

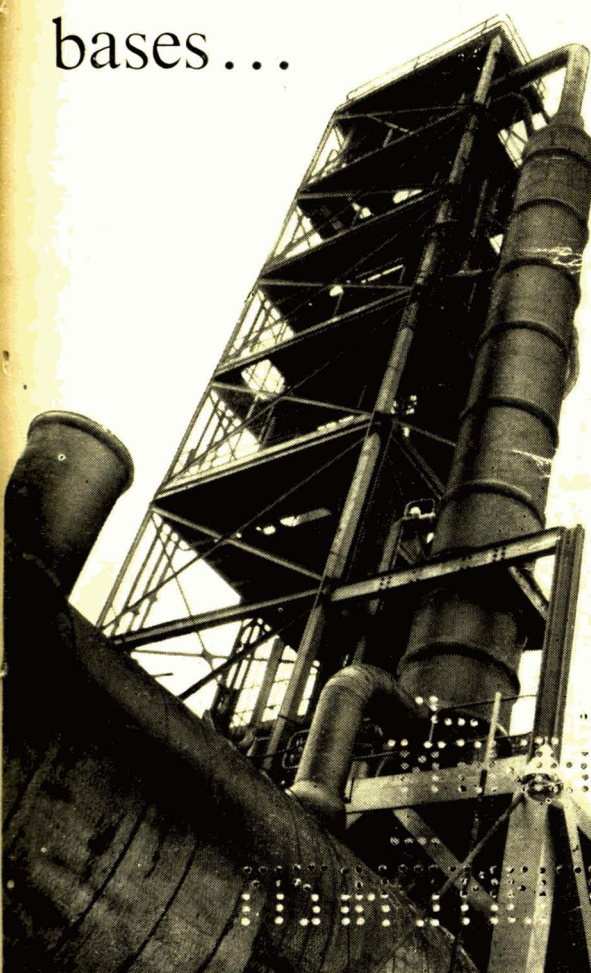
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VOL. LXXV

28 JULY 1956

No. 1933

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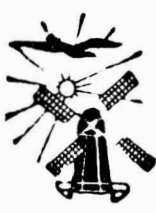
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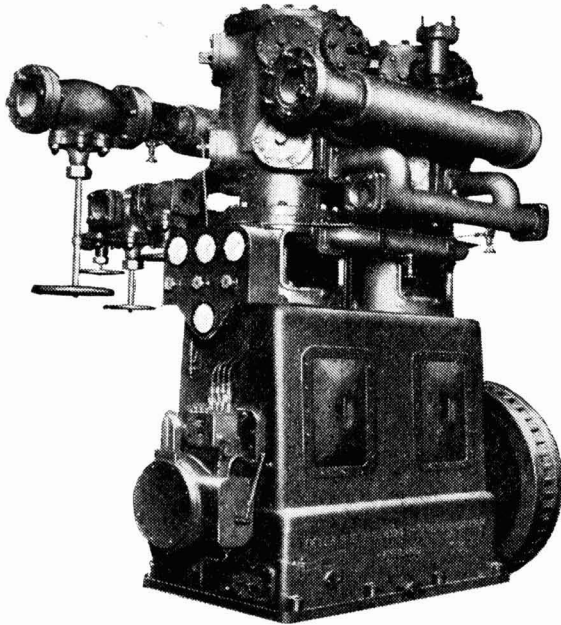
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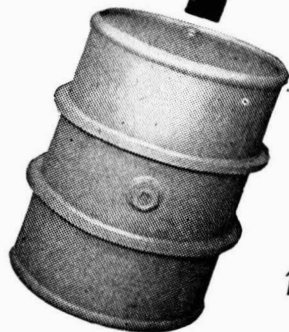
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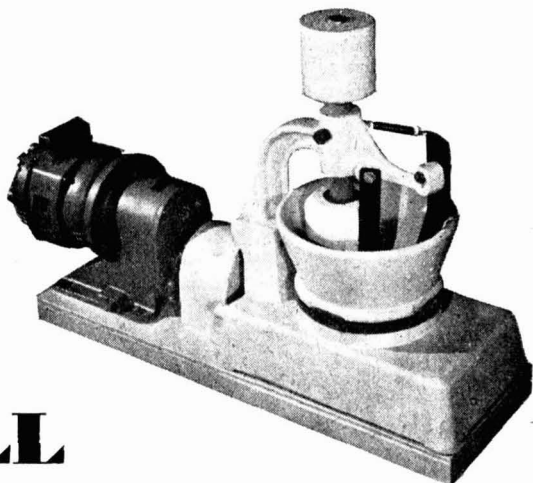
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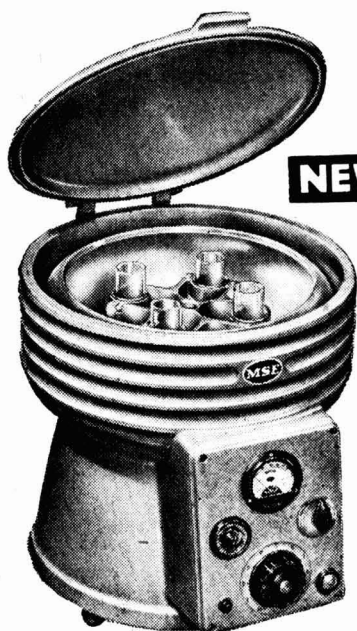
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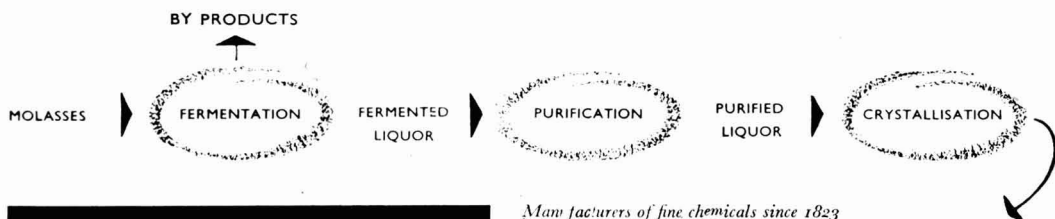
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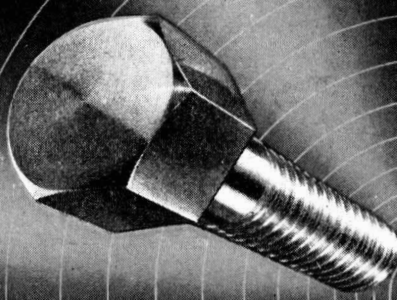
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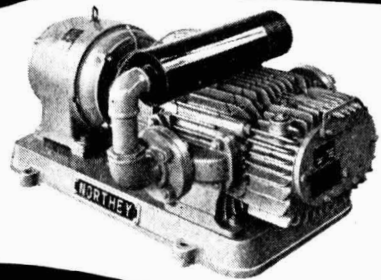


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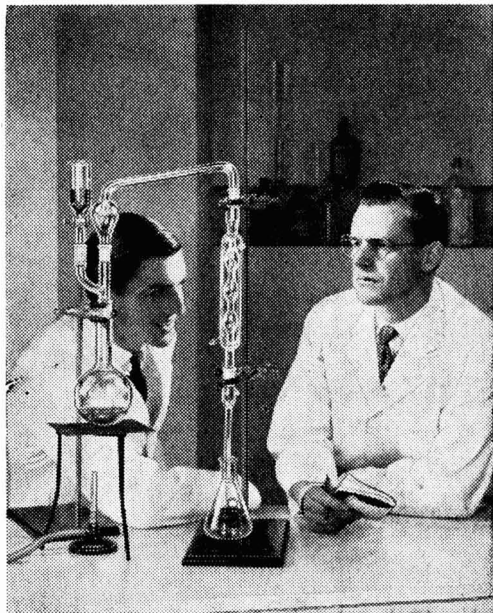
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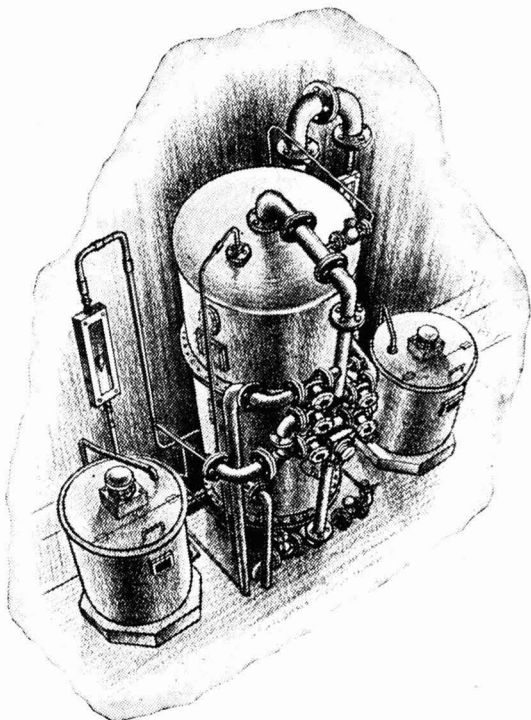
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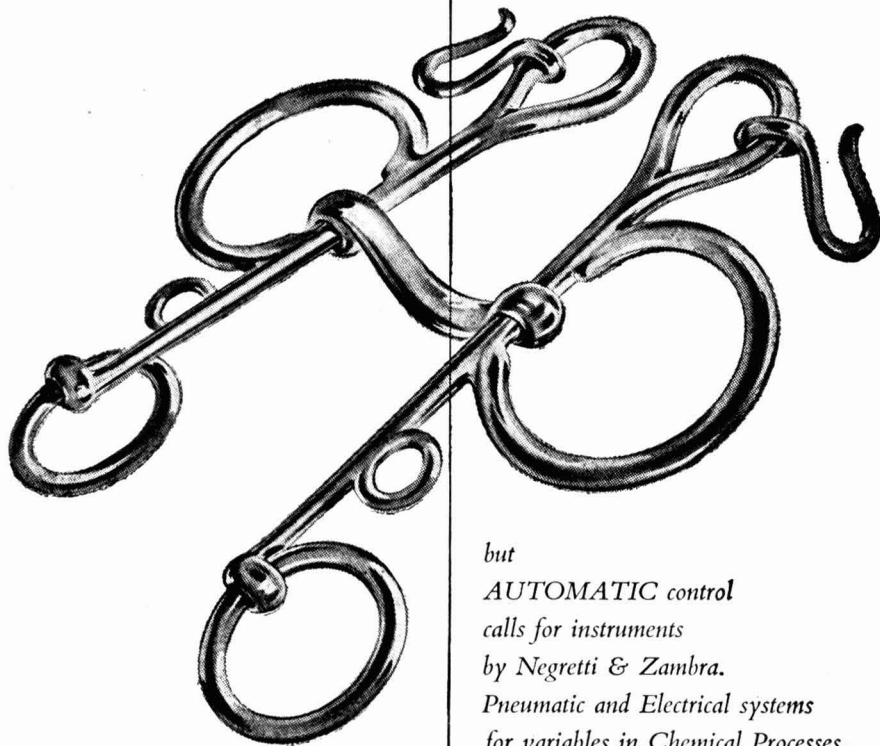
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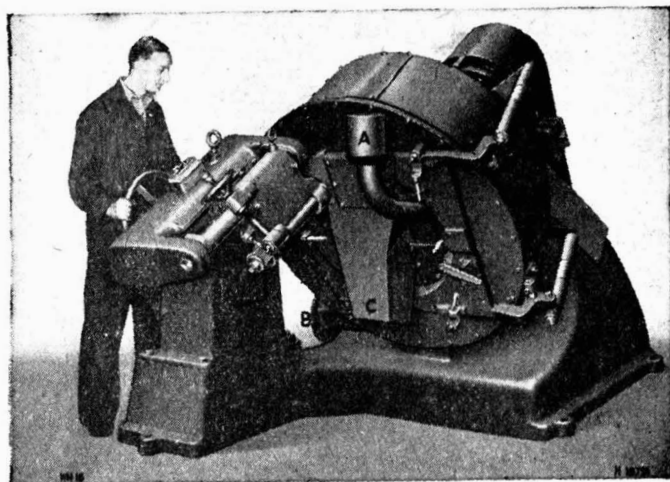
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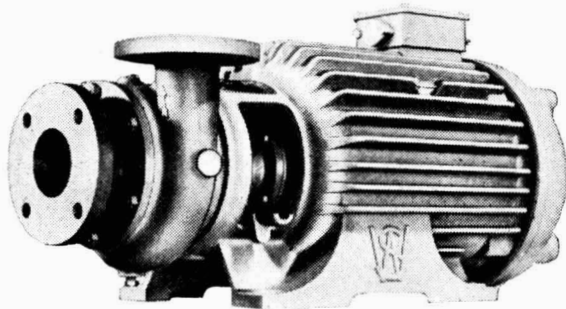
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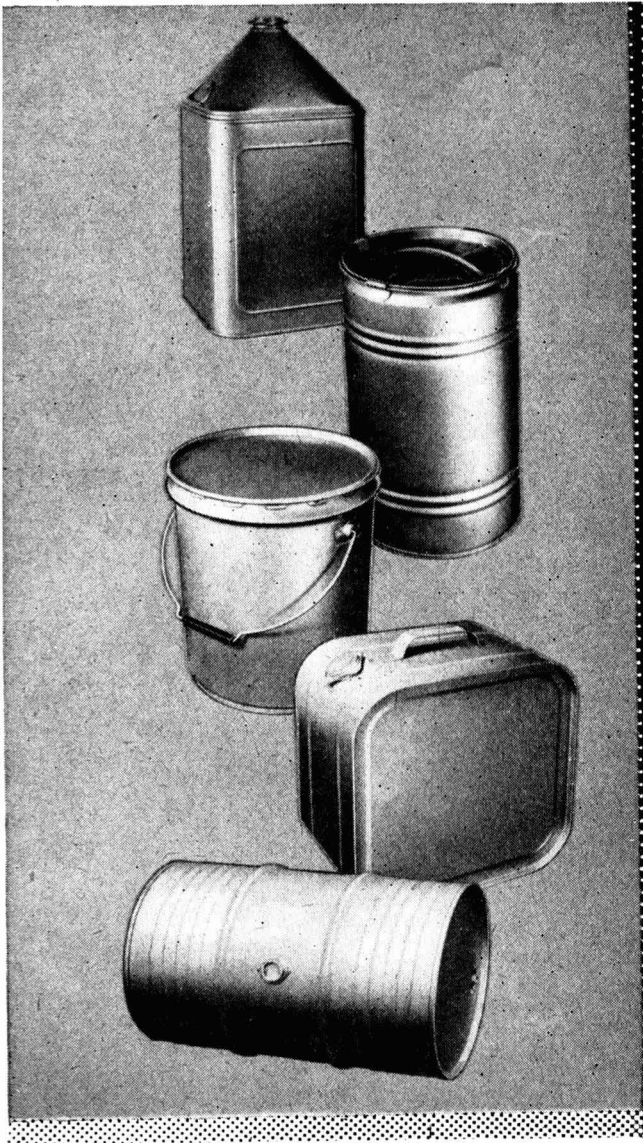


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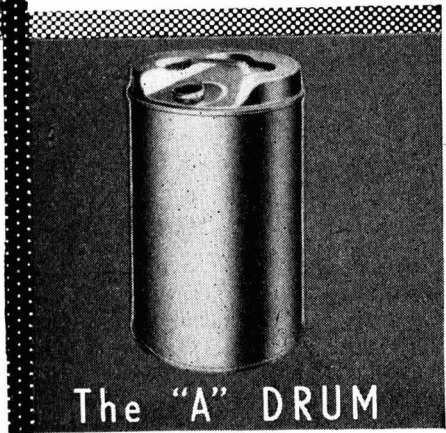
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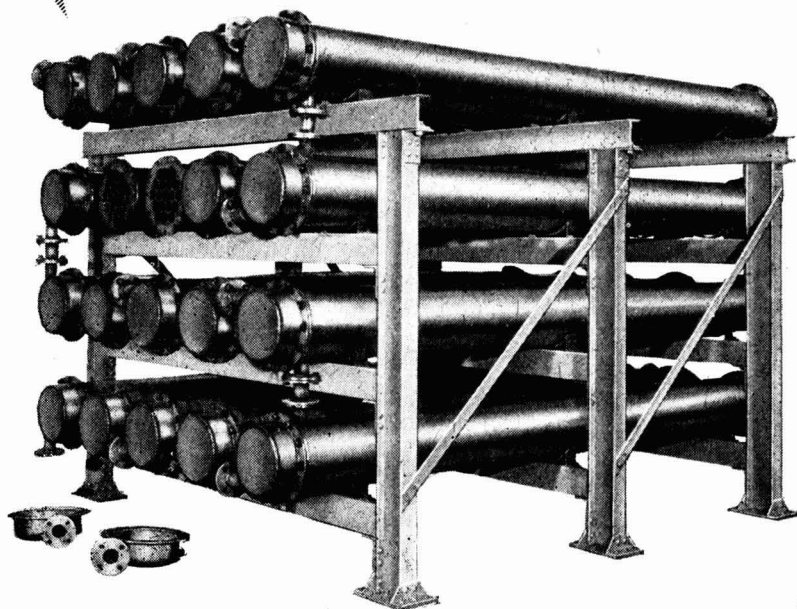
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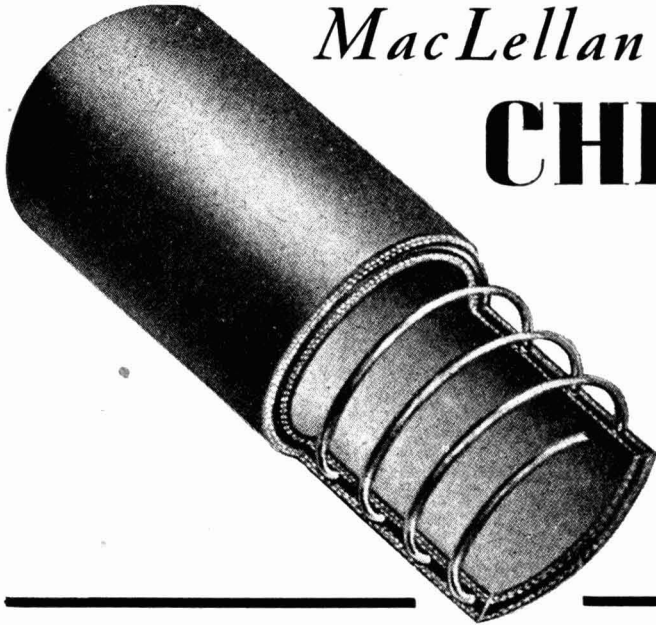
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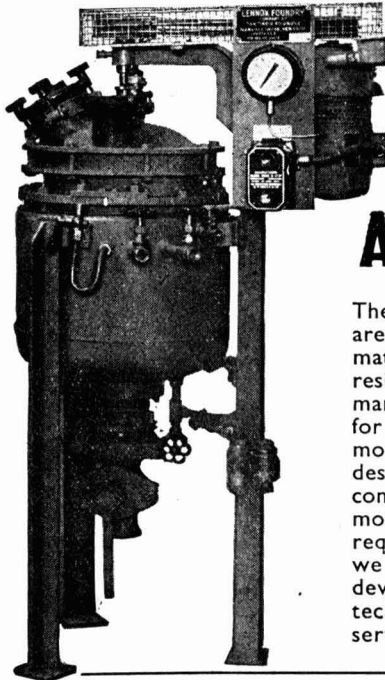
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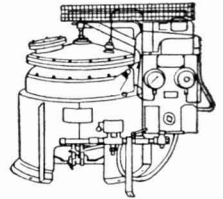
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Fuel Chemistry Studied

NOT many annual reports from the Fuel Research Board have been as dominated by chemical themes as the report for 1955. There have been times when this major national subject has seemed to depend largely upon the contributions of thermal physicists and combustion engineers, and when those who look upon this country's basic raw mineral, coal, as a chemical complex first and a source of flame and calories second, have seemed to have but a small voice faintly and occasionally heard.

One of the earlier sentences in the new report strikes a most welcome note—'during recent years there has been increased interest in investigations aimed at providing more precise information on the constitution of coal, as such knowledge should make it possible to extend the use of coal as a raw material for chemicals'. Indeed, it is already possible to give a broad chemical account of the changes in coal's chemical structure that accompany its *in situ* maturing. There is 'a progressive development of six-membered carbocyclic structure', and up to the point when coal's carbon content is 90 per cent these cyclic structures are simple, but beyond 90 per cent there is an increasing extent of condensation and ring formation. Fundamental investigations of coals of different ranks are now aimed at finding the controlling factors of the maturing process. In particular the hydroxyl contents of coals have been studied, using ketene as an experimental acetylating agent. Ketene, as a highly reactive gas, is preferred to the more usual liquid agents as it penetrates the pores of coal more easily.

A substantial section of the report is devoted to the 'Synthesis of Oils and Chemicals from Coal'. Here there is no

change in the view that the Fischer-Tropsch process is the most likely approach, though its operation must still be regarded as uneconomic. However, 'there are grounds for believing that further developments are possible which may ultimately make it commercially attractive in many countries'. The major item of cost is that of the process gas. Economic success depends to a great extent, therefore, upon the use of highly efficient catalysts which enable this expensive gas to be directed towards desired end-products with small wastage. However, attention is also being given to cheaper gases high in CO-content and to liquid-phase or slurry processes. There would seem at present to be some lack of fundamental knowledge about the *modus operandi* of catalysts prepared from steel rolling-mill scale. Until recently, efficiency of these catalysts has not been regarded as critically dependent upon conditions of preparation, *i.e.*, impregnation with aqueous potassium carbonate followed by ignition at about 1,000°C. Now, however, a number of cases of poor catalytic activity have been encountered, and the whole problem—composition of mill-scale and catalyst preparation conditions—has had to be re-investigated. It is possible, though as yet unproved, that activity is related to the amount of ferrite ($K_2O \cdot 4Fe_2O_3$) phase present; this amount may be affected in catalyst preparation because certain non-ferrous metals are appreciably present in the original mill-scale, *e.g.*, chromium.

For liquid-phase synthesis better results have been obtained if potassium borate instead of potassium carbonate is used in making the mill-scale catalyst. How far this has general significance for the Fischer-Tropsch processes is not dis-

cussed, but it is stated that potassium borate does not form a ferrite when heated with iron oxide.

Two new research techniques are being applied in Fischer-Tropsch process research—chromatographic analysis, particularly by gas-liquid partition, and radio-isotope tracing using ^{14}C . It is not over-optimistic to believe that these introductions will be of enormous benefit in filling the many gaps there are of detailed knowledge about the fundamental nature of the reactions involved. Can it be doubted that economic success must remain elusive while these gaps remain?

More disappointingly, though perhaps disappointment is far too premature a reaction, attempts to improve the effectiveness of Fischer-Tropsch catalysts by irradiation have been unsuccessful. Nor has irradiation altered the rate or course of reactions. Radioactive cobalt— ^{60}Co —has been used, and also a cobalt catalyst irradiated before use, but beneficial effects are not reported. It might perhaps be commented that any chances of irradiation succeeding would be far greater if the fundamental contribution of Fischer-Tropsch catalysts was more fully understood.

Another chemical aspect of new work at Greenwich concerns the problem of separating sea-water from oil. For both cleaning and ballast purposes sea-water regularly enters the fuel tanks of cargo vessels and the oil tanks of tankers; emulsions are often formed and these are difficult to separate. Yet salt as an impurity in oil will damage boiler tubes and furnace linings. A surface-active agent able to break down these emulsions is being sought. Despite the range of surface-active agents now known, one that is satisfactory for a wide range of oils has yet to be found, although some agents are highly specific when certain oils are involved. Many, too, had good emulsion-breaking activity over narrow ranges of concentration. Here again, therefore, the empirical research approach provided a dusty answer and investigations of a more fundamental kind were required. So far, this has spotlighted the wider-ranged virtues of polypropylene-polyethylene oxide compounds, and agents of this type have been synthe-

sised. One of these products has shown some promise.

On a larger but not dissimilar problem—the pollution of sea and shores with discharged oil—a start has been made on developing separators that could be used to treat oily water before ships dispose of this at sea. Existing methods have been surveyed and several types of separating devices are to be tested. The social and economic value of any progress that the Fuel Research Station could make towards minimising this problem can hardly be underestimated. The work is being conducted at the request of the Ministry of Transport. This inter-departmental use of Government research facilities is sensible enough, of course, but it can be hoped that any substantial research effort will be supported with extra funds and extra staff, for this cannot be looked upon as a minor sideline problem to be fitted into the programme of a research organisation already busily committed.

This brief account of the more chemical sectors in current Fuel Research Station work will have shown that the overall effort is no longer wholly or almost wholly concerned with coal and its major products, gas and coke. A study of the report itself would make this even clearer. The steadily increasing use of oil (see *THE CHEMICAL AGE*, 1956, **74**, 1357) is already reflected in the Station's programme; the flow characteristics of stored fuel oils have been studied in view of the fact that viscosity often increases so seriously during storage that pumping becomes difficult; the formation of sulphur trioxide when oil is used as a power station fuel has also been investigated, and the need to use low-sulphur-content oils is apparent by implication in that the other conditions for reducing trioxide formation are not compatible with efficient combustion.

But these details of fuel oil research are less important in themselves than for the general inference that may be drawn—that a considerable expansion in the Station's research capacity will be required if it is to attack the problems of fuel oil as well as those of coal. This need will become more obvious as oil increasingly balances the gap between fuel demand and coal supply.

NEWS BRIEFS

Pye Forms New Company

Pye Electric Ltd. has been formed by Pye Ltd. to develop and manufacture electrical equipment for the home and export market. The new company has an initial capital of £100. Pye Ltd. stated last week that it was hoped to make an announcement within the next three months on the range of appliances to be covered.

Fifth Factory Equipment Exhibition

The theme of the fifth Factory Equipment Exhibition to be held at Earls Court, London, from 29 April to 4 May 1957 will be 'Greater efficiency in industry'. Exhibits will cover every type of modern factory equipment for large and small works. Details regarding space etc. may be obtained from the organisers, Factory Equipment Exhibitions Ltd., 4 Snow Hill, London EC1.

Royal Society Visit to USSR

A meeting of the Society for Visiting Scientists was held at 5 Old Burlington Street, London W1, on 25 July at 7.30 p.m. to discuss the visit of the Royal Society delegation to the USSR. Speakers were Dr. Mary L. Cartwright, Sc.D., F.R.S., Dr. H. G. Thornton, D.Sc., F.R.S., and Dr. D. C. Martin, Ph.D., F.R.I.C., F.R.S.E.

Price Restraint Endorsed

The Council of the Association of British Chemical Manufacturers has endorsed the recommendations made recently by the Federation of British Industries and other national bodies urging restraint in prices.

International Potash Congress

The fourth congress of the International Potash Institute will be held at University College, London, Gower Street WC1, on 1, 2 and 3 August. An informal reception will be held at the Piccadilly Hotel on 31 July at 8.30 p.m. Papers will be read on various aspects of potassium in plants, the effect of potassium, and British agriculture. In addition, a number of excursions have been arranged.

Name Changed

S. Girling & Sons (Coopers) Ltd., Leyton, London E10, is now known as S. Girling & Sons (Drums) Ltd. A statement by the company has been made as follows: 'To ensure that we remain in the forefront of our industry we have decided to discontinue the coopering of casks and concentrate all our

efforts on the reconditioning and supply of metal containers'. To facilitate this decision, the name of the company has therefore been changed.

Oil Exploration Licence

The British Petroleum Exploration Co. Ltd., a subsidiary of the Anglo-Iranian Oil Co. Ltd., has been granted licences to explore for oil in an area of over 700 square miles in West Northumberland and East Durham. The first step will be a detailed survey and if this proves satisfactory, exploratory drilling will take place. No survey work has yet been done in either of these two areas.

Flintshire Glass Factory

Negotiations are being made by Pilkington Brothers and Chance Brothers for a 30-acre building site at St. Asaph, Flintshire. Planning permission to erect a factory for the manufacture of spectacle and optical glass has been applied for and work on the site should start as soon as this has been given. The factory would probably be open within 12 to 14 months.

BFMIRA at Food Fair

In view of the growing interest shown by manufacturers all over the country in research work, the British Food Manufacturing Industries Research Association has arranged an information stand (number 22) at the Food Fair which will be held at Olympia, London, from 28 August to 15 September.

Institute of Physics Exams

The Institute of Physics' recently established graduateship examination was taken in four centres by 54 candidates of whom only 11 satisfied the examiners. The number of candidates for the final examination for national certificates in applied physics was 309 at the ordinary level and 82 for the higher certificate. These figures compare with 206 and 75 respectively in 1954.

CRL Open Days

An exhibition of the work in progress may be seen during a series of open days to be held at the Chemical Research Laboratory from 2 to 4 October. Industrial concerns wishing to receive invitations to the various sessions should apply to the director not later than 31 August.

Gifts Received

The Council of the University of Leeds has acknowledged the receipt of gifts of £3,043 from Hickson & Welch Ltd. and £603 from Mr. Berner Hickson for the North Block 1 (fuel) building fund.

£6,500 Model Cat-Cracker

COSTING £6,500, a scale model of a second catalytic cracking plant is now being used as a three dimensional blue print at Shell's Pernis (Rotterdam) refinery.

Built of wood, plastic and copper to scale of one in 50, the model enabled technologists to study the plant and especially the layout of the pipelines before building began, thus solving many problems in good time and avoiding alterations during construction. Later it was also used for planning the erection of the shear legs when large components were being hoisted into position.

The model is built in three parts: the catalytic cracker with fractionating column, the distillation plant in which the feed is prepared, and the gas treater. These are mounted on separate tables which can be placed together for studying the complete plant.

Despite its high cost the model is said to have proved an economic proposition, making possible many savings, particularly in drawing costs. Other savings were in the cost of pipework, painting etc., for the plant. By studying the model, contractors were able to make more accurate estimates of the work involved and their tenders were, on average, 10 per cent to 20 per cent lower. The model is also being used for training operating staff.

So successful has this model been that models of new plant for other Shell refineries at Cardon and Curacao are now being made. These will cost £2,200 each.

World Oil Output Up

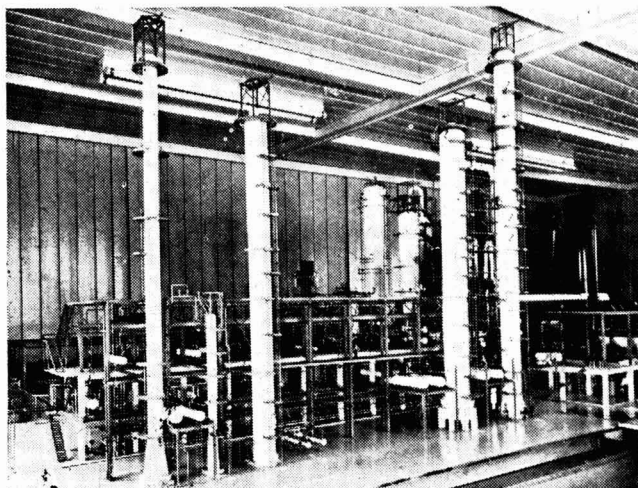
WORLD oil output is estimated to have risen by 10 per cent in the first half of this year, compared with the same period of 1955.

This rate of increase is one of the largest the oil industry has ever experienced, and is greater than had been expected. It is understood that US consumption has been running at a higher level than had been anticipated.

The increase is partly attributed to the switch from coal to oil by many plants in Western Europe. Demand has been at a very high level in Germany.

Will

MR. ARTHUR FREDERICK CAMPBELL, of Torquay, well-known former company director, left £5,000 to Manchester University to found an annual scholarship in some branch of chemistry. It was a token of his gratitude for the tuition he was given at the University from 1905 to 1910. Mr. Campbell left £44,693 gross. Duty paid £10,394. He was at one time managing director of Hardman and Holden Ltd., a director of the Lancashire Tar Distillers Ltd., a director of Manchester Creosote Storage Co. Ltd., and a founder-director of Hubron Rubber Chemicals Ltd. Mr. Campbell left his annual reports of the Chemical Society to that Society; £250 to Providence Church, Middleton; £200 to the Apollo Glee Society, Middleton; £1,500 to the Chemical Society towards maintenance of the library; and £1,000 to the Royal Institute of Chemistry.



Model of the gas treating plant at Pernis (Rotterdam) Refinery

NOTE & COMMENT

CELEBRATING ITS CENTENARY this year is The Morgan Crucible Co Ltd., Battersea, London, and appropriately enough the firm has published a very fine history of its activities since five Morgan brothers—'Importers and exporters of Jewin Crescent in the city of London'—were trading as 'Druggist Sundriesmen and Hardware Merchants.' Crucibles were one of the many items in their stock-in-trade; these they imported from Germany. The source of supply was traditional and might, indeed, have remained so, if the young head of the business had not been impressed by an American crucible, manufactured according to a new process, which he had seen at the Great Exhibition of 1851. The brothers obtained the sole selling agency for the British Empire and then in 1856 bought the manufacturing rights from their American principals, and also a small factory in a secluded spot of the rural Battersea of that time. It was William Morgan who was the true founder of the company, but Septimus took the products of the Battersea works all over the world and Edward built up the home trade. Octavius was Battersea's first MP and first of the company's four chairmen. Walter became Lord Mayor of London and Thomas won the St. Leger with 'Hawthornden' in 1872. A nephew of Octavius, Sir Kenyon Vaughan Morgan, was MP for Fulham, and father of John Kenyon Vaughan-Morgan, a present member of the board, and MP for Reigate.

'The Morgan Secret'

THE ORIGINAL factory was small, the labourers few, and production limited. A horse-gin was used to grind the clay which, with plumbago, formed the crucibles. Nevertheless, the firm exhibited its products at the Crystal Palace in 1857—

and was fined for making smoke. In 1872 steam power replaced the horse-gin and 18 years later the partnership became a public limited company with Octavius Vaughan Morgan as chairman. In the sphere of industrial relations the company showed a pioneering spirit. It had one of the first profit-sharing schemes in British industry; in 1890 the board reduced the hours of work to 54 a week. A year later holidays with pay were granted and a pensions scheme has operated ever since 1883. Then in 1937 the five-day week was introduced into the factory and two years later a family allowance was paid to employees for all children under 14 still at school. And yet there are some who believe that directors, shareholders and managements are ever ready to 'grind the workers in the dust.' Those who think in this way should peruse *Battersea Works 1856-1956*. Moreover the book should be read in all junior schools as part of the social history studies. In conclusion it is appropriate to say how well Richard Bennett has written the narrative and how excellently Newman Neame Ltd. and Percy Lund, Humphries & Co. Ltd. have co-operated to produce the book.

Sulphur Recovery

THERE ARE some technical topics that are all the better discussed with breadth rather than with detailed depth. The production of sulphur by extracting it from materials in which it is an impurity is one such subject, and this treatment has been given to it in an article in the latest *Quarterly Bulletin* (1956, 13, 3) from the British Sulphur Corporation. Incidentally, this relatively new publication is excellent as a whole, full of technical and economic data and most attractively presented. Sulphur recovery accounted for 9½ per cent of world production back in 1934—now when sulphur consumption per annum is much greater, its share is 14½ per cent. This represents an increase of nearly one and a half million tons of sulphur, no minor contribution by any standard of reference. At present the increasing output of recovered sulphur is mainly attributable to recovery developments with natural gas. The point may be trite

but it cannot be over-emphasised that sulphur recovery is handicapped by the low price at which sulphur can be otherwise produced, notably, of course, by the Frasch process. The shortage of a few years ago was a useful stimulation, but this also stimulated sulphur production from pyrites and brought additions to the Frasch fields of operation. The economic position of recovery processes is back where it was before the shortage crisis, and it might be said to have worsened. Other factors are, nevertheless, favouring sulphur recovery developments. The demand for control of air pollution is one of these; even if extraction of sulphur from flue gases is not profitable by itself, it is socially desirable, and the return obtained for the sulphur thus recovered should be looked upon as a pleasant reduction in the costs of civic hygiene. In any case, the national losses that can be ascribed to sulphur's non-removal from fuel gases are inestimable. Another factor is the rapidly rising use of oil as fuel; in Europe this seems certain to expand rapidly and much of the oil will come from the Middle East and, as such, will be high in sulphur content. However, economic recovery of this sulphur depends on whether other reasons justify the application of hydrogenation processes to the heavier fractions of crude oil.

Scottish⁵ Education 'Backward'

IN TECHNICAL education Scotland is an under-developed and backward nation compared to the Soviet Union. This opinion was expressed by Bailie Herbert Brechin, vice-chairman of the governors of the Heriot-Watt College at Edinburgh, when speaking at the annual presentation of awards on 10 July. He said that when the college extensions were complete next year additional accommodation would be made for the chemistry department in another building. Bailie Brechin stated that the Government had made an allotment of £12 million for technical education in Scotland.

MR. VERNON YOUNG, of Abbotsmead, Ditton Grange Close, Ditton Hill, Surrey, formerly of Park View, Hatch End, Middlesex, a director of International Combustion (Holdings) Ltd., left £56,185 (duty paid £26,094).

Chemical Exports for June

THE largest importer of British chemical products in June, according to 'Accounts Relating to Trade & Navigation in the UK', HM Stationery Office, 17s 6d, was Australia, £1,430,334, with India second at £1,349,165. Other big importers were: Italy (£853,649), Netherlands (£837,834), South Africa (£821,767), France (£716,105) and Eire (£712,220).

Total value of chemical exports amounted to £20,677,569, compared with £20,974,146 for May.

A more detailed analysis divides exports up as follows:—

Chemical elements and compounds	£5,206,300
Coal tar products	£339,870
Synthetic dyestuffs	£744,563
Paints, pigments and tannins	£1,992,331
Medicinal and pharmaceutical products	£2,963,961
Essential oils, perfumes, soaps, polishes etc.	£2,197,212
Fertilisers	£18,404
Plastics	£2,158,169

Russians Visit Crawley

THREE members of the Soviet trade delegation which arrived in Great Britain earlier this month, paid a recent visit to the Crawley factory of the APV Company Ltd. They were Mr. N. A. Petrov (a member of the Collegium of the Ministry of Food Industry), Mr. M. I. Kopiev (director of a scientific research institute within the Ministry of Chemical Industry), and Mr. S. G. Goryunov (departmental head of the Ministry of Machine Building). The delegates were accompanied by Mr. Degtiariov of the Permanent Soviet Delegation in London, and two interpreters. The party spent the day touring the APV factory and foundries, and inspecting the full range of products supplied by the company to dairy, brewery, food and chemical industries throughout the world.

UK to Assist European Atomic Development

Sir Edward Boyle, UK Economic Secretary to the Treasury, is reported to have indicated Britain's willingness to assist European atomic development with British experience and 'know-how'. Addressing the Ministerial Council of the OEEC in Paris last week, he said that the UK, backed by nine years' experience of the atomic industry, was willing to contribute with training courses for technicians and help in plant design, and to take part in one of the proposed joint undertakings—a chemical separation plant.

Oils & Chemicals from Coal

Fuel Research Report

THE report of the Fuel Research Board and the Director of Fuel Research for 1955 (*Fuel Research 1955*, published by HMSO for DSIR, price 4s, by post 4s 3d) states that as a balanced programme of research must include an appropriate measure of basic or fundamental investigations, as well as applied research, most of the items in the Board's programme, even those aimed at solving the more immediate problems, include a considerable amount of basic research.

Synthesis Gas Cost

Describing work carried out on the synthesis of oils and chemicals from coal, the report states that while substantial improvements have been made on the original Fischer-Tropsch process, the major item in operating costs is still the cost of the synthesis gas. During the past year, increased attention has been given to operation with cheaper gases rich in carbon monoxide and to the liquid-phase (slurry) process which is considered to be more suitable than other techniques for large-scale economic operation. A 50-gallon-per-day pilot plant has been converted for operation in this way and preliminary trials are in progress.

Studies have been continued on the production of active catalysts based on steel rolling-mill scale and of methods of pre-treatment of different types of iron catalysts.

Continued use has been made of radioactive tracers in studies of the detailed mechanisms of the synthesis reaction, and catalyst studies are in progress using X-ray diffraction methods and methods based on measurement of changes in the photo-electric work function.

Turning to the effect of gamma radiation on the Fischer-Tropsch synthesis, the report says that a source of gamma radiation which is convenient for the study of chemical systems is the radioactive isotope ^{60}Co . A radiation cell containing 110 curies of this isotope has been erected at the Fuel Research Station. This installation, the design of which is based on that of a somewhat similar unit at AERE, Harwell, is suitable

for the study of a wide variety of systems. The dose-rate in an annular volume of 159 ml. surrounding the source is about 1,700 röntgen per minute.

As it seemed possible that the irradiation of Fischer-Tropsch catalysts might affect their efficiency, tests have been made with a cobalt catalyst, in which the catalyst was irradiated in an atmosphere of hydrogen before use in oil synthesis. Although definite results are not yet available, says the report, the composition of the synthesis product does not appear to be affected in any marked way by irradiation of the catalyst either before or during synthesis, under the conditions so far tried.

The report describes work carried out during the year on the flow properties of residual petroleum fuel oils. During storage, many fuel oils become more viscous and their flow properties change in such a way that they become difficult or impossible to pump as they will no longer flow readily down the suction line to the pumps.

Previous work on this problem, says the report, had been based on the assumption that the flow characteristics of an oil that had been stored in a tank for a number of years could be established by taking a sample, transporting it to the laboratory, and then, without further treatment, measuring the properties of the oil, such as pour point, yield value, or viscosity.

Sampling Problems

It has now been found that during transport of the sample from the storage tank, which is often a long way from the testing laboratory, considerable changes can take place in the oil. To overcome the difficulties involved in isothermal transport of samples, measurements have been made of the properties of stored oils by sampling at the tank and testing with equipment transported to the storage depot for the purpose. In addition, full-scale pumping trials have been made on the same oils with the object of comparing the pumpability of the oil with the data from laboratory tests.

A series of trials was carried out during a period of cold weather with a number of

oils which laboratory data had indicated as having dissimilar properties. The results of these trials showed that both pour-point tests and yield-value tests, hitherto used as a measure of the flow properties, gave misleading information on the relative pumpabilities of the oils. It was established, however, that the viscosity of an oil, as measured in a co-axial cylinder viscometer in which the velocity gradient was approximately the same as that in the full-scale installation, showed a fairly good correlation with the rate at which the oil could be pumped.

Laporte Plant Extensions

Output Increases

IN HIS annual statement to shareholders of Laporte Industries Ltd., Mr. L. P. O'Brien, chairman and managing director, reveals that the development programme for Laporte Chemicals Ltd. is being steadily pursued. Modifications to the older electrolytic hydrogen plant at Luton have been completed and resulted in increase of output. Additional production of hydrogen peroxide from new plant at Warrington, working by the electrolytic process, became available in the last quarter of the financial year.

Further production from electrolytic plant should become available by August next and, according to present indications, LCL expect to be able to dispose of all the hydrogen peroxide they can make this year.

By the beginning of 1958, it is expected that the new plant to manufacture hydrogen peroxide by an autoxidation process will be in process. Arrangements have been made for sale of a large part of the prospective new production. LCL present selling price of hydrogen peroxide is only 47 per cent above that of 1939, yet wage rates paid are 200 per cent higher, and electricity, fuel, and transport are all much more costly. This price has been possible by technical improvements in the manufacturing processes and the greatly increased scale of output.

Sales of barium carbonate, barium oxide and barium hydrate have been increased, and the trading position for the current financial year is considered satisfactory for all departments.

Of Laporte Titanium Ltd., Mr. O'Brien says that as the demand for titanium oxide, both from UK and export markets, is still unsatisfied, the company has entered into

capital commitments for plant for a third stage of development.

Despite the temporary closing for major renewals of some plants worked by Laporte Acids Ltd.—deferred by reason of heavy demands for sulphuric acid in recent years—turnover was within close limits of the previous year.

Mr. O'Brien states that The Fuller's Earth Union Ltd. has decided to undertake additional capital work with the object of reducing the cost of production of activated earth, by the adoption of improved methods already established by recent research. Customers' usage of activated fuller's earth diminished last year, and present indications are that during the current period demands for supplies will not equal forward estimates of requirements given to the company a few years ago, when additional plant was installed.

A temporary decline in earnings by Laporte Chemicals (Australia) Pty. Ltd. is forecast.

'Sporting Fish'

EFFORTS made by Monsanto Chemicals Ltd. to solve the effluent problem (THE CHEMICAL AGE, 14 July) were mentioned on 18 July by Sir Miles Thomas, the recently appointed chairman of the company, when he paid his first visit to the plant at Cefn Mawr near Ruabon. The occasion was a luncheon in the works to which representatives of local authorities in East Denbighshire had been invited. Sir Miles said that as one born in the area he had an active interest in the district, and assured the guests that the company was conscious of its civic responsibility. It already had spent £1 million in trying to solve the problem of effluent, and was now spending £75,000 a year. Local authorities in the area had preserved a reasonable point of view about the matter.

It was important that the company should be given support, because Britain must hold her own in world markets. The contrast was the interests and livelihood of 2,000 employees as compared with a few sporting fish. That was a great principle which should be realised. 'We in Monsanto are doing everything we can to solve the problem. We are applying the latest chemical science to grapple with the problem, and I am sure we will get it under control', said Sir Miles.

PEOPLE in the NEWS

- **MR. ROBERT BAIN**, B.Sc.(Aberdeen), has been awarded the SAI post-graduate studentship at Aberdeen University. He will work on 'The sorption of polyelectrolytes on mercury and on clay mineral surfaces'. **MR. HENRY SMITH**, to whom the first of the SAI studentships was awarded two years ago, has now gained his Ph.D. for work carried out at the Rowett Research Institute on the nutrition of young pigs.
- **MR. G. D. BAERMAN** has been appointed director of sales for the insecticide division of Olin Mathieson Chemical Corporation. Mr. Baerman was previously the general sales manager. Other changes announced by the Corporation are: **MR. PAUL H. WILLIAMS**, formerly assistant sales manager, to general sales manager; **MR. DAVIS J. WALSH**, formerly assistant sales manager, to assistant general sales manager; and **MR. DOUGLAS M. MALCOLM**, formerly Midwest sales manager, to sales correspondent in the division's headquarters offices at Baltimore.
- Monsanto (Canada) Ltd. state that **MR. JOHN L. BURNIE**, Port Credit, Ontario, has been appointed to the newly-created post of product sales manager of polystyrene.
- Assistant to the vice-president, Petrochemicals Division of Commercial Solvents Corporation, **MR. THOMAS B. POTTER**, has been named secretary and assistant treasurer of Northwest Nitro-Chemicals Ltd., Canadian affiliate of Commercial Solvents. Mr. Potter will move to Northwest Nitro's 22 million dollar plant which is now under construction at Medicine Hat, Alberta. When completed this autumn, the plant will produce nitrogen-bearing fertilisers.
- **MR. G. M. MENZIES** has been elected chairman of the British Steel Founders Association, in succession to **MR. F. N. LLOYD**. Mr. Menzies is chairman and managing director of the North British Steel Foundry Ltd. His other directorships include those of Bonnington Castings Ltd. and Alex Findlay & Co. Ltd. **DR. C. J. DADSWELL** has been elected vice-chairman. He is a director of English Steel Corporation Ltd., English Steel Castings Corporation Ltd. and Darlington Forge Ltd.
- At the annual general meeting of the Institute of Physics held in London on 16 July **MR. O. W. HUMPHREYS** (director of the General Electric Co. Ltd., in charge of research) was elected president. **DR. B. P. DUDING** was elected a vice-president, **DR. J. TAYLOR**, honorary treasurer, and **PROFESSOR F. A. VICK**, honorary secretary. The two new ordinary members of the board elected were **DR. L. R. G. TRELOAR** and **MR. G. W. WARREN**. **SIR GEORGE PAGET THOMSON** was elected to honorary fellowship in recognition of his contributions to physics and his services to physicists.
- **SIR JACK STEVENS**, chairman of the Australian Atomic Energy Commission, who, as reported in THE CHEMICAL AGE last week, is to retire from the Commission in September, will join the board of the AEI group in Australia on 7 September. He will succeed **LORD CHANDOS** as chairman of the holding company, AEI, and **MR. KNIGHT** as chairman and chief executive of the operating company, Australian Electrical Industries Pty.
- Sheffield University is to honour three noted scientists who will be taking part in the British Association's meeting at Sheffield from 29 August to 5 September. On 29 August, **LORD HALIFAX**, Chancellor of the University, will confer honorary degrees on **SIR RAYMOND PRIESTLEY**, president of the Association, **SIR GEORGE PAGET THOMSON** and **SIR CHARLES GOODEVE** at a Congregation in the City Hall.
- **MR. DOUGLAS R. J. COOK** has been appointed export sales manager of Sanders & Forster Ltd., structural engineers and manufacturers of standard steel buildings.
- **SIR ROBERT ROBINSON**, former Professor of Cambridge University, who has held chairs of chemistry at many universities, is to be made an honorary associate of Manchester College of Technology. He has received honours from universities in all parts of the world, and in 1947 was awarded the Nobel prize for chemistry. He was Professor of Chemistry at Manchester University in the 1920s.
- **DR. CLYDE WILLIAMS**, American scientist and research executive, will address the

Trade Promotion Conference and second annual dinner of the Welsh Economic Development Council at Cardiff on 12 October 1956. Dr. Williams is the president and director of Battelle Institute, an international industrial research organisation that is playing an increasing role in British technology.

● **MR. A. G. B. OWEN**, chairman of the Owen Organisation, has joined the executive committee of the Welsh Economic Development Council, the organisation formed in 1954 to develop existing industries, attract new ones, and expand Welsh trade at home and overseas.

● **MR. JOHN MALCOLM CORSTIGE**, assistant technical director of I.C.I. Ltd., Fibres Division, Hookstone Road, Harrogate, has been elected as an Associate of the Textile Institute. **MR. RALPH TURNER**, dyer, of Charles Fox and Co. (Dyers) Ltd., stubbing yarn dyers of Bradford, has been appointed a Licentiate of the Institute.

● **MR. JOHN WILLIAM KERR** has been appointed a director of Scottish Agricultural Industries Ltd.

● **MR. W. H. POXON** has retired from the board of British Celanese.

● The Council of the University of Leeds announced on 20 July the appointment of **MR. N. J. PETCH** as Professor of Metallurgy and head of the department from 1 October this year.

Stork Refinery

Van den Berghs and Jurgens, makers of Stork margarine, opened a new refinery at Bromborough on 23 July. According to Mr. Van den Bergh, managing director, the operation of the new refinery will increase the potential output of the Bromborough factory by 50 per cent.

US Celebrates Perkin Anniversary

From 10-16 September the Perkin centennial will be held at the Waldorf-Astoria in New York. Sponsored by the American Association of Textile Chemists and Colourists, the celebrations will include a symposium at which 60 papers will be presented and an exhibition depicting the development of dyes and colours. Sir Robert Robinson will speak on Sir William Perkin—His Life and Work.

AUSTRALIAN NEWS

Pharmaceutical Projects. Glaxo Laboratories Ltd., the Australian branch of the British firm, has begun manufacture of antibiotics at Port Faurey, Victoria. The plant is already producing penicillin and will now make streptomycin in Australia for the first time.

A new factory for Nicholas Pty Ltd., at Homes Glen, Victoria, which will have an area of 220,000 sq. ft., will make a wide range of pharmaceutical lines. The factory will cost £A1,000,000, and sufficient land has been secured for doubling the plant. A staff of 400 will be employed.

New Carbon Plant. The United Carbon Co. of Charleston, West Virginia Nth., is co-operating with Shell Chemical (Australia) Pty. Ltd. in a new plant to make the major types of furnace blacks required by the Australian rubber industry. The factory will adjoin Shell's refinery at Geelong, Victoria, and will be the only carbon black plant operating in the Southern Hemisphere. It will cost £A2 million.

Uranium Extraction Filter. An ingenious inverted filter, devised by officers of the Australian Commonwealth Scientific & Industrial Research Organisation, is now being used for extracting uranium cheaply and quickly from some formerly unprofitable types of Australian uranium ores.

Resin Filter

The ore liquid is filtered up through resin instead of downward. The fluid is forced through in separate pulses instead of being continuously pushed upward. Each upward pulse forces the particles of the resin apart, freeing the filter of the clogging material, which is carried away at the top. The resin particles settle together again after each pulse.

The inverted filter is said to act perfectly, even with crushed ore fluid containing 40 per cent of clogging solids.

Rayon Loses Popularity. A falling off in the popularity of rayon underwear in Australia is noted by a large company in the local textile trade. The company, Lustre Hosiery Ltd., of Sydney, states that it became necessary to sell quantities of rayon goods at substantial discounts and to curtail manufacturing. At the end of the year the company wrote down heavily the rayon stock still on hand.

Parliamentary Topics

ANSWERING a question in the Commons on 17 July, Mr. P. G. T. Buchan-Hepburn, Minister of Works, gave details of new buildings constructed since 1945 by the DSIR and its research institutions. The list, which did not cover minor new works costing less than £10,000, included new buildings at the Building Research Station, Chemical Research Laboratory, Joint Fire Research Organisation, Food Investigation (Fish and Fish Products Division), Forest Products Research Laboratory, Fuel Research Station, Pest Infestation Laboratory, Road Research Laboratory, and Water Pollution Research Laboratory.

THE Parliamentary Secretary to the Ministry of Works, Mr. J. R. Bevens, replying to a question in the Commons on 17 July, said that the respective committees of the Privy Council were responsible for approving the pay and allowances of members of the staff of the research councils working under the Privy Council. In practice this duty fell upon the Lord President of the Council in consultation with the Treasury. The Lord President had regard to the nature of the work and the responsibilities of the people concerned. Broadly speaking, continued Mr. Bevens, Civil Service standards obtained, but the Medical Research Council was in a somewhat special position and its scientific staffs were aligned with the universities while most of its technical staffs were aligned with the National Health Service.

MAJOR Gwilym Lloyd-George, Secretary of State for the Home Department and Minister for Welsh Affairs, replying to a question in the Commons on behalf of the Lord Privy Seal on 18 July, said that the nuclear power station at Dounreay was primarily a research and development establishment. An experimental model of a fast breeder reactor capable of producing power was under construction and electricity generating equipment with a capacity of 15,000 kilowatts was being installed. Owing to the experimental nature of the project,

however, it was not possible to forecast when, or on what scale, it might provide a continuous supply of electricity.

REPLYING to another question on behalf of the Lord Privy Seal on 18 July, Major Lloyd-George said that the plant at Windscale, near Sellafield, for converting enriched uranium hexafluoride to enriched uranium metal, was already in operation. Enrichment of uranium was carried out at the diffusion plant at Capenhurst, a number of sections of which were in operation, the material for the purpose of that process being in the form of uranium hexafluoride.

THE Parliamentary Secretary to the Ministry of Works, Mr. J. R. Bevens, said in the Commons recently that two methods of testing textiles for flammability were at present being studied by a committee of the Textile Institute, co-operating with the British Standards Institute and the Joint Fire Research Organisation. The JFRO was also carrying out a survey in connection with the investigation, which involved collecting statistics and examining samples of clothing involved in burning accidents. Mr. Bevens added that it would not be possible to lay down standards until this survey had been completed.

THE Minister of Health, Mr. R. H. Turton, said in a written answer on Monday (23 July) that the right level for the fluoridation of water in the studies in this country was determined as a result of investigations into the effects of water which naturally contained fluoride, and in the light of over 10 years' experience in other countries. It had been found, continued the Minister, that at one part per million a very high degree of protection against caries was given, but the mottling caused by higher concentrations was avoided. Referring to the recommendation of the report of the UK Mission to North America as to the best way of determining the present level of ingestion in human beings, the Minister said that a pilot investigation had confirmed the results obtained in other countries.

Record US Oil Imports Forecast

A record level of crude oil imports in the third quarter of this year is forecast by the Independent Petroleum Association of America.

Test Facilities for Industry Factory Fires

International Combustion's Test House

ALL facilities of the test house of International Combustion Ltd, at Derby are now available to industry generally (see *THE CHEMICAL AGE*, 7 July). Equipped with the full range of machines which the company manufactures, the test house is claimed to be the most comprehensive of its type in the world.

The plant is arranged in two sections for wet and dry processing respectively, each unit being the smallest commercial size available. Equipment comprises a range of pulverising mills of varying types, air classifying equipment, vacuum filtration plant, continuous centrifuges, hydraulic classifier and thickener, pumps for handling solids in suspension, vibratory screens and feeding devices, together with certain research equipment for studying the heat transfer and other effects of boiler flue gases.

Sample Room Specimens

An adjoining sample room contains several thousand specimens of materials which have been tested, data being compiled in each case and filed for record purposes.

Potential customers are invited by arrangement to send samples of their products for processing, to enable the company to advise on the most suitable machine required for that particular operation.

The grinding equipment includes hammer mills, roller mills, ball and rod mills which are generally provided with air classifying equipment, except for the wet ball mill which is in circuit with a rake classifier. With this range of machines, materials from the softest to the hardest are reduced to powders of a consistent degree of fineness. The particles of such products are frequently required to have a maximum diameter of two thousandths of an inch and in special cases, less than a half-thousandth of an inch.

The latest addition to the range of machines in the test house is the Dynocone. This machine is designed to effect by centrifugal force the various separation of solids from liquid suspending media. It gives a continuous discharge of both dewatered solids and effluent and instead of the usual basket construction has a solid bowl on to which solids are deposited.

A CONFERENCE on fires in industry, arranged by the British Occupational Hygiene Society, will be opened by HM Chief Inspector of Factories, Sir George Barnett, at the London School of Hygiene & Tropical Medicine on 12 November.

The following papers will be read:—

'A Technical Survey of Fires in Industry' by N. C. Strother Smith, M.A., A.M.I.E.E., director, Fire Protection Association; 'Industrial Fires from the Point of View of the Fire Brigades' by E. R. Ashill, A.M.I.F.E., chief officer, Croydon Fire Brigade; 'First-aid for Casualties from Fire' by D. McG. Jackson, M.D., F.R.C.S., surgeon-in-charge, MRC Burns Unit; 'Modern Methods of Fire Alarm and Extinction' by P. Nash, Fire Research Station; 'Managerial Responsibilities and Fire Prevention' by H. Mason Bibby, M.Eng., M.I.Mech.E.

The conference fee for persons who are not members of the Society is one guinea. Applications should be sent to the hon. scientific secretary, Dr. D. Turner, M.R.C. Laboratories, Holly Hill, Hampstead, London NW3.

Alkali Works Report

The 92nd report on alkali etc. works in England and Wales in 1955 by the Chief Inspector, shows that the number of works registered under the Alkali etc. Works Regulation Act, 1906, at the end of 1955 was 921, involving the operation of 1,794 separate processes. Compared with 1954 there was a decrease of six in the number of works and an increase of 10 in the number of processes. The total number of visits and inspections made during the year was 3,894 including 165 special visits by the chief and deputy chief inspectors.

Surplus Refinery Gas to be Used

Surplus gas from the Esso Petroleum Co.'s refinery at Fawley, near Southampton, will be used by households and industry in the district under a 10 year agreement concluded by the company with the Southern Gas Board. This, after reforming at Southampton, will give the equivalent of about 13 million therms of town gas each year. The Board is to lay a 17-mile main from the refinery to Southampton works to take the supply. As a result of the agreement the Board may save 115,000 tons of coal a year.

Estimation of Germanium & Gallium

Two Papers Presented to Midlands Section of SAC

GERMANIUM, said Dr. Cluley, was discovered by Winkler in 1886. It fulfilled the requirements of 'eka-silicon', one of the elements whose properties had been predicted by Mendeleef (1871) from the periodic table. Following the early work on germanium very little interest had been shown in the element until recently when it had found use as a semi-conductor. This had led to a search for new sources of the element and stimulated the development of new methods for its determination.

The position of germanium in Group IVB of the periodic table, between silicon and tin, gave little indication of its general analytical behaviour. Although germanium showed a limited similarity to tin (and also to boron), the element it most closely resembled analytically was arsenic. Thus, germanium formed an ammonia-soluble sulphide which could be precipitated from strongly acid solution; germanium tetrachloride readily distilled from strong hydrochloric acid solution; germanium could be detected in a manner similar to the Marsh test for arsenic. With these and other similarities it was not surprising that arsenic interfered with many methods for determining germanium.

Methods of Separation

Methods for the separation of germanium from other elements were as follows:—

(1) Precipitation as germanium sulphide from 5-6N sulphuric acid or 3N hydrochloric acid. Arsenic in particular accompanied the germanium.

(2) Distillation as germanium tetrachloride from strong hydrochloric acid solution (>5N). Although trivalent arsenic also distilled under these conditions, pentavalent arsenic did not; a separation from arsenic could therefore be achieved by distillation under oxidising conditions. The separation of germanium by distillation was highly selective, but the methods applicable to determining germanium in the distillate were limited because of its high acidity and the presence of the germanium in a volatile form.

(3) Extraction of germanium tetrachloride with carbon tetrachloride from strong hydrochloric acid solution (>8N). The

The February meeting of the Midlands Section of the Society for Analytical Chemistry was held in the University, Edmund Street, Birmingham. Two papers were read, 'The Analytical Chemistry of Germanium' by H. J. Cluley, M.Sc., Ph.D., F.R.I.C. (GEC, Wembley), and 'The Analytical Chemistry of Gallium' by G. W. C. Milner, M.Sc., F.R.I.C., A.Inst.P. (AERE, Harwell).

germanium was retained in the water layer at low concentrations of acid, thus permitting recovery of germanium from the carbon tetrachloride by back extraction into water. Trivalent arsenic accompanied the germanium but extraction of arsenic by the organic solvent could be minimised by prior oxidation to the pentavalent state.

(4) Complexing with oxalic or hydrofluoric acid to suppress the normal analytical reactions of germanium. Thus, germanium sulphide was not precipitated under such conditions although the sulphides of certain other elements (e.g. arsenic and antimony) were.

Germanium could be determined gravimetrically by the following procedures:—

(1) Precipitation with tannin from 0.2–0.5N sulphuric acid, containing ammonium sulphate; the precipitate was ignited to the oxide. This was probably the most useful and selective gravimetric method. Arsenic did not interfere, but Mo, W, Nb and Ta did. The method was not applicable to low concentrations of germanium (better determined colorimetrically) as the precipitate tended to become colloidal.

(2) Precipitation as germanium sulphate (see (1) above), followed by solution in ammonia, oxidation with hydrogen peroxide, evaporation and ignition to the oxide. This method was accurate, but arsenic interfered by co-precipitation.

(3) Precipitation as magnesium germanate by addition of magnesium sulphate to a germanium solution containing ammonium sulphate and ammonium hydroxide. The precipitate, weighed as magnesium germanate, conformed to this composition only if the proportions of reagents were controlled within narrow limits. Arsenate and phosphate interfered.

(4) Precipitation of the germanomolybdate of an organic base, e.g. pyridine, cinchonine, 8-hydroxyquinoline, and weighing in this form. The high molecular weights of these precipitates facilitated the determination of small amounts of germanium but the precipitates tended to be somewhat variable in composition. As, Si and P were similarly precipitated.

(5) Precipitation as 5,6-benzoquinoline trioxalatogermanate and ignition to germanium dioxide. Fe, Sn, Ti and Zr interfered.

Volumetric Methods

The following volumetric methods were available:—

(1) Iodometric titration of thiogermanate, formed by the addition of potassium sulphide to a feebly acid-buffered solution of germanium. The thiogermanate was oxidised to GeO_2 with an excess of standard iodine, the excess being ascertained by back titration

(2) Iodometric titration of germanous chloride, formed by sodium hypophosphite reduction of tetravalent germanium in strong hydrochloric acid solution. Under these conditions, arsenic was reduced to the element and could be filtered off prior to titration.

(3) Titration of mannito-germanic acid with sodium hydroxide, analogous to the titration of boric acid in the presence of mannitol. Trivalent arsenic did not interfere.

(4) Bromometric titration of oxine after precipitation of oxine germanomolybdate.

Of these volumetric procedures, methods (2) and (3) appeared to be the most useful.

Colorimetric methods for germanium, using organic reagents, had received particular attention in recent years (see methods (3), (4) and (5) below). The following colorimetric methods for germanium were available:—

(1) Formation of yellow germanomolybdic acid.

(2) Reduction of germanomolybdic acid to 'molybdenum blue'.

(3) Colour reaction with phenylfluorone in N hydrochloric acid solution.

(4) Colour reaction with oxidised haematoxylin at pH 3.

(5) Colour reaction with quinalizarin acetate at pH 5.

The colorimetric methods using organic reagents were more sensitive than the germanomolybdate methods, and in recent years methods (3) and (5) had received by far

ESTIMATION of

the most use. Apart from those listed above, numerous other organic compounds had been found to give colour reactions with germanium and this had permitted the postulation of two essential structural requirements for a reagent suitable for germanium. Many of these reagents gave precipitates with germanium, offering the possibility of new gravimetric methods.

The polarographic determination of germanium had received limited attention and there seemed to be no general agreement on the most suitable conditions for the determination. These methods appeared to have an appreciable lower sensitivity than that obtainable colorimetrically.

Another method of determining germanium was by the formation of the hydride under alkaline conditions and pyrolysis of the hydride to give a germanium stain, the intensity of which was a measure of the germanium present.

Determining Germanium

Practical applications of determining germanium were then reviewed. In this country germanium was extracted from the flue dusts of gas works and its determination in flue dust and coal could be effected as follows:—

(1) Flue Dust

(i) Fusion with sodium carbonate.

(ii) Separation of the germanium by hydrochloric acid distillation.

(iii) Absorptiometric determination with phenylfluorone.

Two per cent germanium could be present, but normally there was much less.

(2) Coal

(i) Combustion in a bomb or decomposition by an Eschka-type method.

(ii) Fusion of the ash with sodium carbonate.

(iii) Steps (ii) and (iii) above.

The average germanium content of British coal was about seven p.p.m., but as little as two p.p.m. could be determined.

In the US and elsewhere, germanium was extracted as a by-product in the refining of zinc, and the determination of germanium in zinc ores and products had been effected by the following methods:—

(1) (i) Separation of germanium by hydrochloric acid distillation.

(ii) Extraction of the germanium from

GERMANIUM

the distillate with carbon tetrachloride.

- (iii) Absorptiometric determination with oxidised haematoxylin.
- (2) (i) Ether extraction of germanium from hydrogen bromide solution.
- (ii) Absorptiometric determination with phenylfluorone.
- (3) (i) Precipitation of germanium and copper sulphides (copper added as a 'collector').
- (ii) Germanium-copper solution chromatographed on paper with an acetone-methyl ethyl ketone—hydrochloric acid—water mixture.
- (iii) Germanium spot developed with phenylfluorone.

The following methods had been used for the determination of germanium in ores and rocks:—

- (1) *Ores* (Zn, Cu, Pb and V minerals).
 - (i) Decomposition of the mineral by heating with phosphoric acid.
 - (ii) Extraction of the germanium from hydrochloric acid solution with carbon tetrachloride.
 - (iii) Absorptiometric determination with quinalizarin acetate or phenylfluorone.
- (2) *Silicate Rocks*
 - (i) Decomposition with a mixture of hydrofluoric and sulphuric acids.
 - (ii) Extraction of the germanium from hydrochloric acid solution with carbon tetrachloride.
 - (iii) Absorptiometric determination with phenylfluorone.

Final Words

Dr. Cluley concluded by saying that while the colorimetric determination of germanium could be considered to be in a fairly healthy state, few of the gravimetric and volumetric methods possessed both accuracy and good selectivity.

During the discussion period which followed the presentation of the two papers, Dr. Cluley was asked about instrumental difficulties encountered when using a Cambridge galvanometer in deriving calibration curves for the colorimetric determination of germanium with phenylfluorone.

It seemed that better results were forthcoming by using a Unicam instrument if the very narrow peak wavelength required could be obtained. A suggestion concerning the deter-

mination of germanium in flue dusts was that interference from arsenic could be eliminated by ignition at 1000°C. Dr. Cluley thought that there was a general danger of germanium losses unless all carbonaceous matter was removed, first. Otherwise, germanous compounds produced by reduction were lost appreciably above about 700°C due to their volatility.

Finally the quantitative precipitation of germanium sulphide from 3N hydrochloric acid was queried as being perhaps too low a concentration of acid. Morgan and Davies had studied this problem, and their figures indicated that quantitative precipitation did occur under such conditions said Dr. Cluley. At a hydrochloric acid concentration of 6N there became a danger of losses of germanium due to the volatility of the tetrachloride, so that the precipitation of germanium sulphide was best carried out from sulphuric acid media.

(To be continued)

Sarnia Petrochemical Plant

IMPERIAL OIL has announced plans for a \$25 million, 50 acre plant adjacent to the Sarnia refinery. This petrochemical plant will supply the Canadian chemical industry with large quantities of ethylene, propylene, normal butylene, isobutylene, butadiene, aromatic distillates and aromatic tars.

Feedstock for the plant will come from Imperial's nearby refinery—said to be Canada's largest. Operations will be integrated to utilise the hydrocarbon fractions best suited for manufacture of petrochemicals.

Engineering work on the plant is under way and construction crews will move on to the site next spring. Completion date is expected to be spring 1958.

UK Attitude to Business

BRITISH businessmen's attitude has been criticised by an Australian writer in a recent issue of *The Director*. In US, states the writer, businessmen were anxious to meet the Australians and were enthusiastic about co-operating with them in business in Australia.

But in Britain the businessmen's reaction is that perhaps in two or three years' time they would send somebody to Australia to see what could be done. According to the writer, this attitude almost forces Australians into doing business with the US.



From all Quarters



New Non-Toxic Insecticide

The Airkem Co. Inc., of New York, has introduced an insecticide called Airkem Odor-Counteracted. Formulated as an aerosol it is packed in a 16 oz. dispenser. The company claims that the presence of an odour counteractant in the formulation ensures that there is no unpleasant smell after use. The US Department of Agriculture has passed the formulation as being non-toxic.

Shell to Expand US Plant

Shell Chemical Corporation is to increase the scope of its synthetic rubber plant at Torrance, California. The programme, which will cost several million dollars, includes a new unit to produce a special latex for the manufacture of foam rubber products, extensions to the butadiene facilities and modernisation of the synthetic rubber unit.

Portuguese Ammonium Sulphate Record

A record total of 80,000 tons of ammonium sulphate was produced from two Portuguese plants during 1955, according to a recent report from Lisbon. A government plan calls for a total production by the two factories of 140,000 tons a year. In 1955, a group of electrolyzers was installed in each factory and plans call for the installation of four more by 1957.

Uganda Cement Output to be Trebled

The Uganda Cement Industry Ltd. announces plans for expansion which will enable production to be trebled by the end of the year. Exports to the Belgian Congo have already increased from 120 to between 300 and 400 tons a month.

Finnish Pulp Production Up

Finland's chemical pulp output in 1955 reached a new record of 1,826,000 tons, of which over 1,100,000 tons were exported (about 61 per cent sulphite pulp, and 39 per cent sulphate). In 1950 the chemical pulp industry's production capacity totalled about 1.4 million metric tons a year; in 1955 it reached over 1.8 million, and when extensions are completed will total over two million metric tons a year.

Atomic Energy in Chemical Reactions

The setting up of laboratories to specialise in the use of radiations of beta and gamma rays and neutrons in various chemical reactions is contemplated in Rumania, according to the *Information Bulletin* of the Rumanian Chamber of Commerce. Among the problems to be studied initially will be chloride treatment of various hydrocarbons which yield products such as hexachlorocyclohexane. Gamma rays may be used in polymerisation reactions, in the treatment of polythene to modify its properties, and for converting heavy gasoline into light gasoline.

Japanese Potash Order

A Japanese order for 70,000 metric tons of potash has been placed with the German potash industry, according to the Canadian journal, *Foreign Trade*. Negotiations over the supply of German potash to Japan began last autumn in the Federal Republic between the Japanese Agricultural Minister and the sales organisation of the German potash companies in Hanover. The order is stated to be worth DM 28 million.

Slow Progress at Dead Sea Works

The slow progress so far recorded by the Dead Sea Works potash project is due to a number of bottlenecks which must be eliminated in the new plant before anything approaching an optimum production of 6,000 tons a month can be achieved, says a report from Israel. The machinery put into operation last March must have at least six months to complete its trial runs while the unseasonably cold spring has retarded evaporation in the carnallite pans. Production of potash has fluctuated between 3,200 and 2,900 tons a month, but is expected to exceed 3,000 tons monthly when new supplies of carnallite becomes available this month.

Italian Industrial Expansion

Italy's output of rubber in 1955 reached an index figure of 202, compared with 194 in 1954 (1938 = 100). Chemical production increased from 240 to 279, and oil and coal by-products increased from 733 to 784.

US Plastics Project

IMPERIAL Chemical Industries Ltd. and Hercules Powder Co. of the US are to build an \$11 million plant in Missouri for the manufacture of methyl methacrylate. British Treasury sanction for ICI to participate in this project has been obtained.

The new plant, with an annual capacity of 34,000,000 lb., will be built on a 20-acre site at Louisiana, Missouri, adjoining the Missouri Ammonia Works owned and operated by Hercules Powder Co. The new company will make and sell both monomer and polymer in various forms.

Methyl methacrylate is made on a large scale by only two other companies in the US and at present its main application is as a plastic polymer. US consumption has doubled between 1949 and 1955 and is expected to double again in the next five or six years.

In addition, there are growing outlets for the monomer as a raw material for products used as protective coatings, lubricating oil additives, and other applications.

Potash Nitrate Prices

THE Nitrate Corporation of Chile Ltd. announces that until further notice the prices for Chilean potash nitrate, 15 per cent N, 10 per cent K₂O, 20 per cent sodium, in lots of not less than six tons delivered carriage paid to any railway station in Britain or c.i.f. main ports in the Isle of Man, are:—

July	...	...	£30	0s
August/September	...	...	£30	5s
October/November	...	...	£30	10s
December/February	...	...	£30	15s
March/June	...	...	£31	0s

These prices are per ton of 2,240 lb. gross weight. Smaller lots delivered carriage paid are subject to the following surcharges:—

4 tons and over, but less than 6 tons	—	5s. per ton
2 tons	—	10s. "
1 ton	—	20s. "
5 cwt.	—	1s. 6d. per cwt.
Less than 5 cwt.	—	2s. 6d. per cwt.

There are no surcharges on any quantity collected from the company's nitrate depots, but there is an allowance of 15s per ton when lots of 5 cwt and over are collected. These prices are subject to alteration or withdrawal without notice.

LORD TRENT, former chairman of Boots Pure Drug Co. Ltd., who died at St. Lawrence, Jersey, on 8 March, left estate in England valued at £7,806 gross, net value nil.

Petroleum Chemical Production

PETROLEUM CHEMICAL production in OEEC countries during 1955 has been reviewed by the Organisation's Petroleum Chemical Working Party.

Total carbon content of petroleum chemicals produced in member countries rose from about 200,000 metric tons in 1953 to about 300,000 metric tons in 1954, and 400,000 metric tons in 1955. In 1956, total production is expected to rise to more than 450,000 metric tons and in 1959, to cover one million metric tons.

Prominent in this expansion will be synthetic rubber (both S type and butyl), polythene and ethylene oxide derivatives, glycerine, aromatic and raw materials for plastics and detergents.

This year's review showed that total investment in the petroleum industry in Western Europe (in terms of plants in operation at the given date) rose during 1955 by about 8 per cent to some 314 million dollars at the end of 1955, and is expected to rise to over 750 million dollars by the end of 1958.

In 1955 total sales of plastics materials exceeded a million tons for the first time and were 23 per cent higher than in 1954.

During 1955 the most rapid expansion, both absolute and proportionate, continued to be in thermoplastics, where sales rose by 31 per cent over 1954 to about 500,000 tons (47 per cent of the total). The increase in thermosetting plastics was smaller (19 per cent higher than 1954), although sales in 1955 far rather more than 450,000 tons were 44 per cent of total sales for Western Europe.

OEEC countries produced in 1955 about 116,000 tons of dyestuffs (about 4 per cent less than in 1954). For the current year production is expected to be fairly stable, mainly as a result of the falling-off in demand from the textile industry. The requirements of other industries using dyestuffs are unchanged or have increased slightly.

New Trade Names

The trade names Dixel, Tricel and Celon have been adopted for the major yarn products of British Celanese, with effect from 1 August. The company states that the recent introduction of a new triacetate fibre and a new polyamide fibre has made it necessary to differentiate between these new products and the existing yarns and fibres. The Celanese trade mark can now be applied to all the company's yarn products.

Surface Active Agents

Wyandotte Develop New Range

PLURONICS is the name given to a series of non-ionic surface active agents made by the Wyandotte Chemicals Corp., of Wyandotte, Michigan, US. The development of these materials was based on the observation that as the molecular weight of a polypropylene glycol was increased, the glycol passed from a water-soluble to a relatively water-insoluble material.

At higher molecular weights it was sufficiently water-insoluble to be a suitable hydrophobic base for non-ionic surface active agents. Surface activity was obtained by condensing ethylene oxide on the polyoxypropylene base.

Four Pluronics Available

At present four Pluronics are commercially available. These are identified by the references L44, L62, L64 and F68. The letter describes the physical form of the material, L being used for a liquid, P for a paste and F for a flake. The first digit identifies the average molecular weight of the base unit, and the second the proportion of ethylene oxide in the molecule. F68 is claimed to be the first non-ionic surface active agent to be offered commercially in a flake form.

Data on the toxic effects of Pluronics have been published by Wyandotte. It has been found that F68 is relatively non-toxic when administered orally in single doses. Rats fed three to five per cent of F68 in their food for six months did not exhibit significant symptoms of toxicity as revealed by the growth pattern, biochemical or hematological changes, or a histopathologic examination of their tissues. The general conclusion for all these materials seems to be that they are relatively non-poisonous and non-irritant.

To assist in choosing the appropriate Pluronic for a particular task the Pluronic grid has been devised. By listing the properties he requires and applying them to the grid the formulator can choose the most suitable combination for his problem.

Applications of Pluronics include: Agriculture, cosmetics, detergents, latex and rubber, metal cleaning, paint, pharmaceuticals, plasticisers, soap, textiles, and water treating.

Sole United Kingdom agents for Pluronics are Jacobsen Van Den Berg & Co. (UK) Ltd., 3/5 Crutched Friars, London EC3.

Food Research Campaign

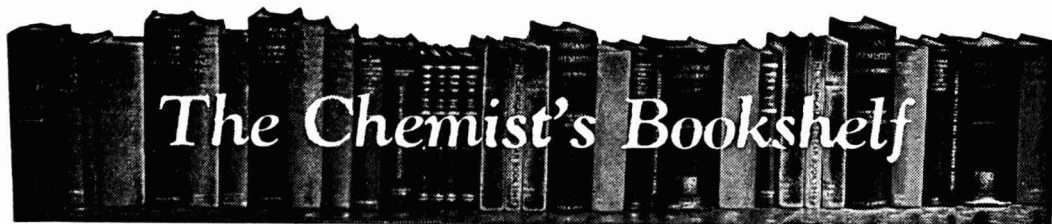
Membership Drive Launched

AN ALL-OUT membership campaign is being launched by the British Food Manufacturing Industries Research Association. This was announced by Mr. R. P. Woollard (London Oil Corporation Ltd.), chairman of the council, at the Association's annual meeting in London. The campaign, he said, would be coupled with the Association's recently-established liaison and advisory unit. There was a large field of potential membership to be tapped, particularly from the smaller food manufacturers and the manufacturers and suppliers of raw materials. The services of the new unit were available to both members and non-members of the Association. 'I am sure those firms already in membership will also welcome this attempt to help them, both by solving specific problems on the spot and at the same time assisting them, where necessary, to apply the results of research.'

Mr. Woollard, who is chairman of an investigating committee enquiring into the biological testing of food additives, revealed that work being done abroad on the subject was being surveyed, together with the possibilities of having the work done in this country, either extra-murally or by setting up a new biological testing station. The committee is comprised of representatives of interested organisations.

Successful Year

The annual report of the Association shows a successful year's working, with an increase in subscription income. Seven research reports, two scientific and technical surveys, and 16 technical circulars were issued to members. Professor A. C. Frazer, of Birmingham University, was elected president of the Association, in succession to Sir Frank Engledow, of Cambridge. Mr. J. G. Mathieson (Clarke, Nickolls & Coombs Ltd.) and Lt. Col. G. R. Harding, D.S.O., M.B.E. (Aplin & Barrett Ltd.) were re-elected vice-presidents. One-third of the members of the council, required to retire under the articles of the Association, were re-elected. Mr. L. V. Johnston (Nabisco Foods Ltd., formerly the Shredded Wheat Co. Ltd.) was elected to the council to fill the vacancy caused by the resignation of Mr. H. M. Beak. The vacancy caused by the death of Mr. W. B. Chivers will be filled at a later date.



The Chemist's Bookshelf

VALENCY AND MOLECULAR STRUCTURE. By E. Cartmell & G. W. A. Fowles. Butterworths Scientific Publications, London; Academic Press, Inc., New York. 1956. Pp. xi+256. 32s. 6d.

It is extremely probable that this book will become prescribed reading for honours students in chemistry in many of the universities in this country. The recent resurgence of interest in inorganic chemistry, and the realisation of the necessity for a structural approach to many of its problems have emphasised gaps in the training of many inorganic chemists. The requisite physical and physicochemical background has usually been acquired in physics or physical chemistry courses without any emphasis on its significance in the inorganic field.

Attempts to apply such detached information prove difficult and are often abandoned. Lecturers in advanced inorganic chemistry have felt the lack of a suitable textbook to supplement the small amount of structural treatment that time permits them to give; or they have sometimes even restricted themselves to purely descriptive teaching with the feeling that no instruction at all is better than the muddle that may result from too little.

This book, it is claimed, is written 'by chemists for chemists'. One might go even further, and point out that it is written by inorganic chemists for inorganic chemists. The reviewer would not suggest by this that it is the child's guide to inorganic chemistry. Far from it. The reader will have to apply himself diligently to master the contents of the book, which commences with a quite advanced treatment of the quantum theory as applied to atomic structure, a full grasp of which is required for further progress.

Therefore, although the reader will not be able to comfort himself by repeating that what one fool can do another can, he should at least be able to spur himself on to the

necessary effort by reflecting that what one inorganic chemist has done another ought to be able to do.

The book goes on in the second section to treat of the formation of compounds on the basis of the quantum theory—what is usually referred to as the quantum theory of valency. Finally, the third section applies all this preliminary matter to the discussion of up-to-date views on the structures of actual inorganic materials. Starting with general theories of the solid state, it goes on to deal with numerous examples of simple and complex inorganic compounds, and concludes with a consideration of electron-deficient molecules.

Compressed into such relatively small space, the matter contained in this book is bound to make difficult reading, particularly for the student with no flair for the mathematical approach (who still exists, in these days, and who still may be interested in inorganic chemistry). It is fair to say, however, that as far as can be judged, the matter treated has been rendered as simple as possible. Consequently time spent on mastering the contents of this book will be rewarding, and should benefit not only the individual reader, but, in the long run, the state of inorganic chemistry.—CECIL L. WILSON.

MODERN CHEMICAL PROCESSES. Vol. IV. By the editors of *Industrial & Engineering Chemistry*. Reinhold Publishing Corp., New York; Chapman & Hall Ltd., London. 1956. Pp. 202. 40s.

This is the fourth in a series of volumes, the first of which was published in 1950. The purpose of the series, stated the first edition, is to provide a perpetual inventory of American chemical technology and the most valuable reference source of its kind available. It is perhaps possible now to decide whether this purpose is being fulfilled.

The system adopted throughout the series

is for each process to be written-up by an associate editor of *Industrial & Engineering Chemistry* in conjunction with experts from the company concerned. In this way the information contained is both accurate and, in general, competently written.

It is a tribute both to the judgment of the editors and to the diversity of the chemical industry that there is no falling-off of interest as one proceeds from Vol. I to Vol. IV. The editors have been careful not to use all the 'plums' in the first one or two volumes, leaving the remainder to be filled up with fringe material and processes of little or no contemporary interest.

Altogether 88 processes have now been described in the four volumes. Further volumes are promised at intervals of two years and one hopes that eventually a complete coverage of the chemical industry will be obtained, if such a thing is possible.

A series of this nature should appeal to a wide readership. There is certainly a place for it in the library of any institution which teaches applied chemistry or chemical engineering. Many practising chemical engineers will also find much of interest, and to British scientists and industrialists this series should provide a useful source of information on the latest state of the American chemical industry.

The printing and paper are of a high quality and the photographs and diagrams used are very good. All-in-all this series can be described as a success and we look forward to further volumes as they appear.—J.P.S.J.

A LIFE OF SIR WILLIAM RAMSAY. By MORRIS W. Travers. Edward Arnold (Publishers) Ltd., London. 1956. Pp. viii + 308. 50s.

Professor Travers, who for many years was a colleague of Sir William Ramsay's, has collected a considerable number of Ramsay's papers, and has used them as the basis for this book. Much of the material, which consists of letters written by Ramsay to his family and scientific colleagues, and notebooks describing his discoveries, appear for the first time. Indeed, many facsimile reproductions of pages from Sir William's letters and notebooks are used as illustrations.

The amount of work involved in planning and writing such a monumental work as this is considerable, and Professor Travers is to be congratulated on the thoroughness with which he has carried out his task. He has not

confined himself merely to setting down in order well-documented facts: he has produced an excellent analytical study of Ramsay's scientific and educational work, and the experimental methods which he employed. The descriptions of Ramsay's research, and the portrait of the man himself, are imbued with an atmosphere of warmth and understanding.

The book describes in detail Sir William's ancestry, childhood and youth, his posts as university lecturer in Glasgow, professor in University College, Bristol, principal of University College, Bristol, and his early years at University College, London.

Professor Travers deals fully and critically with the discovery of argon, helium, neon, krypton and xenon, the isolation of neon, krypton and xenon, experiments with radium, work on the physical properties of radon, and the attempts to split the atom.

An appendix on the memorials to Ramsay and a comprehensive index complete a work of significance which every chemist, and aspirant chemist, will undoubtedly wish to own. This book should rapidly establish itself as the standard work on Ramsay.—P.W.A.

Exports to East Africa

IN THE EXPANDING market of British East Africa ground has been lost by the United Kingdom in the past year or so, and the share of trade imports enjoyed by foreign competitors combined is now greater than her own. The *Board of Trade Journal* of 14 July states that among the lines in which competition is strong or developing are paints, chemicals and pharmaceuticals. The *Journal* points out that slow deliveries and failure to keep delivery dates are frequent subjects of complaint. The age-old tale that f.o.b. and not c.i.f. prices are quoted is still heard. Complaints as to quality also arise, and it would seem that work at inspection points in factories remains often very poor. High prices and failure, or perhaps inability, to make them firm, and failures to keep delivery dates, are fatal. Customers' complaints, in this reference, are taken to be of a general nature and not directed towards any specific commodity.

MR. SYDNEY SHAW, of 10, The Crescent, Hipperholme, a director of Bradford Dyers' Association, left £24,157 (net £23,845, duty £3,580).

Publications & Announcements

THE JANUARY 1954 edition of *Vacuum*, produced by Edwards High Vacuum Ltd. of Crawley, Sussex, has recently been published. In an article entitled 'The Ultimate Vacuum Obtainable in Vapour Pumps' Dr. N. A. Florescu of the New South Wales University of Technology criticises the assertion that the ultimate vacuum of a vapour pump is limited by the diffusion of gas back through the vapour blast. It has been shown, he says, that the ultimate vacuum with hydrogen is much lower than that resulting from backward diffusion. The conclusion is drawn that for a well-designed vapour pump the ultimate vacuum is limited, not by the pressure of the gas diffused from the fore pressure side, but by the lowest total pressure of all gases and vapours already contained in the vapour before it leaves the nozzle, apart from the partial pressure of the vapour of the working fluid. A corresponding article on 'The Ultimate Vacua of Two-Stage Rotary Oil Pumps' is also contained in this edition. The price of *Vacuum* is £2 10s per year or 15s for a single copy when available.

* * *

THE June issue of *CIBA Review* contains nine articles commemorating the centenary of Sir William Henry Perkin's discovery of mauveine. Profusely illustrated with contemporary engravings and photographs, the articles deal in turn with the age in which Perkin lived; Perkin, the man; chemistry and chemical education in Perkin's student days; Perkin, the scientist; Perkin, the manufacturer; the impact of his work; and dyestuff's research and application over the past 100 years.

* * *

HANDSOMELY bound and employing a straightforward but admirable presentation, the new catalogue issued by A. Boake, Roberts & Co. Ltd., of London, *Industrial Chemicals*, should prove of great value to all those who are interested in the company's products. Headed by some useful explanatory notes, the contents refer to the terms and conditions of sale, plasticisers and chemical intermediates, metallic soaps and salts, metallic stearates, surface coating

resins, lubricants and stabilisers and deodorants. The catalogue states that if the reader requires further information regarding the technical details of the products listed, a number of special sheets providing the necessary amplification are available. A selection of those at present in print is listed and is referred to, where applicable, in the body of the publication.

* * *

A LITERATURE survey of papers published on the subject of pyroclor transformers has been issued by Monsanto Chemicals Ltd., London SW1. Altogether 23 references are given, listed under the four headings: Fire Resistance, General Properties, and Transformer Design and Applications.

* * *

PRECIPITATED calcium carbonate under the trade name of Purecal, is described in a brochure published by Wyandotte Chemicals Corp. of Wyandotte, Michigan, US. In the Wyandotte process for producing p.c.c., milk of lime is first treated with ammonium chloride to produce calcium chloride and ammonia. The ammonia is boiled off and the clear solution is treated with sodium carbonate to precipitate calcium carbonate. In this way it is claimed that the purest calcium carbonate can be obtained. Applications suggested for Purecal include high grade coatings, tooth powders and pastes, paints, enamels and lacquers, animal feeds and pharmaceuticals. Agents in the UK for these materials are Jacobsen Van Den Berg & Co. (UK) Ltd., 3/5 Crutched Friars, London EC3.

Bequest to RIC Benevolent Fund

Under the will of the late Mr. James Bruce Miller, retired manufacturing chemist, Aberdeen, the Royal Institute of Chemistry Benevolent Fund will benefit to the extent of £1,500 after the expiry of life rents to employees. Mr. Miller, who left £203,901, was for many years a director of Scottish Agricultural Industries (Aberdeen) Ltd., which took over the firm founded by his father, John Miller & Co., Sandilands, Aberdeen.

Chemical & Allied Stocks & Shares

STOCK markets have been liable to rather sharp fluctuations, due partly to a tendency for the general trend to be influenced by movements in leading oil and other shares in which American investors have been taking an increasing interest. The volume of business generally has not increased, but on the other hand, there was at times a tendency for moderate demand to put prices up strongly because little selling was in evidence.

Yields on chemical shares are well below those on many other groups of industrial shares. This is because in the majority of cases last year's dividends were covered by a large margin of profit, and that, consequently, there would have to be a very heavy fall in future earnings to necessitate a cut in dividends. It is therefore being assumed in the City that there are excellent prospects of dividends being maintained and a number of increases.

ICI Shares Higher

Compared with a month ago, Imperial Chemical were a few pence higher at 45s 7½d, an earlier advance to nearly 47s not having been held. Monsanto Chemicals 5s shares have come back from 26s 6d a month ago to 25s and Laporte 5s shares from 18s 1½d to 17s 9d. View in the City is that more chemical companies should issue half-yearly profit figures and progress reports. Both Imperial Chemical and Monsanto do this and there is no doubt it pleases shareholders.

A good feature has been an advance from 18s 7½d to 20s 6d in the 5s shares of Albright & Wilson following the deal in connection with the company's American subsidiary. Brotherton 10s shares have changed hands around 29s 4½d and Fisons around 52s 6d, while in other directions, F. W. Berk 5s shares were 7s 4½d, and William Blythe 3s shares have been very active around 12s. Greeff-Chemicals Holdings 5s shares were 15s 9d. Boake, Roberts 5s shares came back to 14s.

British Chrome Chemicals 4s shares remained at 10s 9d, and Anchor Chemicals 5s shares at 12s 3d. Yorkshire Dyeware & Chemical 5s shares at 9s 3d were within 3d of the level a month ago. Reichhold Chemical 5s shares turned firmer at 16s, while

Coalite & Chemical 2s shares were active and well maintained at 4s 1½d.

But the main feature of chemical and kindred shares, and of stock markets generally, has been the continued advance in Borax (Holdings) shares. A month ago they were £10 3/16. They have since advanced to £14½, but have shown a partial reaction to £13 5/16. The strength and activity in the shares has been due partly to American buying and partly to the fact that because the shares are tightly held there is often a shortage of them in the market. The steady buying reflects the view that the internal rearrangement of the group is likely to bring considerable benefits and that a more liberal dividend policy is probably in prospect. There are also hopes of a scrip issue, or a decision to 'split' the £1 shares into 5s shares so as to increase the number available in the market.

There was again firmness in Hardman & Holden 5s shares which at 11s 3d xd compared with 11s 6d a month ago. Hickson & Welch 10s shares were in demand and have risen on the month from 28s 9d to 30s 6d.

British Glues 4s shares were 10s 9d xd compared with 11s 6d a month ago. Plastics reflected some selling with British Xylonite down from 27s 9d to 26s. British Industrial Plastics 2s shares held steady at 5s xd.

Trading Profits

Boots Drug 5s shares eased from 15s to 14s 6d. The 6s 8d units of The Distillers Co. did not keep best prices at 22s 3d, despite the good impression created by the trading profits, which appear to be the highest in the company's history, and the raising of the dividend from 16½ per cent to 17½ per cent. There has been a sharp rise in United Molasses shares to 49s 9d on scrip issue talk. Oils were exceptionally active, but fluctuated sharply. BP, for instance, after advancing to the new record level of 183s 6d, reacted to 175s 7½d which, however, compares with 167s 6d a month ago.

Suez to Cairo Pipeline

The new oil pipeline from Suez to Cairo was inaugurated on 23 July. It is expected to reduce substantially the cost of moving oil from Suez to Cairo.

British Chemical Prices

(These prices are checked with the manufacturers, but it must be pointed out that in many cases there are variations according to quantity, quality, place of delivery, etc.)

LONDON.—Trading activity during the past week has been steady with a fair volume of new business on home account. Export enquiry remains on a good scale with the supply position satisfactory. Prices generally have shown a firmer trend. Increases in raw materials, labour and fuel have caused an upward movement in the prices of solvents. Butyl acetate is now quoted at £165 per ton, butyl alcohol at £152 per ton and ethyl acetate £135 per ton, the quotations in each case being for 10-ton lots. Acetic acid prices have advanced to £97 per ton for 80 per cent pure, and £91 per ton for 80 per cent technical. In the coal-tar products market, the movement has been steady although, with the exception of creosote oil, the activity is less pronounced. The call for pitch on export account is much reduced.

MANCHESTER.—Leading users of heavy chemical products in the Lancashire and West Riding areas are taking reasonably good contract deliveries, bearing in mind the seasonal influences which are operating. A

fair number of fresh enquiries from home consumers and also from shippers have been dealt with on the Manchester market during the past week. No change of any consequence in the general price position has occurred compared with recent weeks. Moderate buying is being shown in fertilisers, chiefly in the nitrogenous materials and their compounds. The demand for most of the by-products keeps up at a satisfactory level.

GLASGOW.—Although business during the past week in the Scottish heavy chemical market was fairly well maintained, there was the expected tendency to quietness due to the seasonal holiday stoppages. On the whole, prices have remained steady, with a slight firming in certain directions. On the agricultural side, the demand has been moderate in keeping with seasonal requirements. The export market continues satisfactorily, with the usual flow of enquiries being received.

General Chemicals

Acetic Acid.—Per ton : 80% technical, 10 tons, £91 ; 80% pure, 10 tons, £97 ; commercial glacial, 10 tons, £99 ; delivered buyers' premises in returnable barrels (technical acid barrels free) ; in glass carboys, £8 ; demijohns, £12 extra.

Acetic Anhydride.—Ton lots d/d, £132 per ton.

Alum.—Ground, about £25 per ton, f.o.r. MANCHESTER : Ground, £25.

Aluminium Sulphate.—Ex works, £15 10s per ton d/d. MANCHESTER : £15 15s to £18 10s.

Ammonia, Anhydrous.—1s 9d to 2s 3d per lb.

Ammonium Bicarbonate.—2-cwt. non-returnable drums, 1-cwt. non-returnable kegs ; 1-ton lots, £50 5s per ton.

Ammonium Chloride.—Per ton lot, in non-returnable packaging, £29 2s 6d.

Ammonium Nitrate.—D/d, £31 per ton (in 4-ton lots).

Ammonium Persulphate. — MANCHESTER : £6 2s 6d per cwt., in 1-cwt. lots, delivered. £112 10s per ton, in minimum 1-ton lots, delivered.

Ammonium Phosphate.—Mono- and di-, ton lots, d/d, £106 and £97 10s per ton.

Antimony Sulphide.—Crimson, 4s 5d to 4s 10½d ; golden, 2s 8½d to 4s 1½d ; all per lb., delivered UK in minimum 1-ton lots.

Arsenic.—Per ton, £45 to £50 ex store.

Barium Carbonate.—Precip., d/d ; 4-ton lots, £40 10s per ton, bag packing.

Barium Chloride.—£49 per ton in 2-ton lots.

Barium Sulphate (Dry Blanc Fixe).—Precip., 2-ton lots, £35 per ton d/d.

Bleaching Powder.—£28 12 6d per ton in returnable casks, carriage paid station, in 4-ton lots.

Borax.—Per ton for ton lots, in hessian sacks, carriage paid : Technical, anhydrous, £61 10s ; granular, £41 ; crystal, £43 10s ; powder, £44 10s ; extra fine powder, £45 10s ; BP, granular, £50 ; crystal, £52 10s ; powder, £53 10s ; extra fine powder, £54 10s.

- Boric Acid.**—Per ton for ton lots, in hessian sacks, carriage paid : Technical, granular, £70 ; crystal, £78 ; powder, £75 10s ; extra fine powder, £77 10s ; BP granular, £83 ; crystal, £90 ; powder, £87 10s ; extra fine powder, £89 10s.
- Calcium Chloride.**—Per ton lots, in non-returnable packaging : solid and flake, £16.
- Chlorine, Liquid.**—£38 5s per ton, in returnable 16-17-cwt. drums, delivered address in 3-drum lots.
- Chromic Acid.**—2s 0½d per lb., less 2½%, d/d UK, in 1-ton lots.
- Chromium Sulphate, Basic.**—Crystals, 8½d per lb. delivered (£75 16s 8d per ton).
- Citric Acid.**—1-cwt. lots, £10 5s cwt.
- Cobalt Oxide.**—Black, delivered, bulk quantities, 13s 2d per lb.
- Copper Carbonate.**—3s 3d per lb.
- Copper Sulphate.**—£96 10s per ton f.o.b., less 2% in 2-cwt. bags.
- Cream of Tartar.**—100%, per cwt., about £11 12s.
- Formaldehyde.**—£37 5s per ton in casks, d/d.
- Formic Acid.**—85%, £86 10s in 4-ton lots, carriage paid.
- Glycerine.**—Chemically pure, double distilled 1.260 SG, £12 9s 0d per cwt. Refined pale straw industrial, 5s per cwt. less than chemically pure.
- Hydrochloric Acid.**—Spot, about 12s per carboy d/d, according to purity, strength and locality.
- Hydrofluoric Acid.**—59/60%, about 1s 6d per lb.
- Hydrogen Peroxide.**—27.5% wt., £128 10s per ton. 35% wt., £158 per ton d/d. Carboys extra and returnable.
- Iodine.**—Resublimed BP, 17s 7d per lb., in 28-lb. lots.
- Iodoform.**—£1 6s 7d per lb., in 28-lb. lots.
- Lactic Acid.**—Pale tech., 44 per cent by weight, 14d per lb. ; dark tech., 44 per cent by weight, 9d per lb., ex-works ; chemical quality, 44 per cent by weight, 12½d per lb., ex-works ; 1-ton lots, usual container terms.
- Lead Acetate.**—White : About £150 per ton.
- Lead Nitrate.**—About £135 1-ton lots.
- Lead, Red.**—Basis prices per ton. Genuine dry red, £142 15s ; orange lead, £154 15s. Ground in oil : red, £160 15s ; orange, £172 15s.
- Lead, White.**—Basis prices : Dry English in 5-cwt. casks £147 15s per ton. Ground in oil : English, 1-cwt. lots 194s per cwt.
- Lime Acetate.**—Brown, ton lots, d/d, £40 per ton ; grey, 80-82%, ton lots, d/d, £45 per ton.
- Litharge.**—£144 15s per ton, in 5-ton lots.
- Magnesite.**—Calcined, in bags, ex-works, about £21 per ton.
- Magnesium Carbonate.**—Light, commercial, d/d, 2-ton lots, £84 10s per ton, under 2 tons, £92 per ton.
- Magnesium Chloride.**—Solid (ex-wharf), £16 per ton.
- Magnesium Oxide.**—Light, commercial, d/d, under 1-ton lots, £245 per ton.
- Magnesium Sulphate.**—Crystals, £16 per ton.
- Mercuric Chloride.**—Technical Powder, £1 3s 6d per lb., in 5-cwt. lots ; smaller quantities dearer.
- Mercury Sulphide, Red.**—£1 9s 3d per lb., for 5-cwt. lots.
- Nickel Sulphate.**—D/d, buyers UK £170 per ton. Nominal.
- Nitric Acid.**—80° Tw., £35 per ton.
- Oxalic Acid.**—Home manufacture, minimum 4-ton lots, in 5-cwt. casks, about £131 per ton, carriage paid.
- Phosphoric Acid.**—Technical (SG 1.700) ton lots, carriage paid, £100 per ton ; BP (SG 1.750), ton lots, carriage paid, 1s 3½d per lb.
- Potash, Caustic.**—Solid, £93 10s per ton for 1-ton lots ; Liquid, £34 15s.
- Potassium Carbonate.**—Calcined, 96/98%, about £74 10s per ton for 1-ton lots, ex-store.
- Potassium Chloride.**—Industrial, 96%, 1-ton lots, about £24 per ton.
- Potassium Dichromate.**—Crystals and granular, 1s 1½d per lb., in 5-cwt. to 1-ton lots, d/d UK.
- Potassium Iodide.**—BP, 14s 1d per lb. in 28-lb. lots ; 13s 7d in cwt. lots.
- Potassium Nitrate.**—In 4-ton lots, in non-returnable packaging, paid address, £63 10s per ton.
- Potassium Permanganate.**—BP, 1-cwt. lots, 1s 9d per lb. ; 3-cwt. lots, 1s 8½d per lb. ; 5-cwt. lots, 1s 8d per lb. ; 1-ton lots, 1s 7¾d per lb. ; 5-ton lots, 1s 7¼d per lb. ; Tech., 5-cwt. packed in 1-cwt. drums, £8 14s 6d per cwt. ; packed in 1 drum, £8 9s. 6d per cwt.
- Salammoniac.**—Per ton lot, in non-returnable packaging, £45 10s.
- Salicylic Acid.**—MANCHESTER : Technical 2s 8½d per lb. d/d.
- Soda Ash.**—58% ex-depot or d/d, London station, about £16 8s per ton, 1-ton lots.

- Soda, Caustic.**—Solid 76/77% ; spot, £32 6s 6d per ton d/d (4 ton lots).
- Sodium Acetate.**—Commercial crystals, £91 per ton d/d.
- Sodium Bicarbonate.**—Per ton lot, in non-returnable packaging, £17.
- Sodium Bisulphite.**— Powder, 60/62%, £42 15s d/d in 2-ton lots for home trade.
- Sodium Carbonate Monohydrate.**—Per ton lot, in non-returnable packaging, paid address, £57.
- Sodium Chlorate.**—About £80 per ton in 1-cwt. drums, carriage paid station, in 4-ton lots.
- Sodium Cyanide.**—96/98%, £113 5s per ton lot in 1-cwt. drums.
- Sodium Dichromate.**—Crystals, cake and powder, 11½d per lb. Net d/d UK, anhydrous, 1s 1d per lb. Net del. d/d UK, 5-cwt. to 1-ton lots.
- Sodium Fluoride.**—Delivered, 1-ton lots and over, £5 per cwt. ; 1-cwt. lots, £5 10s per cwt.
- Sodium Hyposulphite.**—Pea crystals £35 15s a ton ; commercial, 1-ton lots, £32 10s per ton, carriage paid.
- Sodium Iodide.**—BP, 17s 1d per lb. in 28-lb. lots.
- Sodium Metaphosphate (Calgon).**—Flaked, paper sacks, £133 per ton.
- Sodium Metasilicate.**—£25 per ton, d/d UK in ton lots, loaned bags.
- Sodium Nitrate.**—Chilean refined granulated over 98% 6-ton lots, d/d station, £28 10s.
- Sodium Nitrite.**—£32 per ton (4-ton lots).
- Sodium Percarbonate.**—12½% available oxygen, £8 6s 9d per cwt. in 1-cwt. kegs.
- Sodium Phosphate.**—Per ton d/d for ton lots : di-sodium, crystalline, £40 10s, anhydrous, £88 ; tri-sodium, crystalline, £39 10s, anhydrous, £86.
- Sodium Silicate.**—75-84° Tw. Lancashire and Cheshire, 4-ton lots, d/d station in loaned drums, £10 15s per ton ; Dorset, Somerset and Devon, £3 17s 6d per ton extra ; Scotland and S. Wales, £3 per ton extra. Elsewhere in England, excluding Cornwall, and Wales, £1 12s 6d per ton extra.
- Sodium Sulphate (Desiccated Glauber's Salts).**—d/d in bags ton, £18.
- Sodium Sulphate (Glauber's Salt).**—£9 5s to £10 5s per ton d/d.
- Sodium Sulphate (Salt Cake).**—Unground, £6 per ton d/d station in bulk. MANCHESTER : £7 per ton d/d station.
- Sodium Sulphide.**—Solid, 60/62%, spot, £33 2s 6d per ton, d/d, in drums in 1-ton lots ; broken, £34 2s 6d per ton, d/d, in drums in 1-ton lots.
- Sodium Sulphite.**—Anhydrous, £66 5s per ton ; commercial, £25 5s to £27 per ton d/d station in bags.
- Sulphur.**—Per ton for 4 tons or more, ground, £20 to £22, according to fineness.
- Sulphuric Acid.**—Net, naked at works, 168° Tw. according to quality, per ton, £10 7s 6d to £12 ; 140° Tw., arsenic free, per ton, £8 12s 6d ; 140° Tw., arsenious, per ton, £8 4s 6d.
- Tartaric Acid.**—Per cwt. : 10 cwt. or more £13 10s, one cwt. £13 15s.
- Titanium Oxide.**—Standard grade comm., with rutile structure, £172 per ton ; standard grade comm., £152 per ton.
- Zinc Oxide.**—Maximum price per ton for 2-ton lots, d/d, white seal, £115 ; green seal, £113 ; red seal, 2-ton lots, £110 per ton. White factice 1s 7½d to 1s 11½d per lb.

Solvents & Plasticisers

Acetone.—Small lots : In 5-gal. cans : 5-gal., £125, 10-gal. and upward, £115, cans included. In 40/45 gal. returnable drums, spot : Less than 1 ton, £90 ; 1 to less than 5 tons, £87 ; 5 to less than 10 tons, £86 ; 10 tons and upward, £85. In tank wagons, spot : 1 to less than 5 tons (min. 400 gal.), £85 ; 5 to less than 10 tons (1,500 gal.), £84 ; 10 tons and upward (2,500 gal.), £83 ; contract rebate, £2. All per ton d/d.

Butyl Acetate BSS.—£165 per ton, in 10-ton lots.

n-Butyl alcohol, BSS.—10 tons, in drums, £152 per ton d/d.

sec-Butyl Alcohol.—5 gal. drums £159 ; 40 gal. drums : less than 1 ton £124 per ton ; 1 to 10 tons £123 per ton ; 10 tons and over £119 per ton ; 100 tons and over £120 per ton.

tert-Butyl Alcohol.—5-gal. drums £195 10s per ton ; 40/45 gal. drums : less than 1 ton £175 10s per ton ; 1 to 5 tons £174 10s per ton ; 5 to 10 tons, £173 10s ; 10 tons and over £172 10s.

Diacetone Alcohol.—Small lots : 5 gal. drums, £177 per ton ; 10 gal. drums, £167 per ton. In 40/45 gal. drums ; less than 1 ton, £142 per ton ; 1 to 9 tons, £141 per ton ; 10 to 50 tons, £140 per ton ; 50 to 100 tons, £139 per ton ; 100 tons and over, £138 per ton.

Dibutyl Phthalate.—In drums, 10 tons, 2s per lb. d/d ; 45-gal. drums, 2s 1½d per lb. d/d.

Diethyl Phthalate.—In drums, 10 tons, 1s 11½d per lb. d/d ; 45 gal. drums, 2s 1d per lb. d/d.

Dimethyl Phthalate.—In drums, 10 tons, 1s 9½d per lb. d/d ; 45 gal. drums, 1s 10½d per lb. d/d.

- Diocetyl Phthalate.**—In drums, 10 tons, 2s 8d per lb. d/d; 45 gal. drums, 2s 9½d per lb. d/d.
- Ether BSS.**—In 1 ton lots, 1s 11d per lb.; drums extra.
- Ethyl Acetate.**—10 tons lots, d/d, £135 per ton.
- Ethyl Alcohol (PBS 66 o.p.).**—Over 300,000 p. gal., 2s 11½d; 2,500-10,000 p. gal., 3s 1½d per p. gal., d/d in tankers. D/D in 40/45-gal. drums, 1d p.p.g. extra. Absolute alcohol (75.2 o.p.) 5d p.p.g. extra.
- Methanol.**—Pure synthetic, d/d, £43 15s per ton.
- Methylated Spirit.**—Industrial 66° o.p.: 500 gal. and over in tankers, 5s 4d per gal. d/d; 100-499 gal. in drums, 5s 8½d per gal. d/d. Pyridinised 64 o.p.: 500 gal. and over in tankers, 5s 6d per gal. d/d; 100-499 gal. in drums, 5s 10½d per gal. d/d.
- Methyl Ethyl Ketone.**—10-ton lots, £133 per ton d/d; 100-ton lots, £131 per ton d/d.
- Methyl isoButyl Ketone.**—10 tons and over £159 per ton.
- isoPropyl Acetate.**—In drums, 10 tons, £130 per ton d/d; 45 gal. drums, £136 per ton d/d.
- isoPropyl Alcohol.**—Small lots: 5-gal. drums, £118 per ton; 10-gal. drums, £108 per ton; in 40-45 gal. drums; less than 1 ton, £83 per ton; 1 to 9 tons £81 per ton; 10 to 50 tons, £80 10s per ton; 50 tons and over, £80 per ton.
- Carbolic Acid.**—Crystals, minimum price 1s 4d per lb. delivered in bulk, ½d per lb. extra in 40/50 gal. returnable drums. Crude, 60's, 8s per gal. Manchester: Crystals, 1s 4d to 1s 7d per lb., d/d crude, 8s naked, at works.
- Creosote.**—Home trade, 1s to 1s 9d per gal. according to quality, f.o.r. maker's works. MANCHESTER: 1s to 1s 8d per gal.
- Cresylic Acid.**—Pale 99/100%, 6s 4d per gal.; 99.5/100%, 6s 6d per gal. D/d UK in bulk: Pale ADF from 7s 3d per imperial gallon f.o.b. UK, 95 cents per US gallon, c.i.f. NY.
- Naphtha.**—Solvent, 90/160°, 5s per gal.; heavy, 90/190°, 3s 11d per gal. for bulk 1000-gal. lots, d/d. Drums extra; higher prices for smaller lots.
- Naphthalene.**—Crude, 4-ton lots, in buyers' bags, £18 6s 0d to £29 19s 6d per ton nominal, according to m.p.; hot pressed, £41 19s 0d per ton in bulk ex-works; refined crystals, £61 10s 0d per ton d/d min. 4-ton lots.
- Pitch.**—Medium, soft, home trade, £9 per ton f.o.r. suppliers' works; export trade about £10 10s per ton f.o.b. suppliers' port.
- Pyridine.**—90/160, 20/- to £1 2s 6d per gal.
- Toluole.**—Pure, 5s 9d; 90's 5s 0d per gal. d/d. 1000 gal. lots in bulk. MANCHESTER: Pure, 5s 9d per gal. naked.
- Xylole.**—5s 11½d to 6s 3½d per gal., according to grade, in 1,000 gal. lots d/d London area in bulk.

Rubber Chemicals

- Carbon Disulphide.**—£61 to £67 per ton, according to quality.
- Carbon Black.**—8d to 1s per lb., according to packing.
- Carbon Tetrachloride.**—Ton lots, £79 10s per ton.
- India-Rubber Substitutes.**—White, 1s 7½d to 1s 11½d per lb.; dark, 1s 4d to 1s 6½d per lb. delivered free to customers' works.
- Lithopone.**—30%, about £55 per ton.
- Mineral Black.**—£7 10s to £10 per ton.
- Sulphur Chloride.**—British, about £50 per ton.
- Vegetable Lamp Black.**—£64 8s per ton in 2-ton lots.
- Vermilion.**—Pale or deep, 15s 6d per lb. for 7-lb. lots.

Coal-Tar Products

- Benzole.**—Per gal., minimum of 200 gals. delivered in bulk, 90's, 5s; pure, 5s 4d.

Intermediates & Dyes (Prices Nominal)

- m-Cresol** 98/100%.—4s 9d per lb. d/d.
- o-Cresol** 30/31° C.—1s per lb. d/d.
- p-Cresol** 34/35° C.—4s 9d per lb. d/d.
- Dichloraniline.**—4s 6d per lb.
- Dinitrobenzene.**—88/99° C., 2s 1d per lb.
- Dinitrotoluene.**—SP 15° C., 2s 1½d per lb.; SP 26° C., 1s 5d per lb.; SP 33° C., 1s 2½d per lb.; SP 66/68; C., 1s 11d per lb. Drums extra.
- p-Nitraniline.**—5s 1d per lb.
- Nitrobenzene.**—Spot, 10d per lb. in 90-gal. drums, drums extra, 1-ton lots d/d buyers' works.
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Commercial Intelligence

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

Mortgages & Charges

(Note.—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.)

J. LEETE & CO. LTD., Meriden, scientific instrument manufacturers.—20 June, charge and further charge securing £11,525 (sec. 97, 1948 Act), to Woolwich Equitable Building Society; charged on factory premises at Four Oaks, Allesley. *Nil. 30 April 1954.

Changes of Name

F. G. SHEPPARD & CO. LTD., 70-74 City Road, EC1, to Ragusa Emulsion Ltd., on 1 June 1956.

BERMANE (MANUFACTURING CHEMISTS) LTD., 59 Sloane Street, SW1, to Nucleus (Chemical Laboratories) Ltd., on 1 June 1956.

Company News

Distillers Co. Ltd.

Group trading profits of The Distillers Co. Ltd. for the year ended 31 March last increased by £1.8 million to £21,475,308, and income from trade investments amounted to over £1 million, an increase of £587,000. A final dividend recommendation of 11½ per cent, against 10½ per cent for the previous year, increases the ordinary total from the equivalent of 16½ per cent to 17½ per cent.

Lansil Ltd.

Lansil Ltd., cellulose acetate and artificial silk manufacturers, has decided to diversify its interests as much as circumstances and present finances permit in order to reduce the effect of the uncertainties of the textile trade. Operations are being started in other fields, therefore, including chemical engineering, where there seem to be prospects of better margins of price and a steady flow of orders, states the chairman, Sir J. Donald


Horsfall. Group net profits dropped from £205,724 to £123,098 in the year ended 31 March last. Consolidated current assets total £1,249,586 (£1,087,144), against which are current liabilities of £582,605 (£583,852).

Scottish Agricultural Industries Ltd.

An interim dividend of three per cent for the year ended 30 September 1956 on a capital raised by a 40 per cent scrip issue, compared with four per cent paid on the smaller capital has been declared by the directors of Scottish Agricultural Industries Ltd. Unaudited figures for the eight months ended 31 May last show sales of £18.6 million against £17.3 million for the corresponding period of 1955, and profits, before tax, of £1,065,000, against £1,130,000.

Yorkshire Dyeware & Chemical Co. Ltd.

The profit for the year ended 31 March 1956 of the Yorkshire Dyeware & Chemical Co. Ltd. was £353,107, compared with £326,633 for the previous year. At the annual general meeting which was held in Leeds on 23 July, the chairman said: 'Since this profit has been achieved in a year of increased competition and narrower margins and, moreover, at a time when certain sections of the textile and leather trades are far from busy, I feel sure you will regard it as very satisfactory.' The directors recommended payment of a final dividend of 10 per cent on the ordinary stock together with a bonus of five per cent, which, with the interim dividend of five per cent, makes a total of 20 per cent for the year. The year's trading had been satisfactory, said the chairman, and had been maintained consistently throughout the 12 months. 'During this time we have continued our policy of modernisation of plant and buildings, power supplies etc., to prepare for new developments. The future of the Dyestuffs Act is still a source of anxiety to British manufacturers and it is of paramount importance that the benefits of this Act should not be lost. Already the German makers have regained their strength and are making intensive efforts to secure world markets. Export trade is, therefore, subject to severe competition, and prices have fallen.'




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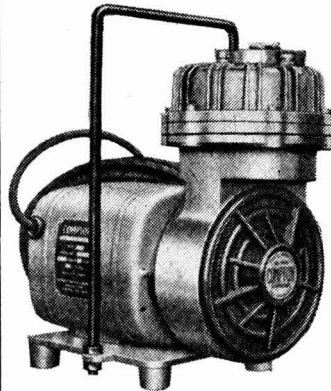
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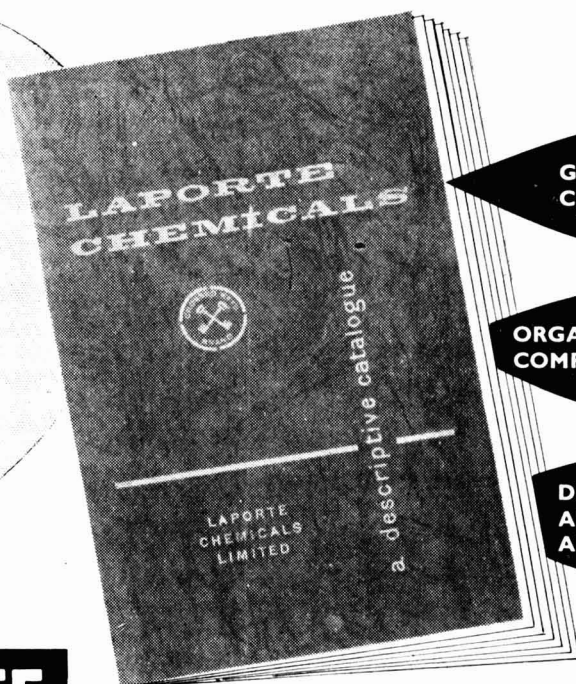
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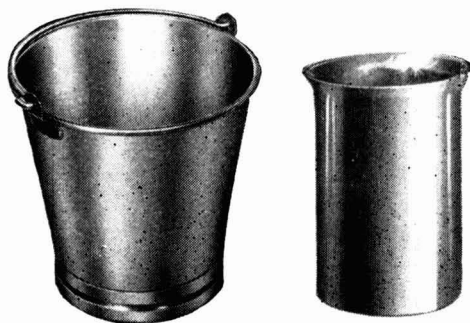
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