prospective sand layer in the well has been tested and, until further layers higher up have also been tested the full potentialities of the well will not be known.

However, the preliminary results indicate that the discovery may be worth appraising by further drilling and a location for a second well is now being prepared.

At the site of a previous find, Oloibiri, test production of oil is expected to begin fairly soon in order to obtain information on the rate at which production is likely to fall off over the life of the reservoir.

People in the NEWS

● The President of the Board of Trade has appointed MR. J. D. STEWART, MR. IAN W. S. WILSON and MR. A. AUGUR EAST to be members of the Scottish Committee of the Council of Industrial Design. Mr. Stewart is managing director of Wyllie & Lochhead Ltd., Mr. Wilson is managing director of Pillans & Wilson Ltd., and Mr. East is managing director of East Brothers Ltd. and of John Scott & Co. Ltd.

● Deputy chairman and managing director of BP's German associated company, MR. JEAN ORNSTEIN, has been appointed an honorary Commander of the Order of the British Empire (CBE) for services to the British community in Germany. Mr. Ornstein, who is French, has had 44 years' service with the oil industry, most of it with the BP Group in France and Germany.

● The Steetley Co. Ltd. announces the following managerial changes: MR. S. BROOKE, who has rendered valuable services to the Oughtibridge Silica Firebrick Co. and the Cleveland Magnesite & Refractory Co. for 45 years retires from the managing directorship of the refractory brick division of the Group. DR. C. BOOTH has been appointed to succeed Mr. Brooke. MR. F. W. LEDGER, secretary of the Oughtibridge Co. retires after 49 years' service and MR. S. C. WALKER will succeed him. DR. W. C. GILPIN has been appointed assistant managing director of the seawater magnesia division of the Group.

● The directors of Powell Duffryn Ltd. announce that, as indicated in the chairman's statement to the shareholders at the annual general meeting on 19 September 1956, SIR HERBERT MERRETT, J.P., has resigned his position as chairman and director of the company with effect from 31 December 1956. From the same date, Sir Herbert is also resigning from the boards of the main subsidiary and associated companies of Powell Duffryn Ltd. The directors also announce that SIR HENRY WILSON SMITH, K.C.B., K.B.E., at present deputy chairman of the company, has been appointed chairman with effect from 1 January 1957.

● DR. RONALD HOLROYD, director in charge of research, has been elected a deputy chairman of Imperial Chemical Industries Ltd. with effect from 1 January 1957, in place of MR. A. J. QUIG, who is retiring after nearly 50 years' service with the company and its predecessors. There are two other ICI deputy chairmen: MR. S. P. CHAMBERS and SIR EWART SMITH. Dr. Holroyd joined the Alkali Division of ICI in 1928 and four years later moved to Billingham where he became closely associated with the development of the oil works. From oil research manager in 1936 he rose to divisional research director in 1947 and in 1951 became joint managing director of the Billingham Division. He was appointed to ICI main board in November 1952 and became research director in May 1953.

● All present employees of Monsanto Chemicals Ltd. who have served 25 years or more at 31 December, are being invited to a long-service dinner which will be held at Ruabon on 17 January. The following, who have become eligible since the last presentation, will receive their awards at the dinner: MISS L. BERHENDO, MISS H. C. JOY, and MRS. G. M. WISEMAN (London) and A. BAILIFF, L. BLUNT, J. N. CREWE, B. DAVIES, N. GEORGE, T. HEWITT, L. T. HUGHES, E. JONES, G. JONES, W. O. JONES, E. KELSHAW, E. W. PEARCE, J. H. PHILLIPS, J. TEAGUE, H. WILLIAMS and G. A. WRIGHT (Ruabon).

● The Yorkshire Dyeware & Chemical Co. Ltd. announces the appointment to the board of directors of MR. R. K. FOURNESS, chief dyestuffs chemist at the Kirkstall Road (Leeds) branch.

● MR. O. SECHER, joint sales director, Marchon Products Ltd., has now taken on the additional responsibility of chemical products sales, which has in the past been in the hands of MR. B. B. DUGAN. Mr. Dugan is emigrating with his family to South Africa, where he will continue his association with Marchon Products Ltd. by becoming a director of Chemical Services (Proprietary) Ltd., the company's agents in South Africa.

● MR. L. T. SAWNEY, M.C., was unanimously elected president of the Glass Manufacturers' Federation at its annual general meeting on 18 December. He succeeds MR. E. A. S. ALEXANDER, who has been president for the past three years. MR. A. W. CLARK, managing director of Beatson Clark & Co. Ltd., was elected chairman of the executive committee, and MR. I. B. THRONDSEN, managing director of Johnsen & Jorgensen Flint Glass Ltd., was elected vice-chairman of the executive committee.

● MR. E. F. PERKINS has been appointed managing director of International Minerals and Chemicals Ltd., London WC1. He succeeds the late H. A. VOSS.

● In the early part of 1957 MR. A. MELBOURNE, export sales manager of Joseph Crosfield & Sons Ltd., Warrington, will be making his third extensive overseas tour. The journey, which will occupy about 10 weeks, involves a round-the-world flight, and places to be visited include the Persian Gulf, India, Ceylon, Siam, Burma, Singapore, Indonesia, Hong Kong, Japan and New York.

● MR. A. H. KAYE, B.Sc., A.R.I.C., has been appointed technical development controller, fertiliser and heavy chemical division of Fisons Ltd.

● MR. C. E. EVANS, O.B.E., general manager of British Hydrocarbon Chemicals Ltd. at Grangemouth, Scotland, has been appointed general manager of the company with headquarters in London. MR. D. BLAIR WATT has been appointed works general manager at Grangemouth.

● MR. ROBERT B. CHADWICK, chief chemist of Craig & Rose Ltd., paint and varnish manufacturers, Edinburgh, has retired after 48 years' service with the company. He has been succeeded by MR. COLIN G. COCHRANE. Mr. Chadwick was presented with a mahogany grandmother clock by MR. HUGH ROSE, chairman of Craig & Rose Ltd., to mark his service.

Education Symposium

Papers to be Presented at I.Chem.E. Midlands Meeting

A SYMPOSIUM on chemical engineering education will be held by the Institution of Chemical Engineers in the new building of the Chemical Engineering Department, The University, Edgbaston, Birmingham 15 on 9, 10, and 11 April.

Papers will be presented under the following heads: 'The Requirements of Industry', 'Methods of Training', 'New Trends in Teaching Chemical Engineering', and 'Recruitment to the Profession'. Details are obtainable from the symposium manager, Chemical Engineering Department, The University, Edgbaston, Birmingham 15.

The symposium was among the subjects referred to by Mr. John A. Oriel, president of the Institution, when the Institution's new premises at 16 Belgrave Square, London SW1, were opened for inspection shortly before Christmas. Speaking on methods of developing the status of technical education as an inspiration to the youth of the country, the president announced the publication of a new booklet, 'Chemical Engineering—A Career.' Copies are obtainable from the Institution, price 2s each.

Exemptions from KID

THE TREASURY has made an order under Section 10(5) of the Finance Act, 1926, exempting the following chemicals from Key Industry Duty for the period beginning 27 December 1956 and ending 18 February 1957.

Synthetic organic chemicals, analytical reagents, other fine chemicals and chemicals manufactured by fermentation processes, the following: L-Arginine (substituted guanidine), L-Arginine monohydrochloride (a substituted guanidine compound), Ditert-butyl diperphthalate (a butyl ester), *S*-2:5-Dichlorophenylthiomethyl *OO*-diethyl dithio phosphate (an ethyl ester), *N*-Ethyl-3-piperidyl benzilate methobromide (a benzilic ester), *N*-Ethyl-3-piperidyl diphenylacetate hydrochloride (a diphenylacetic ester). This order is the Safeguarding of Industries (Exemption) (No. 9) Order, 1956, and is published as Statutory Instruments, 1956, No. 2006. Copies of the order may be obtained (price 2d net.) from HMSO, London WC2.

Change of Address

DERBY Luminescents Ltd. announces that its address is now 107 Old Broad Street, London EC2 (telephone MINcing Lane 5272).

German Shell

Expansion Plans for the Next Five Years

SOME £50 million to £60 million will be spent by German Shell over the next five years on plant expansion in Germany.

A refinery is to be built between Bonn and Cologne, close to the petrochemical plant jointly owned by Shell and Badische Soda. The refinery, which is to have a throughput of 3 million tons of crude oil, is scheduled for completion by 1960-61. Additional later expansion is planned to increase the capacity to 6 million tons of crude a year.

Shell's Hamburg refinery is to have its throughput capacity increased from 0.9 million tons of crude to 2.8 million tons a year. This work should be completed by the middle of 1958, at a cost of £25 million.

Jointly, Shell and Badische Soda will expand the olefine petrochemical works near Bonn, at a cost of £12 million to £13 million.

One-third of the capital required for these projects will be supplied by the parent company, another one-third is to be earned by German Shell itself and the remainder will be raised in the German capital market. It is stated that Royal Dutch Shell, as a first step, is taking over the entire new share issue of DM50 million (£4.3 million) thus raising the equity capital to DM300 million (£25.6 million).

Finishes for Leather

AT A MEETING of the West of England Group, SLTC, at Yeovil Technical College on 7 December, Mr. W. O. Nutt lectured on 'Modern Finishes for Leather.'

He said that during recent years a change had been made from heavy obliterative finishes to lighter ones which preserved the full grain pattern. Synthetic resin emulsions are now widely used as binders.

Differences in properties between acrylic and diene resins were described by Mr. Nutt, who then discussed the chemistry of both types and the effects of variations upon the properties of the resins.

In a review of the types of pigment suspension available, the lecturer described the conditions requisite to obtain an abrasion resistant finish and the effect of particle size.

Mr. Nutt advocated the use of the pigment to volume concentration figure (p.v.c.) as a means of control and he reported on the p.v.c. figure found for finishes in use on various classes of leather.

Castor Bean Oil

PRODUCTION of oil from the castor bean is to begin in the Federation of Rhodesia and Nyasaland. A site for a factory has been acquired in Fort Victoria. New hybrid seed developed in the US is being imported for distribution to farmers in the Federation and a guaranteed minimum price of £30 per ton will be paid for the crop. According to a director of the company which is promoting the new industry, castor oil has value as a lubricating agent for jet engines and in the manufacture of paint, plastics and nylon. The residue is said to make up valuable fertiliser with high nitrogen content. The factory at Fort Victoria will handle only the first stage in the production of oil—the husking of the bean, but later the complete process will be carried out.

Ambassador & Chairman

AMBASSADOR-to-be from the United States to the Court of St. James's, Mr. John Hay Whitney, is chairman of the board of Freeport Sulphur Co. which has strong trade ties with the United Kingdom.

The company is a major supplier, through F. W. Berk & Co., of sulphur for the British chemical, fertiliser and other industries. It is the oldest American sulphur producer.

In addition to this connection, Mr. Whitney has another link with the United Kingdom. His grandfather, John Hay, who was secretary to President Abraham Lincoln, was also at one time American Ambassador to Great Britain.

AEA Sales Section

THE Atomic Energy Authority has set up a commercial department within the Industrial Group, to handle sales of uranium, plutonium, thorium, graphite and other similar materials.

Manager of the new department is Mr. W. P. Warren. His address is UK Atomic Energy Authority, Industrial Group Headquarters, Risley, near Warrington, Lancs.

Radioisotopes, stable isotopes, and special requirements for small quantities of research materials will continue to be handled by the Research Group of the AEA.

Pitchblende in Rhodesia

PITCHBLENDE deposit near Umtali in Rhodesia is being investigated by UKAEA officials. It is not yet known how big the deposit is because a good deal of investigation has to be done before it can be proven.

DIARY DATES

MONDAY 7 JANUARY

SCI (London Section)
London: The Royal Society of Arts, 6 John Adam Street, Adelphi WC2. 6.30 p.m. Scientific Films.

TUESDAY 8 JANUARY

RIC (London Section)
Gravesend: Technical College, Mayfield Hall Annexe, Pelham Road, 7.30 p.m. Film: 'Corrosion in Action' introduced by P. A. Raine.

I.Chem.E. (London Section)
London: The Geological Society, Burlington House W1, 5.30 p.m. 'Solution of the Equations for Mass-transfer in Plate-type Distillation Columns' by H. H. Rosenbrock.

WEDNESDAY 9 JANUARY

SCI (Corrosion Group)
London: 14 Belgrave Square SW1, 6.30 p.m. 'Corrosion Problems in Nuclear Power Production' by A. B. McIntosh.

SCI (Microbiology Group)
London: Beveridge Hall, Senate House, University of London, 2.15 p.m. Discussion on 'Training of Microbiologists.'

SAC (Microchemistry Group)
London: 'The Feathers', Tudor Street, off Bouverie Street, Fleet Street, EC4, 6.30 p.m. Discussion meeting.

THURSDAY 10 JANUARY

CS, RIC & SCI
Edinburgh: North British Hotel, 7.30 p.m. 'Chocolate Manufacture with Special Reference to Cacao Constituents' by H. B. Brown.

SAC (Midlands Section)
Birmingham: Mason Theatre, The University, Edmund Street, 7 p.m. 'The Analytical Chemistry of Some Newer Insecticides and Herbicides' by K. Gardner.

FRIDAY 11 JANUARY

SCI (Fine Chemicals Group)
London: Chemistry Lecture Theatre, King's College, Strand WC2, 7 p.m. 'Problems in the Packaging of Fine Chemicals' by J. L. Winfield.

Oil & Colour Chemists' Association
Manchester: Engineers' Club, Albert Square, 3 p.m. 'Recent Work on the Mechanism of the Prevention of Corrosion by Paint Films' by C. C. Maitland and J. E. O. Mayne.

CIL to Boost Output

CANADIAN Industries Ltd. will install new continuous equipment at Shawinigan Falls, Quebec, works in order to increase by 30 per cent the production of packed (solid anhydrous) caustic soda. Present rate of production of packed caustic at the Shawinigan Falls plant is approximately 11,000 tons a year. The new installation, called 'anhydrous caustic concentrator,' will enable the plant to produce at least 15,000 tons annually. It will replace the present semi-continuous method of producing packed caustic from caustic soda solution. Completion of the installation is planned for late 1957.

Potassium Salts Factory

CONSTRUCTION of a new factory to produce potassium salts is being initiated by Societa Montecatini near Campofranco in Sicily. Raw materials will come from an ore bed situated between San Cataldo and Serradifalco. A portion of the salts produced will be sent to the Akragas-Montecatini factory at Porto Empedocle which produces potassium fertilisers, and the rest will be exported.

Societa Trinacria and Societa Edison, who have discovered potassium ore beds in other parts of Sicily, are to start similar undertakings.

Calcutta Office

AN OFFICE in Calcutta has been opened by the Head, Wrightson Export Co. Ltd., subsidiary of Head, Wrightson & Co. Ltd., Thornaby-on-Tees. The office, at 21 Netaji Subhas Road, Calcutta 1, will be the headquarters of the company's staff who are working on the Durgopur steel plant project.

New Titanium Co.

SOME $40 million has been invested by Allied Chemical and Dye Corporation and Kennecott Copper Corporation, both of the US, to form a new company which will produce and sell titanium metal. The new company expects to produce titanium sponge and billets by late 1958.

Turkish Sulphuric Plant

A SULPHURIC ACID PLANT attached to the copper refinery at Murgul, Turkey, was completed in October. It is reported to have cost TL 12.5 million. Annual capacity is 70,000 tons of acid. An extension is planned.

Price Stabilisation

Borax Unchanged Until End of March

IN a letter sent to its buyers in the UK on 28 December, Borax Consolidated Ltd. announced that it still intends to hold its prices in the UK firm to 31 March 1957, unless 'altogether exceptional factors make this impossible.'

Expressing 'great concern' at the continued increase in shipping and transport costs, the statement recalls that in August the company announced its intention to hold its prices firm in this country from 1 October 1956 to 31 March 1957, unless exceptional factors intervened. Since then, says the company, events in the Middle East have led to an increase in domestic delivery costs here which, although serious, is far overshadowed by the alarming rise in ocean shipping costs. These factors, coupled with an increase in American domestic and export prices, would normally have meant an increase of £3-£3 10s per ton in the company's UK prices. 'This,' adds the company, 'is a practical example of the present cost to one industry of price stabilisation.'

Atomic Programme

THROUGH its subsidiary company, the Gewerkschaft Werra, Weissenstadt Maximilianschütte AG claims to have developed a method of processing uranium ore which leaves only 2 per cent waste. Bavarian ores enriched to date will supply the reactors already planned with uranium fuel for five years.

Maximilianschütte AG, recently presented Minister President Hoegner with the first uranium rod made from ores mined in the Fichtelgebridge.

The graphite works in Kropfmühl have succeeded in mining a 45 per cent graphite which can be purified to almost 100 per cent purity, according to Secretary of State Herr Guthsmuths. It was hoped that Kropfmühl would be able to produce 100 tons of graphite every month.

Import Duties Exemptions

THE TREASURY has made the Import Duties (Exemptions) (No. 16) Order, 1956, which continues for a further period of three months ending on 26 March 1957, the exemption of titanium dioxide from duty chargeable under the Import Duties Act 1932.

The Order came into operation on 27 December 1956, and has been published as Statutory Instruments 1956, No. 2005.

ROBINSON BROS. RESEARCH

Mr. Stanley Robinson (second from left), chairman of Robinson Brothers Ltd., congratulates Mr. C. H. Savage, the architect, at the opening of the new research department. From left to right: Mr. B. W. Robinson, director, Mr. D. W. Parkes, M.C., B.A., B.Sc., F.R.I.C., chief chemist, Mr. H. W. Homer, A.M.I.Chem.E., chief engineer, Mr. Richard B. Robinson, B.A., (vice-chairman) and Mr. F. C. Rawstron, B.Sc., general manager

THE NEW research block of Robinson Bros. Ltd., West Bromwich, was officially opened on 14 December by the chairman of the company, Mr. Stanley Robinson.

An old two storey process and warehouse building which has been modernised and reconstructed now houses the department. The ground floor provides offices for chief chemist, engineers and secretarial staff, together with special rooms for spectrometer equipment.

The first and second floors are of similar layout with office for senior chemists, writing rooms, and balance room with two small and one large laboratory on each floor. There is also an annex with provision for fractionating columns up to 30 ft. high, and a library.

Research Pioneers

Robinson Bros. has been well known in the tar trade for many years, having started tar distillation in the middle of the last century. It pioneered research even before the 1914-1918 war, when two German chemists were employed, who explored fields far beyond tar products and included synthetic rubber from isoprene and synthetic resins from phenols among their activities.

Work was also done on horticultural products and the company later turned its attention to fine chemicals, the present research department being started at Oxford in 1920 and finally moved to West Bromwich in 1922, where it occupied the old tar laboratories, rendered vacant by the removal of the tar distillation process to Oldbury.

Research work continued on problems connected with the horticultural products manufactured at West Bromwich and was extended to other organic chemicals as well as those directly concerned with the distillation of tar. Work on coal tar ceased in 1946, when this was taken over by the Midland Tar Distillers, and attention has since been directed to extending the range of chemicals for the rubber and other industries.

Detergents & Sewage

AS REPORTED briefly in the issue of 22 December, the Minister of Housing and Local Government is to appoint a standing technical committee to secure that research is carried out on the destruction of detergents during sewage treatment.

The terms of reference of the committee will be as follows:

To keep under review the difficulties, or risk of difficulty, arising in sewage works, rivers and water supply as a result of the use of synthetic detergents.

To encourage and assist the co-ordination of appropriate research by manufacturers of detergents and intermediate materials, and by suitable public bodies, into methods by which these difficulties, or risk of difficulty, could, without an undue burden on public funds, be avoided or overcome.

And to report progress at least once a year.

Gypsum Project

LARGE-SCALE MINING of gypsum on Kangaroo Island, Australia, and the creation of a plaster plant at Port Adelaide to use the gypsum has been announced. Fred Ingham & Co. Ltd., plaster manufacturers have been granted a mining lease for 500 acres of swampland known as Salt Lake, 10 miles south-west of American River on Kangaroo Island. The lake is estimated to contain 2.5 million tons of gypsum.

Pyrites Prospects

Uncertain Future in Queensland

AN UNCERTAIN FUTURE in regard to local markets is suggested for pyrites produced at Mount Morgan, Queensland, by the *Australian Financial Review*. The *Review* states that it would be unfortunate for pyrites to revert to a valueless material (unpayable marginal ore) after hopes that the Australian fertiliser industry would provide an outlet for it.

During the Second World War, Australia's isolation from cheaper overseas elemental sulphur stocks encouraged the exploitation of its own pyrites as a substitute source for sulphuric acid production, to be used mainly by fertiliser manufacturers. New plants were in consequence established and a bounty was given to help the fertiliser manufacturers foot the bill.

Now that the situation has changed, however, the sulphur intake from Italy and other places has risen in the two years to last December by 49,201 tons, or 33.6 per cent, to 195,482 tons. Imports this year have apparently been reduced, due to a lowered demand for superphosphate as a result of excessive rainfall, smaller rural earnings and hence tightening of credits for pasture improvement etc.

Films & Automation

A MEETING on 'Films and Automation' will be held by the Scientific Film Association on 21 February 1957 at the Messanine Cinema, Shell-Mex House, Strand, London WC2. The meeting commences at 6.30 p.m. and the principal speaker will be Mr. S. B. Bailey of the Intelligence Division of DSIR. A selection of films on the subject will be shown. Applications to attend should be addressed to the General Secretary of the Association at 164 Shaftesbury Avenue, London WC2.

Atomic Information

A COMPREHENSIVE extension of the information on atomic energy which may be freed from security restrictions has been agreed upon by the UK, the US and Canada.. As a result a considerable volume of material to assist the peaceful development of atomic energy will become available.

Aspects of nuclear power covered by the amended declassification guide to which the three countries work embrace ore recovery and fabrication of fuel elements, and the design and operation of plants for chemical recycling of spent fuel from civilian power reactors.

CHEMICALS IN BELGIUM

Expansion Programme Planned for Carbochimique SA

ONE of the most important Belgian chemical producers is Carbochimique SA at Tentre, Hainaut, which employs nearly 1,500 persons. Founded in 1928, its capital has risen from 170 million Belgian francs to 309 million Belgian francs, in realisation of important expansion plans during the last four years. Thus, ammonia production capacity, which was 190 tons a day at the end of 1955, has risen by 240 tons a day, double the output in 1947. This capacity will be still further increased by the construction of a supplementary unit, thereby increasing production to 300 tons a day. Hydrogen supplies for this new unit will be obtained, for the present, from heavy petroleum oils, and, subsequently, from coal.

Carbochemique is, of course, situated near the important coke ovens of Borinage and consumes considerable coking-plant gas. Ammonia fixation plants have been developed alongside these ovens. There are installations, also, for the manufacture of nitric acid—which should soon reach an output of 420 tons a day—and ammonium sulphates and nitrates. Production of these last two has quadrupled since 1948. A plant for the production of fertiliser compounds which was set up in 1951-52 will be enlarged due to the rapid progress of fertiliser sales.

The increase in capital of 103 million Belgian francs is bespoken for the setting up of plants which will produce urea and ammonium sulphonitrate. These contain nitrogen in a more highly concentrated form than the classic fertilisers produced in Belgium up to the present time.

Carbochimique is expanding its activities in the field of ethylene products, production of which have doubled since 1947. In 1950, the company started jointly with the Société Belge de l'Azote at Liege a company—Tensia—to sell surface-active products and detergents produced by Carbochimique and Société Belge de l'Azote. This side of its activities has developed very rapidly, due to the growing demand in Belgium and abroad for these products.

Finally, Carbochimique in 1955 took over a neighbouring company, Les Colorants de Tertre (Tertre dyestuffs) and has enlarged the range of dyes produced. This development has been favoured by the important Belgian textile industry as well as by a very appreciable export market.

SPECIAL COURSE AT HARWELL

NEW opportunities for industry to acquire basic knowledge of nuclear energy are offered by a special course which has been arranged at the Harwell Reactor School.

The standard Reactor School course is one of 14 weeks' duration giving instruction primarily in reactor physics and engineering. Present arrangements enable some students to attend only the first six weeks of this course, during which time the basic principles of these subjects are taught, but the numbers of these students have had to be limited because the demand for places on the standard course has been high.

From 3 June to 12 July next a special six weeks' course is to be run entirely separately, and some 60 places will be available. Besides covering the basic principles of the physics and engineering of reactors, lectures will be given on such subjects as reactor metallurgy, shielding and health physics. In addition, emphasis will be placed on special topics such as the instrumentation of reactors and the use of radioisotopes in industry. The latter topic is not included in the standard Reactor School course.

This special course is designed primarily for people of degree standard who are not directly concerned with overall reactor design. It should appeal especially to members of firms whose interest lies in the making of ancillary equipment for reactors.

Application forms for places may be had on request from the Reactor School, AERE, Harwell, Berks. The students who are to participate will be selected at the beginning of March 1957.

Fertiliser Plant for Pakistan

IT IS REPORTED that the Japan Plant Export Association is considering plans to export two fertiliser plants valued at Y.38,000 million to Pakistan. Destined for West Pakistan is a plant with a daily capacity of 100 tons of urea and ammonium nitrate. To East Pakistan will go a 50-ton daily capacity plant.

The plants will take some two and a half years to construct.

Anti-Corrosion

Interesting Product Developed by Southampton Firm

A METAL PRIMER for stopping rust on iron and steel, Glopane Universal, is announced by Corrosion Ltd., of Southampton. It is claimed that Glopane Universal, which is a zinc-based material, can be painted on iron and steel in wet, damp, and dry weather, and can be applied under water if necessary.

Glopane Universal adheres to damp surfaces, and dries to give a tough rust-resisting finish. Brushed onto wet steel, Glopane Universal dries hard in about 24 hours to withstand abrasion, leaving a tough coat of zinc that renders any rust inert, and incapable of developing further, and protects the structure from breeding any more rust. Coverage is approximately 24 sq. ft. per lb. to give an average one-coat application cost of 1½d per sq. ft. The finish is battleship grey which becomes a shiny metallic surface after weathering. Most types of paints, excluding bitumens, can be applied over Glopane Universal to match surrounding colour schemes.

World Power Conference

SEVENTEEN PAPERS dealing with various aspects of power will be submitted to the sectional meeting of the World Power Conference 1957 by the British National Committee. The meeting is to be held in Belgrade early in June. Among the papers will be the following: 'Review of the Production of Combustible Gas from Low-Grade Fuel and Agricultural Wastes' by R. W. Rutherford and F. F. Rixon; 'Underground Gasification in Great Britain' by C. A. Masterman; 'Design Problems for Nuclear Power Plants' (provisional title) by Dr. H. S. Arms; 'Steam and Power Generation in the Metallurgical, Chemical and Allied Industries (provisional title) by G. Cooke.

US Nickel

NEGOTIATIONS are progressing on the nickel expansion programme which is designed to provide an extra 140 million lb. for the US in three to five years' time. The new mine at Moak Bay, owned by the International Nickel Co. of Canada will produce, when in operation, between 50 and 60 million lb. per annum.

It is stated that the US Administration has decided that there is no need to supplement incentives such as fast tax write-offs, long term contracts and premium price offers, by government loans to nickel producers.

by
R. G. Barradas

Chemical Aspects of Pyrethrum Analysis–Part II

THE METHODS of pyrethrum analysis discussed in the preceding part of this review were essentially based on the more classical principles of analysis. Colorimetric methods are more subject to interference by extraneous substances than titrimetric, gravimetric, or gasometric procedures. Colorimetric reactions are also, generally, less selective and their measurements are less precise than classical methods, but they have gained great favour with analytical chemists where the substances for determination are present in small amounts or, alternatively, when the samples themselves are small.

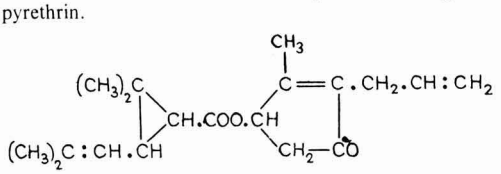
In the case of micro or semi-micro amounts of substances to be determined colorimetrically in a bulk of foreign material the errors incurred are not very significant. A large number of papers has appeared in the literature on the colorimetric methods of estimating pyrethrins. Most of these methods possess the advantage of speed of performance.

Edwards and Cueto (**26**) described a colorimetric reaction which involved the reaction of the pyrethrins with hydroxylamine to form a hydroxamic acid, which was then allowed to react with ferric chloride resulting in the formation of a coloured complex. The coloured complex was evaluated by the use of a photoelectric colorimeter.

This method had been adapted to the estimation of the pyrethrin content of paper bag coatings. Pyrethrum-treated paper bags have been extensively used for the storage of foodstuffs, and the development of this colorimetric analytical procedure for estimating the content of the pyrethrins is of value in the control of their manufacture and also as some indication of the stability of the pyrethrins during the storage of the bags. The method is not specific for the insecticide and is only applicable to uncontaminated pyrethrin-coated bags. Esters and fatty acids from the stored food products cause interference in the development of the colour and the method usually gives high results.

Differences in the ratio of pyrethrin-I to pyrethrin-II also introduce variations in the results.

A colorimetric determination of pyrethrins, allethrin and furethrin was proposed by Dale and Cueto (**27**). Allethrin is the trivial name for allyrethronyl chrysanthemate, a viscous oil and a synthetic analogue of pyrethrin.



Allethrin

Furethrin is the analogue of allethrin in that it contains the furfuryl group as the side chain in the cyclopentenolone component. It has been reported as having the same order of toxicity to house-flies as the pyrethrins. Gersdorff and Mitlin (**28**) assessed the relative order of toxicity to houseflies as allethrin: furethrin: pyrethrin. Dale and Cueto's method of determination was applied to paper or cloth bags treated with the three insecticides.

The insecticides were isolated by extraction of the samples in a Soxhlet apparatus using ethyl alcohol as the solvent. A one per cent solution of sodium sulphide was added to the alcoholic solution of the insecticide and the mixture was heated to $70 \pm 5^{\circ}C$ for exactly 15 minutes. The absorbancy of the orange to red colour produced was measured after 10 minutes spectrophotometrically at 540 $m\mu$. The amount of the insecticide was calculated by reference to a suitable calibration curve, and Beer's law was found to be obeyed for 0.5 to 10.0 mg. of pyrethrins, allethrin, and furethrin. The average experimental error was approximately four per cent and the method was sensitive to 200 μg. of the insecticides. The method could only be applied, however, if it was known which of the three insecticides were present in the sample. If more than one of the three insecticides were present it would be impossible to determine the concentration of each one specifically.

Chemistry of Allethrin

The large scale manufacture of allethrin, its higher toxicity than pyrethrins, and its wide application as an insecticide for the protection of stored grains, in aerosols, in dairy and livestock sprays etc. are perhaps good reasons for the inclusion of a short digression on some aspects of its analytical chemistry in this review.

One of the most highly selective methods put forward for the determination of allethrin was that of Hogsett, Kacy, and Johnson (**29**). This group of authors attempted unsuccessfully to measure quantitatively the ester, carbonyl, and unsaturated groups using conventional functional group determinations or modifications. Their proposed method was based on the reaction of allethrin with ethylenediamine, which gave a product which could be titrated in a non-aqueous medium. The sample of allethrin was allowed to react with ethylenediamine for two hours at 25-30°C to form a quantity of chrysanthemum acid stoichiometrically equivalent to the amount of allethrin present. The chrysanthemum monocarboxylic acid formed was determined by titration with a standard solution of sodium methylate in pyridine.

In a pyridine medium, ethylenediamine is neutral to thymolphthalein, but most organic acids are distinctly

acidic and can be quantitatively estimated by titration with standard sodium methylate in pyridine. Chrysanthemum monocarboxylic acid, its anhydride, and acid chloride also react quantitatively and must be determined independently and corrections applied to obtain the true allethrin content of the sample under test.

The acid chloride was determined by treating the sample with methyl alcohol and titration of the hydrochloric acid formed with a standard solution of potassium hydroxide in methyl alcohol using a mixed dimethyl yellow-methylene blue indicator. Chrysanthemum monocarboxylic acid and the acid chloride were determined by titration with an ethanolic solution of sodium hydroxide using α-naphtholbenzein as indicator. The chrysanthemum monocarboxylic acid anhydride and the acid chloride were determined by reaction with a measured excess of morpholine in methyl alcohol, followed by the titration of the excess of morpholine with methanolic hydrochloric acid using the dimethyl yellow-methylene blue indicator.

New Procedure

From these four titrations the amounts of allethrin, chrysanthemum monocarboxylic acid, acid chloride and anhydride could be calculated. The method is applicable to the determination of esters of other β-alcohols, and is a new procedure for the determination of acid anhydrides in the presence of their corresponding acids.

Moore (**30**) described a colorimetric method using 2,4-dinitrophenylhydrazine for the assay of pyrethrins and allethrin concentrates. A quantity of the sample to be tested, containing approximately 40 mg. of the active material, was dissolved in 15 ml. of a 10 per cent v/v solution of sulphuric acid in carbonyl-free methanol. 120 to 150 mg. of 2.4-dinitrophenylhydrazine powder were added to the solution. The mixture was heated at 80°C for about 20 minutes in a closed flask, cooled, and transferred using 20 ml. of ether to a separator, and extracted with successive 15, 15, and 10 ml. portions of water. The combined aqueous extracts were extracted with two 20 ml. portions of ether, and each extract was washed with two 10 ml. portions of water. The combined ethereal solutions were evaporated to a low volume and diluted with 25 ml. of dry benzene. The evaporation was continued until the benzene started to distil, and the solution was cooled and further diluted with an equal volume of light petroleum ether.

Chromatography

The mixture was chromatographed on a 2.5 cm. diameter column filled with alumina prepared by adding it as a slurry in a benzene-light petroleum ether mixture (1:1). The chromatogram was developed with the solvent mixture until the orange allethrin derivative reached the bottom of the column when it was eluted with a mixture of one part benzene to two parts of light petroleum ether. Polymerised material remained as a brown band above a dark band of 2.4-dinitrophenylhydrazine at the top of the column but other impurities passed through the column as a yellow fraction.

The bulk of the light petroleum was evaporated off *in vacuo* from the eluate, which was then diluted to 100 ml. with dry benzene. A 10 ml. aliquot was further diluted to 100 ml. with dry benzene. The optical density was measured in a suitable photometer using a one cm. cell and a blue-green filter against benzene as a blank, and the amount of allethrin in the sample was then derived by reference to a calibration curve prepared by using standard solutions of allethrin. Pyrethrin equivalents were obtained by multiplying the allethrin figures by a factor of 1.07. Comparative determinations indicated that this method gave consistent and accurate results which were rather lower than those obtained by the AOAC method.

Shukis, Cristi, and Wachs (**31**) described a rapid ultra-violet spectrophotometric method for the determination of total pyrethrins in pyrethrum flowers and extracts. The ultra-violet absorption was measured at 227 mμ. This method was rapid and capable of giving results of excellent reproducibility, but precautions were necessary to avoid even traces of impurities. The method was based on that of Beckley (**32**) whose results were dependable to 0.05 per cent.

Beckley extracted pyrethrum powder with petroleum ether in a Soxhlet apparatus for eight hours. The extract was allowed to stand overnight so that any waxes would crystallise out. It was then filtered and made up to volume. An aliquot was withdrawn from which the petroleum ether was evaporated because it was opaque to ultra-violet light of the wave-length used. The residue was then taken up in alcohol, diluted to standard volume and examined spectrophotometrically. In a later paper Beckley (**33**) discussed further details of his method. A notable point was that the petroleum ether which had been recovered and re-used repeatedly gave high results. This was apparently due to the accumulation of volatile material in the solvent. The material could be eliminated by heating and blowing with air.

Three Methods

Three methods were given for the determination of allethrin or pyrethrin in solutions, in flour, and in impregnated paper or cloth bags in a paper entitled 'Estimation of micro quantities of pyrethroids' by Schreiber and McClellan (**34**). Before the determination, the pyrethroids (chrysanthemumic and pyrethric esters of alkylcyclopentenolones) were extracted from the flour by light petroleum and from the paper by normal butanol. The solutions were then refluxed with 3-5 ml. of 0.1N ethanolic sodium hydroxide solution. A 10 per cent solution of barium chloride was added, and the solution mixture was filtered after it had been allowed to settle for a short while. The filter was washed with water and the combined filtrates were acidified with sulphuric acid. The filtration was repeated through a Celite-coated paper, and the filtrate was extracted with light petroleum ether.

The extracts were evaporated almost to dryness, and the remaining solution was transferred to a colorimeter tube. The light petroleum ether was evaporated and five ml. of mercuric oxide reagent (1 g. HgO in 120 ml. of 33 per cent sulphuric acid) were added. The reading was taken in a Klett-Summerson colorimeter with No. 54 filters, and a calibration curve was prepared with pure chrysanthemum monocarboxylic acid.

CHEMICAL ASPECTS OF

PYRETHRUM ANALYSIS

One of the simplest and most rapid colorimetric methods for the determination of total pyrethrins is that proposed by Estrada and Levy (**35**). The method consisted of taking 1.0 ml. of the extract (diluted if necessary with kerosene) containing 0.2 to 1.0 mg. of total pyrethrins, and adding 3 ml. of sulphur-carbon tetrachloride reagent followed by 3 ml. of sulphur-potassium hydroxide reagent. The mixture was then shaken for 15 seconds. The sulphur-carbon tetrachloride reagent was prepared by dissolving 2.5 g. of flowers of sulphur in carbon tetrachloride without heating, and diluting to one litre. The sulphur-potassium hydroxide reagent was prepared by dissolving 0.25 g. of flowers of sulphur in one litre of N anhydrous alcoholic potassium hydroxide solution. The solution was centrifuged when necessary and had to be protected from both air and moisture.

The mixture of the extract and the two sulphur-containing reagents was placed in a stoppered tube on a water bath maintained at 30±0.5° C for exactly 73 minutes from the time of mixing. A small amount of filter acid was added and the mixture was filtered within a time limit of two minutes. After a total time of 75 minutes from the time of mixing, the light absorption was measured at 560 mμ against a blank of kerosene similarly treated.

To Correct for Colour

To correct for the original colour of the extract, the above procedure was repeated, including the blank determination, using three ml. each of carbon tetrachloride and potassium hydroxide without the sulphur. From the difference between the two absorptions the total amount of pyrethrins in the sample was derived by comparison with standard samples. For small amounts of total pyrethrins (0.04 to 0.2 mg.) the light absorption should be measured at 440 mμ. The authors claim that synergists and dicophane did not interfere with the determination.

Kelsey (**36**) made a comparative study of various methods for the determination of the pyrethrins. He compared the spectrophotometric method of Shukis *et al.* (**31**), the ethylenediamine method as used in the determination of allethrin by Hogsett *et al.* (**29**), and the official mercury reduction method of the AOAC. Kelsey showed that the spectrophotometric method was not very satisfactory in the assay of Kenya and Congo pyrethrum concentrates. The other two methods gave reasonably comparable results. Kelsey also reported that the Estrada and Levy method (**35**) gave results almost identical with the AOAC method on Kenya pyrethrum flowers but somewhat lower results with the Congo flowers.

Several papers dealing with qualitative chromatographic methods for the separation of the two pyrethrins have appeared within recent years. One of the more notable is that of Ward (**37**) who described a chromatographic procedure for the separation of pyrethrin-I and cinerin-I from pyrethrin-II and cinerin-II. Bergamini and Versorese (**38**) described the chromatographic identification and estimation of active ingredients in pyrethrum extracts. The work of these authors is interesting in that they describe a method for the separation of pyrethrin-I and pyrethrin-II in pyrethrum extracts by means of circular chromatography.

Pyrethrin-I was found to be more mobile and yielded on development with Deniges' reagent a pink band which rapidly changed colour to red, purple and brown. Pyrethrin-II yielded a distinct yellow band when heated to 70° C for about seven to 10 minutes. This yellow colour was found to be stable for about one hour. The sensitivity of this method was approximately equal to 30 μg. The method could be made quantitative for pyrethrin-II by measurement of the total optical density. In a study of the chromatography of pyrethrum extracts, Brown, Phipers and Singleton (**39**) suggested that the first step in the analysis of pyrethrum should be the removal of 'false' pyrethrins. True and false pyrethrins were separated on an alumina chromatogram by using one part of ether to three parts of light petroleum ether (b.pt. 40-60° C) as the eluent. The true pyrethrins passed through the column and could be analysed spectrophotometrically, or by the Seil or the mercury reduction methods.

Enlightening Factors

Brown and Phipers (**40**) reported further enlightening factors which gave rise to errors in the analysis of pyrethrins. They studied the discrepancies between Seil's titrimetric method and the spectrophotometric method of Shukis *et al.* They discovered that light caused a degradation of the pyrethrins or at least of some materials which were named 'false' pyrethrins.

The instability of the pyrethrins towards artificial light was studied. Films of pyrethrinoid material were prepared by allowing the solvent from a light petroleum ether solution of the material to volatilise from a Petri dish in darkness for 16 hours at 30° C. It was then irradiated for 30 days by placing it 18 inches below two 300W tungsten-filament lamps. The sample was then divided into two fractions: soluble and insoluble in petroleum ether, and analysed by Seil's and Shukis' methods. The results using the two methods showed no agreement. Brown and Phipers suggested that the products causing the discrepancy might be (a) esters of true chrysanthemum acids and degraded pyrethrolone or (b) degraded chrysanthemum acids and the true pyrethrins or (c) esters degraded in both portions of the molecule.

Cornelius' Assay

A very sound and practical quantitative chromatographic procedure for the determination of pyrethrins in pyrethrum extracts was that described by Cornelius (**41**). The method was suitable for the assay of pyrethrum extracts in *n*-hexane, and pyrethrum extracts in mineral oil could be assayed after removal of the solvent. Cornelius standardised the activity of the alumina in his chromatographic column by means of Sudan yellow and Sudan red, which were also used as marker dyes in the subsequent separation of the pyrethrins. The pyrethrum extract in *n*-hexane was added to the column with the mixed dyes solution and the column was eluted with *n*-hexane containing 10 per cent of ethyl ether.

Collection of the pyrethrin-I eluate was started when

PYRETHRUM ANALYSIS

the Sudan yellow reached the base of the column, the activity of the column having been adjusted so that with 70-95 ml. of the eluate the Sudan red would have reached the base of the column. The eluate was finally adjusted to 100 ml. Elution of the pyrethrin-II was then started with *n*-hexane containing 20 per cent of ethyl ether and 200 ml. were collected. One hundredth of each fraction was deprived of solvent and the residue was dissolved in aldehyde free ethyl alcohol (20 ml.). The optical density of the solution was then determined at 224 mμ for pyrethrin-I and at 229 mμ for pyrethrin-II. E_1cm. × 17.85 gave the weight in milligrams of pyrethrin-I and E_1cm. × 20.39 gave the weight in milligrams of pyrethrin-II placed on the chromatographic column.

The factors given by Cornelius were empirical since they were based on parallel determinations by a mercury reduction method. It should be noted that crude pyrethrum extracts contain plant pigments that separate in the eluates but do not interfere seriously with the use of marker dyes. The reproducibility of this method was found to be scarcely inferior to that of the mercury-reduction method and it had the advantage of being more rapid.

Most popular methods of analysis are undoubtedly the Seil, mercury-reduction, and spectrophotometric procedures. Polarographic methods have also made their appearance in the scientific literature but, despite the claims of their authors, they are not yet superior in technique and accuracy to the existing methods. In this connection attention of readers is drawn to the polarographic method developed by Ohno and Oiwa (**42**).

(Concluded)

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(**37**) Ward, *Chem. & Ind. (Rev.)*, 1953, 586.
(**38**) Bergamini & Versorese, *Sperimentali*, 1954, **5** (1-2), (6-10).
(**39**) Brown, Phipers & Singleton, *Pyrethrum Post*, 1954, **3** [3], 3.
(**40**) Brown & Phipers, *ibid.*, 1955, **3** [4], 23.
(**41**) Cornelius, *Analyst*, 1954, **79**, 458.
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Terylene Production Increase

IMPERIAL Chemical Industries Ltd. is to increase production of Terylene polyester fibre to 30 million lb. a year by extending sections of the plant at Wilton in North Yorkshire. Work is likely begin in the spring.

This increase, says the company, in the annual capacity of the plant from the present rate of 22 million lb. is an interim measure to keep pace with the increasing demand for Terylene, particularly for the production of skirts, trousers, suits, ties, curtains and stockings as well as for industrial uses.

ZIRCONIUM RECOVERY

Method from Impure Sponge

AN ESSENTIAL CONSTRUCTION MATERIAL for atomic furnaces is zirconium because of its strength and corrosion resistance. Also the fact that it does not absorb particles needed to sustain a chain reaction makes it an ideal material for structural use in reactor cores.

Unfortunately zirconium is one of the most difficult metals to work with, for it oxidises easily and when molten will flare in ordinary air. It has, therefore, to be melted in a vacuum, with a covering of steel to protect it from the atmosphere during hot forging or rolling.

It is of interest to note that the US Department of the Interior has announced plans to develop a method of recovering zirconium from impure sponge metal, mill scrap and zirconium alloys. This research project, to be financed by the US Atomic Energy Commission at a cost of $110,000, is to be undertaken by the US Bureau of Mines at Boulder City, Nevada. An electrorefining process will be investigated. With this method, various grades of scrap, off grade sponge and certain zirconium alloys are fed into an electrolytic cell. When current is passed through the cell, the feed metal is dissolved and relatively pure zirconium is deposited on the cathode plate.

Development of a commercially feasible electrorefining process would make more zirconium metal available for use in building atomic reactors. Also, material now lost in producing, manufacturing and machining zirconium could be recovered, thus helping to reduce the metal's price and stimulating its use in other fields.

Tanker Terminal in Wales

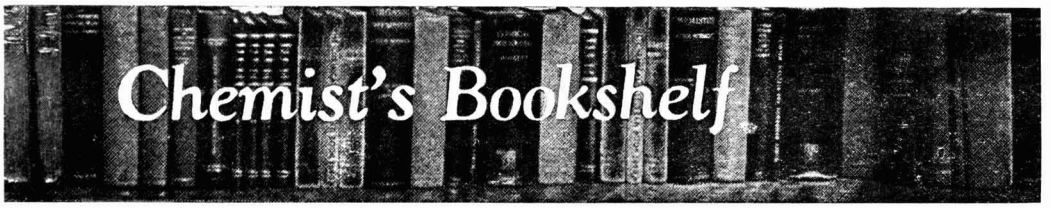
FURTHER details have been given of BP's proposed crude oil tanker terminal on the south shore of Milford Haven. The terminal would be connected with Llandarcy refinery by a 60-mile buried pipeline, capable of carrying five million tons of crude oil a year.

The terminal's jetty would have two berths and would be able to receive the largest tankers. Vessels would discharge their cargoes direct into a transfer pipeline connecting with a tank farm at the south east corner of Angle Bay. One main pumping station, electrically operated, would be required to pump the crude oil along the pipeline to Llandarcy.

Construction work on the project cannot start until Parliament approves a Bill which will be introduced during the present session. If the Bill receives Royal Assent by July next, construction work would begin shortly afterwards.

Preservatives Described

USES OF Bonomold preservatives (said to have a wide application for the preservation of foods, leather articles, cosmetics, glues, pastes, machine oils, casein paints etc.), are described in a technical pamphlet recently issued by AB Bofors Nobelkrut of Sweden. Copies of the publication are available from the company's selling agents: Guest Industrials Ltd., 81 Gracechurch Street, London EC3.



PROCEEDINGS OF THE INTERNATIONAL CONFERENCE ON THE PEACEFUL USES OF ATOMIC ENERGY. VOL. 15. APPLICATIONS OF RADIOACTIVE ISOTOPES AND FISSION PRODUCTS IN RESEARCH AND INDUSTRY. *Compiled and published by* the United Nations Scientific Secretariate, New York. *1956*. Pp. 327. *54s.*

The information contained in this volume had, to a large extent, been declassified before the conference was held at Geneva. This, therefore, robbed these sessions of the conference of the glamour of spectacular disclosures. However, these papers are necessary for the balance of meetings discussing the peaceful uses of atomic energy. Of more importance to the reader is that he can find in one volume a most valuable and stimulating review of the wide applications which radioactive isotopes and fission products find in research and industry.

One of the more recent applications discussed by the Americans utilises the sterilising effects of radiation. Prepacked medical dressings, gauzes and so on have been sterilised successfully and this process appears economically preferable to the conventional steam method. In the treatment of food, the problem is how to overcome certain undesirable changes in flavour, colour and texture.

Another interesting series of papers describes experiments attempting the direct conversion of radiation into electrical energy. Efficiencies obtained are very low and a limit to feasible applications is set by the cost of radioactive materials and the problem of providing adequate shielding for the equipment. However, this still presents an interesting possibility for utilising large quantities of fission products when they are available from full scale power production.

Under the action of gamma rays, polymerisation and certain other reactions have been induced. Paper P/168 outlines the design of a chlorination process using gamma radiation for the production of benzenehexachloride. Cost estimates given for the suggested flowsheet based on laboratory trials are of the same order as for more conventional methods. Again an important factor is the cost of the high intensity source.

As general tools in industry, radioactive methods for thickness measurement are well established. Hydraulic problems and wear have been most successfully investigated. Perhaps the most important industrial application at present, however, is that of radiography. A wide selection of radiations are now available at lower cost than from the more conventional industrial machines. Two papers (P/156 and P/383) describe the development of beta-ray excited X-ray sources in the energy range 20 to 200 kev. Previously, the only suitable source in this energy range was thulium-170 and so the possibilities for radiography of thin parts are extended.

In the research laboratory radioactive isotopes have proved most valuable in the investigation of reaction mechanisms and of such processes as absorption, activation and diffusion. These applications are reviewed and well supported by references. Analytical methods are also reviewed including that of radioactivation wherein the sample, say of graphite with small rare earth impurities, is irradiated in a pile and then the characteristics of the induced active isotopes are determined in order to estimate the quantities of the parent rare earths. Again, for example, such a method may be used for the determination of calcium of p.p.m. concentration in fairly pure iron.

One thing that puzzles is the way values quoted for isotopic half lives vary inconsistently from paper to paper. For example, paper P/463 table I quotes half lives of 4 yr. and 20 yr. for ^{204}Tl and ^{90}Sr respectively whereas the following paper (P/164) in its table I gives 2.7 yr. and 25 yr. The 1948 and 1952 editions of the Segré chart respectively, quote 4 yr. and 2.7 yr. for ^{204}Tl and 25 yr. and 20 yr. for ^{90}Sr. J.S.M.B.

CIBA FOUNDATION SYMPOSIUM ON PAPER ELECTROPHORESIS. *Edited by* DR. G. E. W. WOLSTENHOLME. J. & A. Churchill Ltd., London. Pp. 224. *35s.*

The classical technique of electrophoresis has proved an excellent method of separating protein mixtures and as such has been widely applied to the analysis of the proteins of blood and serum. However, this method requires complicated apparatus and is not readily applicable to routine analyses. In the last 15 years the technique of paper electrophoresis has developed. This offers a simple and convenient procedure more suited to routine analysis. It also has additional advantages over the classical technique in that it is possible to analyse simultaneously in the same simple proteins, lipids and protein-bound carbohydrates.

Difficulties in correlating the results of analyses by paper electrophoresis have occurred between laboratories. This symposium was arranged to give an opportunity for discussions concerning these variations and to attempt to standardise the technique.

Communications dealt with the methods of electrophoresis and the design of apparatus. It would seem that there is standardisation of apparatus and various forms are described. Another group of papers dealt with the analysis of the separated materials. It appeared that the reason for the variations that occurred in the results between various workers was in the analysis of the separated materials. A common procedure is to make measurements *in situ* by the interaction of separated substances on the paper with a dye as in the case of proteins. The colours are then measured

photometrically using some form of scanning device. The chief errors are involved in deciding exactly where to draw the base line and where to place the divisions between the various fractions. It is, however, now possible to get repeatability if all the conditions are standardised.

Further development in this type of electrophoresis will come by reducing tailing effects by such methods as chemical treatment of the paper, as has already been done by acetylation, and also by the use of alternative supporting media such as starch gels. A further advance is the development of high voltage paper electrophoresis which permits the separation of low molecular weight charged substances, giving clear cut separations in the minimum time. Many examples are given in this book of the application of the method to clinical problems. The book should prove extremely useful both to workers who are interested in applying this method to their problems and to those already engaged in its use. K.R.

SODIUM: ITS MANUFACTURE, PROPERTIES AND USES. *By* MARSHALL SITTIG. Reinhold Publishing Corporation, New York; Chapman and Hall Ltd., London. *1956*. Pp. 529. *100s.*

Total world production of sodium now amounts to about 300 million lb. per year, and sodium might therefore be classed as a heavy chemical. Although various reviews of sodium chemistry are available there has been a need for a specialist treatise containing all the technical information available to the chemist or engineer interested in sodium. In this volume all the important information available on the manufacture, handling and uses of sodium has been covered, and in addition there is a critical resumé of the physical and thermodynamic properties of sodium, written by G. W. Thomson and E. Garelis. The book also contains 150 illustrations including flow sheets, line drawings and photographs of equipment and actual sodium handling operations, and over 2,000 references to the literature.

Sodium is used on a large scale in the synthesis of tetraethyl lead, in the manufacture of detergents and of sodium peroxide, cyanide, hydride and amide. Production and properties of metallic sodium and the manufacture and uses of products derived directly from the metal are discussed, but the important sodium compounds, such as sodium chloride, caustic soda and sodium carbonate, which are not produced from metallic sodium and which have been adequately described in the literature, are excluded.

The chapter on the manufacture of metallic sodium deals mainly with thermochemical reduction processes and the electrolysis of molten sodium salts, but there are some interesting references to the manufacture of sodium by electrolysis in solvent media and to the recovery of sodium from its alloys. This is followed by an account of its solubility and alloy formation.

More than a third of the book is devoted to a description of the applications of sodium. These have been divided into two main categories: those uses based upon the unique physical properties of the metal, wherein the latter is not changed chemically; and those based upon its role in inorganic and organic chemical reactions. In the first category the use of sodium as a heat transfer medium for nuclear power plants deserves particular attention. There is also an account of the analytical determination of metallic sodium.

Mr. Sittig is to be congratulated upon preparing a most interesting account of the manufacture and properties of metallic sodium, which should be of considerable value to research and industrial chemists. G.S.E.

CHEMIE DER ZUCKER UND POLYSACCHARIDE. 2nd edn. *By* F. MICHEEL, *assisted by* A. KLEMER. Akademische Verlagsgesellschaft Geest und Portig, Leipzig. *1956*. Pp.xx + 512. *DM 36.*

Interest in carbohydrate chemistry has recently been stimulated by the discovery of remarkable new sugars in antibiotics, by the elucidation of the complex mechanisms of many biological processes, and by the wider realisation that the study of carbohydrates can make useful contributions to the elucidation of stereochemical aspects of reaction mechanisms. This volume, which provides a detailed introduction to the subject, will therefore be welcomed, not only by carbohydrate chemists, but also by biologists and research workers in other branches of chemistry.

The first half of the book gives a stimulating and comprehensive picture of the chemistry of monosaccharides and their derivatives. An excellent section on Hudson's rules deserves special mention. Professor Micheel supports his discussion of classical carbohydrate chemistry with a wealth of literature references and 83 pages of tables giving the physical constants of carbohydrate derivatives. Both text and tables provide a powerful key to the widely scattered literature of the subject, although the author makes no claim to achieve exhaustive coverage. The tables are a valuable feature, but the reviewer was disappointed to find that the compounds tabulated are not given in the index. A number of general references to the tables would greatly increase the accessibility of their contents.

Oligosaccharides are reviewed in only 30 pages, in which little attention is paid to the higher members; this is unfortunate in view of the increasing number and importance of the oligosaccharides isolated from transglycosylation reactions and from the partial hydrolysis of polysaccharides.

The chapter devoted to polysaccharides gives excellent, brief surveys of the most important classes and it is documented by a large number of literature references, including many of recent date. The excellent section on the biochemistry of carbohydrates has also been completely rewritten for the present edition; it includes a concise account of photosynthesis and an authoritative discussion of carbohydrate-protein compounds. The volume also contains a brief chapter on cyclitols and a short section on the use of labelled isotopes in carbohydrate chemistry.

It is unfortunate that the standard of printing falls short of the high quality of the text. The structural formulae are often inelegant and sometimes confusing, and the poor lay-out discourages the reader from browsing. However, the book deserves a warm welcome despite its imperfections. English readers will be grateful to the author for his unpretentious German style. J.C.P.S.

CHEMICAL STOCKS & SHARES

Spectacular Rally Follows Egyptian Crisis

STOCK markets made a spectacular rally from the sharp fall in values which was in evidence when the Egyptian crisis was at its peak. All but a small part of the rally has been held, but even so, there is a good deal of uncertainty as to the outlook. This does not arise from the future of the £, which the City is convinced should now more than hold its own in the foreign exchange markets. The moves made by Mr. Macmillan have demonstrated that the sterling area has massive dollar resources with which to back the £, if necessary, and there is not the slightest intention of devaluing sterling. The uncertainty which has developed is mainly due to the repercussions of the sharp advance in the price of oil and the increase in steel prices. Our trade rivals on the Continent face somewhat similar problems, but our danger of inflation may be more acute and, in the circumstances, fresh measures to keep inflation in check may become necessary. General belief in the City is that the position will not be clear until the April Budget, but that in any case it seems doubtful if this can be expected to bring any major tax concessions.

ICI £40 Million Issue

Meanwhile the big talking point is Imperial Chemical's impending £40,000,000 issue of 5½ per cent convertible loan stock at £96 per £100 stock. At the issue price there is a yield of almost 5¾ per cent, and the City is looking for a small premium over the issue price when dealings start. Indeed, it is being suggested by some brokers that a premium of as much as £10 or more over the issue price is possible as 1958 approaches. This is the first year in which the stock can be converted into ordinary shares. The conversion terms may very well look extremely attractive at that time, if all goes well. This stock, which combines the merits of a fixed-interest stock with the attractions and scope offered by ordinary shares, is a safeguard for investors against the future. The City expects large applications from the big insurance and investment companies who are shareholders in ICI and widespread support from small investors as well. There is no limit to the amount for which a shareholder can apply.

There is no particular significance why Imperial Chemical has decided to go ahead with this large new issue now. It is not because they and their advisers feel that stock market conditions may deteriorate and be less satisfactory later on for a large new issue. Mr. Stanley Chambers one of the ICI deputy chairmen has pointed out that the position is that the company's expansion programme requires more money. This is the biggest issue ever made by an industrial company in Britain and ICI is Britain's biggest industrial group.

Selling of Shares

Imperial Chemical shares at 38s have held virtually the same level as a month ago, an earlier rally not having been held. There has been a fair amount of selling of the shares by shareholders as a means of financing applications for the new loan stock. Borax Holdings provided a good feature with an advance on the month from £13½ to £14 in response to the decision to distribute a scrip issue of one free share for every one held. Then the £1 shares will be divided into four 5s units. Based on the current price of the £1 shares, the price of the 5s units after the free scrip issue and splitting of the shares, would be 23s 3d. In the City the directors' proposals created an excellent impression.

Elsewhere, British Glues & Chemicals 5s shares have been well maintained at 10s 6d. Compared with a month ago, Albright & Wilson 5s. shares have lost a few pence at 18s 1½d. Anchor Chemical 5s shares were well maintained at 11s 6d, while Laporte 5s shares have been also well maintained at 15s 6d, Reichhold 5s shares eased to 13s 3d and Fisons to 47s 6d.

The 6s 9d units of the Distillers Co. strengthened from 19s 9d a month ago to 21s 7½d, helped by the directors' announcement that earnings of the group in the first half of the financial year have shown an 'encouraging' rise. Meanwhile the interim dividend is being maintained at 6 per cent, but in the City it is assumed the total dividend will be increased if the rise in profits is held. Hardman & Holden 5s shares eased to 8s xd. Hickson & Welch 10s shares moved up to 30s 6d compared with 28s 3d a month ago. British Chrome Chemicals 5s shares at 9s were within 3d of the level ruling a month ago. British Industrial Plastics 2s shares were 4s 6d compared with 4s 3d. British Xylonite have eased from 25s 6d to 24s 9d. Oils recovered well, but did not keep best prices. BP were 129s 4½d compared with 118s 9d a month ago, and Shell 141s 6d compared with 138s.

New BDH Chemicals

FIVE NEW ENTRIES are now listed in the BDH catalogue. These are: Benzene phosphoric acid, supplied as an almost colourless crystalline powder, melting at 165-167°C; 4-bromodiphenyl, colourless flakes, melting at 87-89°C which converts to 4:4′-diphenyl-diphenyl; 2-bromo-thiophen, supplied as a slightly tinted liquid boiling at 151-153°C; methyl acrylate, an almost colourless liquid boiling at about 80°C; and methyl 2-hydroxy *iso*-butyrate, now produced industrially in Britain on a large scale as a solvent and intermediate, is supplied as a colourless liquid, boiling at about 137°C.

BDH announces also that new chromatographic (CG) grades of certain Amberlite resins are now available from stock. These meet the requirements of ion exchange chromatography for resins of small particle size. They are supplied in the exhausted form, except CG-50 (free acid) and CG145 (free base) and their moisture content of 5 to 10 per cent is considerably less than that of the analytical and standard grades.

Shell Epoxy Resins

CAPACITY for production of epoxy resins has been tripled by Shell Chemical Corp. at its plant at Houston, Texas.

PATENTS

By permission of the Controller of HM Stationery Office the following extracts are reproduced from the 'Official Journal (Patents).' Copies of this publication may be obtained from the Patent Office (Sale Branch), 25 Southampton Buildings, Chancery Lane, London, WC2, price 2s 6d per copy (including postage); annual subscription £6 6s. The letter P or C preceding the number indicates that the application was accompanied by a provisional specification or a complete specification respectively.

APPLICATIONS

C34161 Isocyanates producing method. Francais Etat.
C33492 Amine acetates salts. Geigy AG.
C33855 Amine-formaldehyde resin composition. General Aniline & Film Corp.
C33856 Acylated leucomethylene blue making process. General Aniline & Film Corp.
C33857 2, 2, 3, 3, Tetrachloro-1, 4-Butanediol. General Aniline & Film Corp.
C33916 Gaseous-discharge device. Germeshausen.
P34191 Pharmaceutical compositions. Glaxo Laboratories Ltd.
C34116 Liquid flow measuring apparatus. Heyduk, F.
C34002 Diketene manufacturing apparatus. Hoffmann-la Roche & Co. AG.
C33692 Chemical process. Horizons Titanium Corp.
C34054 Aluminium phosphate. Huber, H.
C33515 Refined metal manufacturing process. Huttenwerk Oberhausen AG.
P33965 Silver recovery. Ilford Ltd.
P33660 Aromatic compounds oxidation process. Imperial Chemical Industries Ltd.
P33663—P33664 Aromatic disulphonic acids. Imperial Chemical Industries Ltd.
P33484 Esters. Imperial Chemical Industries Ltd.
P33662 Polymeric polymethylene terephthalates. Imperial Chemical Industries Ltd.
P33926 Organic compounds oxidation. Imperial Chemical Industries Ltd.
P33485 Chemical compounds. Imperial Chemical Industries Ltd.
C34050 Alkyl arylstearates. Institut Francaise du Petrole des Carburants et Lubrifiants.
C34181 Amino acids. Inventa AG fur Forschung und Patentverwertung.
C33987 Gaseous mixtures separation. Kellogg Co.
C33726 Vauable gases producing arrangement. Koppers Ges.
C34198 Flue gas testing devices measuring apparatus. Landis & Gyr AG.
C33877 Hibernation producing substance. Lannacher Heilmittel Ges.
C33723 Nicotinic acid amides &c. Lannacher Heilmittel Ges.
C34202 Polymers aqeuous dispersions. Lonza Electric & & Chemical Works Ltd.
C34055 Pigment &c. dispersion. Marco Co., Inc.
C33880 Chemical product. Metal & Thermit Corp.
C34032 Organopolysiloxane compositions. Midland Silicones Ltd.
C33679 Fluids albuminum determination method. Miles Laboratories, Inc.
C33780 Thiourea compounds. Monsanto Canada Ltd.
C34141 Olefinic monomers thermal polymerisation. Monsanto Canada Ltd.
C34008 Olefins polymers preparing process. Montecatini Soc. Generale per l'Industria Mineraria e Chimica.
C33561 Branched chain alcohols process. Naamlooze Vennootschap de Bataafsche Petroleum Maatschappij.
C33521—C33522 Heat exchangers. Naamlooze Vennootschap Philip's Gloeilampenfabrieken.
C34171 Zirconium production. National Lead Co.
P33961 Polymers stabilisation Chemische Werke Huls AG.
P33962 Low pressure polyolefine working up means. Chemische Werke Huls AG.
C33862 Barbituric acid derivatives hydrohalides Nordmark-Werke Ges.
C34144 Penetrant compositions. Olin Mathieson Chemical Corp.
C33773 Hydrazine dehydrating process. Olin Mathieson Chemical Corp.
C34042 Titanium ores treating methods. Pechiney Compagnie de Produits Chimiques et Eletrometallurgiques.
C33932 Copolymers. Pennsylvania Salt Manufacturing Co.
C33709 Halofuran preparing process. Pennsylanvia Salt Manufacturing Co.
C33546 Cation exchange membranes. Permutit Co. Ltd.
C33547 Ion exchange membranes. Permutit Co. Ltd.
C33840 Styrene &c. copolymers. Petrochemicals Ltd.
P33741 Organo-metallic compounds. Petrochemicals Ltd.
C33659 Butadiene/hydrocarbons separation. Phillips Petroluem Co.
C33984 Olefin polymers producing process &c. Phillips Petroleum Co.
C33832 Thermoplastic interpolymers &c. Rohm & Haas Co.
C33464 Anticoagulant. Roubal, Z.
C33913 Antihistaminics tasteless preparations. Schering AG.
C34193 Nitric acid manufacturing processes. Soc. Belge de l'Azote et des Produits Chimiques du Marly.
C33891 Combustible gas production apparatus. Soc. de Construction d'Appareils pour Gaz à l'Eau et Gaz Industriels.
C34213 Phenthiazine derivatives. Soc. des Usines Chimiques Rhone-Poulenc.
C33575 Liquids separators. Sulzer Freres, Soc. Anon.
C33896 Chromatographic analysing &c. apparatus. Technicon International Ltd.
C33893 Trivalent titanium compounds oxidation. Titan Co. Aktieselskap.
P33979 Solid materials separation process. Trotter, F. J.
C33566 Interesterification process. Unilever Ltd.
C33894 Volatile liquids handling &c. apparatus. Union Carbide & Carbon Corp.
C33545—C33545—C33700 Steroids. Upjohn Co.
C34036 Organic compounds. Upjohn Co.
C33752 Carbon black products. Verdier, A. L.
C33876 Aluminium &c. treating method. Vereinigte Aluminium-Werke AG.
C33550 Dimethyl terephthalate purifying process. Vereinigte Glanzstoff Fabriken AG.
C34179 Dicarboxylic acids &c. polyamide production. Vereinigte Glanzstoff Fabriken AG.
C33510 Chromium alloys powder. Wargons Aktiebolag.

ACCEPTANCES

Applications in the following list, and the specifications filed in pursuance thereof, will be open to public inspection in due course. Persons interested may give notice of opposition to the grant of a Patent on any of the applications included in the list by filing Patents Form number 12 *at any time within the prescribed period. See 'Official Journal (Patents)' for dates on which these applications will be open to public inspection.*

766 133 Plastic coatings on floors and walls. Chemische Werke Hüls AG.
766 167 Separation of materials. Imperial Chemical Industries Ltd.
766 015 Diazo dyestuffs. Sandoz Ltd.
765 885 Dispersing pulverulent substances in water. Goldschmidt AG.
766 273 Curing of polyepoxides. Naamlooze Vennootschap de Bataafsche Petroleum Maatschappij.
766 274 Method and apparatus of separating solids from a liquid suspension. Bauer Bros. Co.
766 275 Dehydrating hydrazine by azeotropic distillation. Olin Mathieson Chemical Corp.
766 139 Production of porous moulded bodies made of synthetic resins and moulding powder for process. Biazotti, R., and Lintner, J.

Commercial Intelligence

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

Mortgages & Charges

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

NORWOOD INSTRUMENTS LTD., Huddersfield, scientific instrument manufacturers &c. 29 November, £7,000 debenture, to Industrial & Commercial Finance Corporation Ltd.; charged on specified property at Neiley, Henley, nr. Huddersfield and a general charge (subject to &c.).

WESLEY COE (CAMBRIDGE) LTD., glass manufacturers &c. 30 November, £500 debentures, part of a series already registered. *£2,500. 11 April 1956.

New Registrations

Clayton Aniline Works Pension Trust Ltd.

(575,067). Registered December 3 as a company limited by guarantee without share capital. The original number of members is two, each being liable for £1 in the event of winding up. Objects: To enter into and carry into effect an interim trust deed purporting to be made with the Clayton Aniline Co. Ltd., etc. The subscribers are: John P. Perkins, 'Tan Pits,' Moss Lane, Bramhall, Cheshire, company secretary; and Leslie C. Page, 19 Spennithorne Road, Urmston, Manchester, assistant labour manager. The first directors are George H. Carnall (chairman), John P. Perkins, Arthur A. Cunliffe, Jack Barker, Arthur Seaton and Vincent Delaney. Solicitors: Addleshaw, Sons & Latham, Manchester. Registered office: Clayton, Manchester, 11.

Corrobex Chemicals Ltd.

Private company (575,679). Registered 14 December. Capital £5,000 in £1 shares. Objects: to carry on the business of manufacturers of and dealers in chemicals of all kinds, manufacturers of plastics and synthetic materials, moulders, fabricators and constructors in wood, metal and chemical substances, manufacturers of and dealers in fungicides and insecticides etc. The subscribers (each with one share) are: Sidney C. Coker, 12 Ruffetts Close, S. Croydon, Surrey, solicitor's managing clerk, and Ann M. Best, 49 Draycott Place, London SW3, private secretary. The first directors are to be appointed by the subscribers. Solicitors: Highwood & Smith, 6 Fitzroy Square, London W1. Registered office: 56 Kingsway, London WC2.

COMPANY NEWS

British Benzol & Coal Distribution Ltd.

Sales revenue did not keep pace with rising costs, state the directors of British Benzol & Coal Distillation Ltd. in their report for the year to 31 October last. Net profit is down from £53,724 to £34,991 and the dividend is reduced from 17½ per cent to 15 per cent. Adequate supplies of coal suitable for carbonisation were obtained from the NCB and output of coke was maintained by participating in the export market to the maximum permitted extent. Gas and other by-products found ready outlets throughout the year. The annual meeting of the company will be held in London on 15 January.

Commercial Plastics

In exchange for shares, Commercial Plastics will acquire from the Bleachers' Association the total issued capital of Greenwich Plastics on 1 January 1957. Greenwich Plastics will continue to operate as an independent company. Mr. P. L. Wright, chairman, and Mr. E. G. Goold, director and secretary, Bleachers' Association, will join the board of Commercial Plastics.

MARKET REPORTS

LONDON The industrial chemicals markets have begun the New Year on a steady note with an active inquiry reported from most sections. Contract renewal business has been much in evidence, and a widening interest has been shown by users in the textile and allied industries. Prices are steady and unchanged although with a firm tendency, the exception being the fluctuations in the non-ferrous metal compounds. Trade in the coal-tar products market continues to be active.

MANCHESTER The market is not yet fully into its stride after the holiday interruptions, but in the early period of 1957, at all events, a resumption of steady home and export business is anticipated. More active conditions in the Lancashire cotton and allied industries should result in a brisker demand for a wide range of chemicals from this direction. Most other industrial consumers are expected to give a good account of themselves in this respect. A steady seasonal expansion in the call for fertilisers is also anticipated. Taking in the tar products section generally, a fair movement of supplies is reported.

GLASGOW The traditional New Year holidays are having an effect on the Scottish market, and business generally has been quiet, and is likely to remain so until after the holiday period. Prospects for 1957 appear to be reasonably favourable.

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NATIONAL COAL BOARD

Applications are invited for the position of
ASSISTANT DIVISIONAL MARKETING OFFICER
(BY-PRODUCTS)
in the North Eastern Division with Headquarters at "Hill Turrets," Ecclesall Road South, Sheffield, 11.

The position carries a salary range of £1,560 to £2,275.

Applicants should be fully experienced in all chemicals produced from coal for both home and export markets, and should have practical experience of sales development and market surveys. A knowledge of the bulk transport and shipment of chemicals and by-products is essential. It would be an advantage to have a knowledge of the production of these chemicals, together with a Technical qualification.

Applications, giving details of age, qualifications and experience, should be addressed to
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MOORDALE, 1, TAPTON PARK ROAD,
SHEFFIELD, 10,
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MIXERS—1 Baker Hand-tilted Trough, 16 in. by 24 in. by 20 in Fast and loose pulleys and clutch. "Z" blades.
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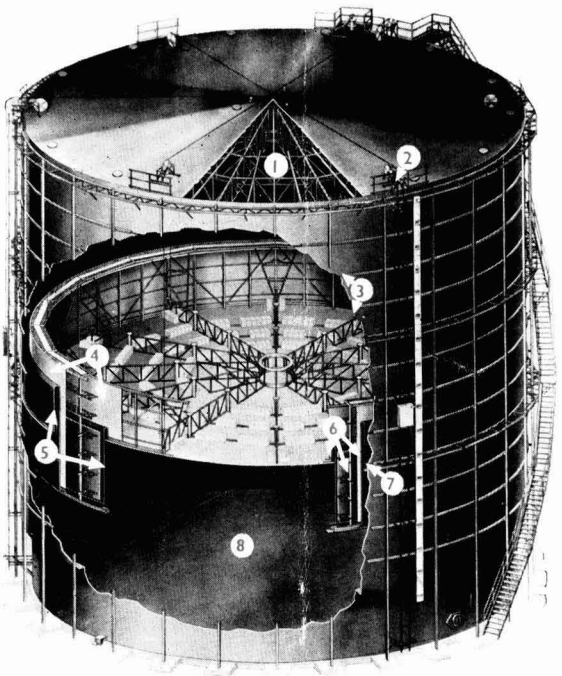

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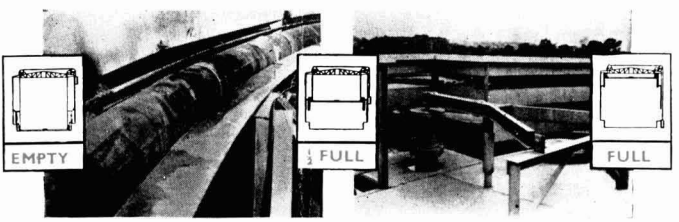

Half full position, showing inflated seal constructed of a synthetic rubber-coated fabric.

Full position view of mechanically-operated relief valve. Releases gas if holder capacity is exceeded.

1 The piston rises nearly to the roof of the gas-tight shell giving maximum capacity.

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3 The section of the shell above the piston is completely ventilated.

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5 The gas-tight seal remains unaffected by weather.

6 Fenders protect the seal when under pressure and guide it on to the side walls without friction.

7 The shell is gas-tight up to the seal connection.

8 Foundations are simple and inexpensive as only the shell weight has to be supported.

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