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Changes for the DSIR?

A RETURN to the DSIR topic has been made inevitable by the publication of an interim report by the Committee of Inquiry, appointed last April. This report, so hard on the heels of the Department's own annual report, is somewhat unexpected. However, there is no direct overlapping of the matters discussed two issues ago and other DSIR matters now raised by the new document. The fact that this is the case is perhaps surprising. The weaknesses of organization that the Committee of Inquiry has diagnosed would seem to have been unnoticed by the Privy Council's DSIR Committee or the Advisory Council in their own 1954-55 Reports.

The Committee of Inquiry, consisting of two technical industrialists of high calibre, two high-ranking civil servants, and the chairman of the Advisory Council, is charged to study the 'organization and functioning' of the DSIR. The report just issued is not in any sense a full one and it is particularly terse even for the interim type of document. But for the fact that a Bill concerning the DSIR is already in draft form for introduction into Parliament, this stop-press and partial airing of the Committee's views would not have happened. Rightly, the Committee point out that any recommendation affecting the Bill cannot wait until their completed Report is ready. Since it must have been known that such a Bill was being prepared, it seems odd that the Lord President of the Council did not appoint the Committee of Inquiry many months earlier.

The draft Bill provides for the present mechanisms of DSIR control to be continued; that is to say, for a Minister or the Privy Council Committee to be 'politically' responsible, and for there to be an Advisory Council. The Committee of Inquiry is opposed to the continuation of this method of control. 'Our investigations so far have led us to the firm conclusion that the organization of an ordinary Government Department is not suited to the research activities of the Department.' And, 'we believe that better direction . . . can only be effectively obtained by introducing into the chain of responsibility, as high as may be, a number of distinguished scientists and industrialists whose professional authority will be recognized by all concerned and particularly by the directors.'

This is forthright criticism, but of a constructive kind, and it will be welcomed by all men of scientific experience. Research and civil service methods do not make good bedfellows; but when research of diverse kinds and at many centres is involved, as in the DSIR case, centralized organization *à la mode Whitehall* is grossly incompatible. The Committee observe that 'the Secretary, as its permanent head, is faced with an impossible task.' Hitherto, outside assistance has been given by the Advisory Council. Although this body has at all times contained a number of eminent men, it has never been an executive body. In recent years, when DSIR expansion—so vitally required—has been restricted by Government parsimony, the reports of the

Advisory Council have been critical enough; but their suggestions have simply been suggestions, their pleas no more than pleas. The Committee of Inquiry believes 'that an executive Council is the right solution in substance.'

This is not as Whitehall-revolutionary as many might at first thought suppose. While the DSIR since its start has followed a conventional Civil Service formula two other large branches of State research have not. The Medical Research Council and the Agricultural Research Council are both executive bodies. This point is firmly put over in the Committee's report. However, there is a financial difference that is more difficult to change. The DSIR's funds are vote-accounted, but research under the MRC or ARC aegis is grant-aided, in full or in part; and accordingly, the staff of the DSIR are all civil servants. Although the Committee does not consider this DSIR system to be the right one for a research agency under the Government, no recommendation for change is made. It is believed to be too late to be practicable. We cannot agree with another point made on this subject, viz, that a large amount of expenditure would be withdrawn from direct Parliamentary control. As we tried to make clear in our leader of two weeks ago, expenditure up to £7,000,000 is not a large sum either in relation to total State responsibilities or to the widespread purposes to which the sum is put. It would be an amply sufficient check for an occasional review of DSIR expenditure to be made—direct control by MPs each year is pointless, both in principle and modern party-line practice.

An executive DSIR Council would attract men of the highest experience and quality for they would know that their work and deliberations carried responsibility. Their views would be bases for action, not pleas for attention. Committees including co-opted experts could be formed to deal in detail with various centres and sectors of DSIR work. The full-time secretary of such an executive Council would be a civil servant, his duties differing from those of the present DSIR secretary only in the fact that he acts as the Council's chief executive officer as well as the Minister's senior permanent adviser. Policy would be carried out by and through the secretary, but it would be created by the Council, subject to the Minister's acceptance.

These changes seem most desirable. The fact that they are suggested now, with a Bill that could include them in the offing, suggests that the Government is likely to favour their adoption. It is almost certain that a better-planned DSIR would result. At present the Committee of Inquiry has found that although 'headquarters determine allocations of man-power and money, they do not and cannot exercise an effective supervision over priorities in the programmes or over the balance between them. Much is started; but not enough is stopped . . . many of the programmes have become too diffuse or too uneven in quality.'

But would this change in organization, fundamental though it is, be enough by itself? If the DSIR remains funded by a single and voted annual sum, would there truly be a great gain in flexibility? We see no reason for not changing the financial control as well. Consider some of the DSIR's detailed sections. Food Investigation and Forestry Research could draw their funds from grants (made to the DSIR executive Council) from the Ministry of Agriculture and Food. Road Research could be grant-funded by the Ministry of Transport, Fuel Research by the Ministry of Fuel and Power. Practically every sector can be associated with one or another Ministry. In this way the total sum for a far better DSIR effort could be provided without the need for a single and overall sum to be voted, and the DSIR Council could ensure that their programmes did not overlap with separate research effort also conducted by the Ministry Departments, e.g., the case of fuel research. This would not differ from the financial support methods of the Medical and Agricultural Research Councils, each of which is funded by the respectively interested Ministries. It would appear to be different only because the DSIR's research subjects are so much more diverse.

Notes & Comments

New Use for Freons ?

AS a postscript to our recent note about the Silver Jubilee of Freons (see THE CHEMICAL AGE, 1956, **74**, 477), an entirely new use for this fluoro-organic chemical family can be reported —as lubricants for machinery running at high temperatures. Just how far this possibility can in fact be developed must remain in the speculative field at present, but the prospects are not unpromising. They possess one basically essential property—the ability to withstand temperatures that would cause many other lubricants to catch fire. How effective they can be in reducing friction between surfaces and, more important still, in reducing frictional damage requires more testing. A lubricating effect is exerted, apparently due to the combination of the Freon vapour with one or more of the metals involved; this combination produces a slippery surface film. Lubrication has been found to be much more powerful if the two surfaces are of closely similar hardness, and when tool steel is one of the metals. The method has proved a failure with stainless steel and with silver-plate surfaces. By comparison with hydrocarbon oils Freons as high-temperature lubricants seem likely to achieve specific uses, but the discovery of these potentialities may perhaps have come along too late—for the realistic comparison is surely with the silicones. Although silicones were not commercially available long after Freons were in large-scale production, they are readily available today.

Copper on the Farm

IN some parts of the world, soils, and therefore crops grown on them, are too short of copper for the nutritional needs of animals. This straightforward type of copper deficiency is generally considered not to occur in Britain, though well enough known in Australia, New Zealand, Holland, and the US. It is curable, like most soil deficiencies, by adding copper-containing materials to the soils; usually copper sulphate is chosen. There seems no room, nevertheless, for complacency about copper supplies in British farming. Copper deficiencies in animals are being encountered, although the grazed herbage contains trace amounts of copper within the 'normal' range. These seem to be 'conditioned deficiencies', caused by the interference of some factor with copper assimilation. The curative treatment in these cases is dosing the animal with copper, either orally or by intravenous injection. Applying copper compounds to the soil is not a preventative method, for the same inhibiting factor is likely to operate.

Low Blood Levels

A MARKED incidence of this type of animal ailment has been found in Caithness, Aberdeenshire, Shropshire, and Cheshire. A survey in Caithness showed that two-thirds of the animals (out of more than 700 on 123 farms) had low blood levels of copper. In Aberdeenshire a slaughterhouse post-mortem survey has indicated that about a quarter of the animals are similarly affected. This has been followed by wider investigations in various farming areas of the United Kingdom, and low blood levels for copper were found on about a third of the farms investigated.

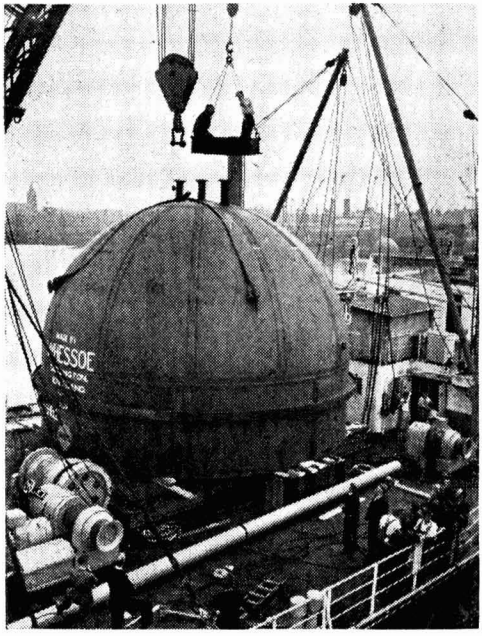
Increasing Demand

EMPHATIC attention to this nutritional problem has been drawn in the latest issue of the Royal Agricultural Society's *Journal* (for 1955). It is a timely reminder; for if the aims of the last Farm Prices Review are achieved, most of our cattle will be fed upon a greater proportion of grass and home-grown feeding stuffs, and in regions where 'conditioned copper deficiency' tends to occur, the chances of this being compensated by copper in non-locally derived foods will be smaller. An increasing agricultural demand for copper compounds seems possible.

Shell's Overseas Shipments

MATERIALS and equipment worth £40,000,000 were exported from the UK in 1955 by the Royal Dutch/Shell Group of oil companies for their operations overseas. This amount was £9,000,000 more than in 1954 and represented about 1.1 per cent of total UK exports.

In addition £10,000,000 was spent on plant and stores to maintain and improve refineries in this country and £18,500,000 on the construction, repair and victualling of the Shell tanker fleet. Export orders were placed with over 4,000 UK suppliers, six of whom received business valued at over £1,000,000 each and 75 over £100,000 each.



Transporting oil refinery equipment to Shell's overseas refineries. The illustration shows parts of a catalyst hopper being loaded aboard a cargo ship on the Tees estuary at Middlesbrough. The catalyst hoppers are 30 ft. diameter and 87 ft. high and are made by Whessoe Ltd., of Darlington, for Shell's overseas refineries. The photograph was taken during one of the first shipments by the new prefabricated method. The hoppers are sub-assembled in five sections, making for easier handling and loading

Shawinigan Expansion Plans

THE Shawinigan Water & Power Co. expects capital expenditures in the next three years to reach a total of $95,000,000. Mr. J. A. Fuller, the president, told shareholders at the company's recent annual meeting.

The figure, he said, included the completed cost of Shawinigan's new hydro-electric development at Rapide Sans Nom, on the St. Maurice River, which is estimated at $56,000,000. To cover these expenditures, Mr. Fuller said that approximately $35,000,000 would need to be obtained by means of new financing.

Expansion is being undertaken by all the companies in the group, and the Chemicals Co. is installing a sulphuric acid plant at Shawinigan Falls, to be followed by the construction of a caustic soda and chlorine plant. Canadian Resins & Chemicals is adding to its resin manufacturing capacity, and is to enter the business of polythene fabrication, in particular the extrusion of film and tubing.

Shawinigan Resins Corp. is installing a new plant at Trenton, Michigan, for the manufacture of Butvar resin, which will go into production at the end of the year. It is also constructing a plant at Springfield, Mass., which will manufacture polyvinyl alcohol. The plant of Hedon Chemicals Ltd., now under construction at Hull, England, for the purpose of manufacturing vinyl acetate, is scheduled to commence production in October.

CIL to Market Alkathene HD

DISTRIBUTORS in Canada for the new ICI polythene material Alkathene HD will be Canadian Industries Ltd. Sample quantities of the new material are expected to be available in Canada in a few months for trials by Canadian moulders and extruders.

If the new material is of sufficient interest Canadian Industries will start production in Canada.

The development of Alkathene HD (high density) polythene was announced recently by ICI (see THE CHEMICAL AGE, 1956, **74**, 585). This new material is claimed to have many advantages over the older low density polythene. It will withstand temperatures up to 110°C and can therefore be sterilized. It can be processed in the same way as the older material but is less flexible.

Polyamide—Epoxy Resin Combinations

American Work described to OCCA

AT the meeting of the London Section of the OCCA on Thursday, 12 April, Dr. H. Wittcoff, of General Mills Inc., Minneapolis, US, lectured on 'Polyamide resin—epoxy resin combinations; a new vehicle for protective coatings'.

The new vehicle for protective and decorative coatings based on the combination of polyamide resins and epoxy resins, said Dr. Wittcoff, had achieved success in the United States, and he was pleased to observe that it was being used in Europe.

The epoxy group, he said, reacted with free amine groups in the polyamide resins to provide the coatings. The polyamide resins were not new to the protective and decorative coatings industry, although their uses until recently had been somewhat specialized.

The alcohol solubility of the polyamide resins also made them prime candidates for admixture with shellac, and such mixtures showed definite improvement over shellac alone, especially from the point of view of water resistance and flexibility.

Because the polyamide resins intumesced when heated, they had been recommended for use in fire-retardant paints.

One of their most spectacular uses was in the formulation of thixotropic paint vehicles. The polyamide resin, when cooked into an alkyd, imparted not only thixotropic structure, but also a gelled structure. Recent developments made it possible to formulate short oil alkyds, which required aromatic thinners, in such a way that they too were thixotropic.

Versamids 100 & 115

The particular polyamide resins he discussed were known as Versamids 100 and 115. The particular epoxy resins which performed well in coatings in combination with the polyamide resins were similar to that known in this country as Epikote 1001.

The polyamide resins contained free amine groups and the epoxy resins contained free epoxy groups. When the two materials came into contact either as such or diluted with solvent, a mild exothermic reaction set in. A very hard thermoset polymer resulted, but it was still resilient. He exhibited a casting made by combining the two resins; it could be sawed, one could pound nails into it, it could be threaded and it could be machined.

The preparation of the vehicle for application as protective and decorative films was extremely simple. It involved merely mixing a solution of the polyamide resin with a solution of the epoxy resin. The ratio of the resins was in the region of 1:1, and some variation of the ratio was possible. Increasing the amount of epoxy resin led to harder and more solvent-resistant films, whereas increasing the quantity of polyamide resin led to films which had even better adhesion, flexibility and improved weathering characteristics.

Pigmentation

Pigmentation was readily accomplished, and one could pigment either resin solution. It was frequently desirable to pigment the polyamide resin solution because the polyamide resin had excellent wetting properties, making the pigmentation easier.

Next he discussed the solvent systems for the protective coatings, which were relatively simple.

The application of the vehicle to a surface was extremely simple. Because the polyamide resin was an excellent wetting agent, the vehicle could be brushed or sprayed on to give an excellent film with very few, if any, surface defects. The vehicle could be applied to surfaces which were wet or from which not all the rust had been brushed or sandblasted away.

The mixing of the two materials was carried out immediately before the coating was to be used. Necessarily a two-package system was used because the two resins started to react once they came into contact with each other in solution. But, because of that high reactivity, the films could be air dried or could be baked at relatively low temperature, the hardness being approximately the same in each case.

Discussing the properties of the films produced, he said they combined a high degree of hardness and gloss and extremely good flexibility and adhesion. The coatings could be used on metal which subsequently was fabricated and subjected to sharp bends and impact. They were excellent on rubber, and had the added advantage of excellent ozone resistance.

It was that high degree of adhesion which contributed to the virtue of polyamide resin—epoxy resin paints as maintenance paints. They would stick to all sorts of surfaces, to old paint etc., without special surface preparation.

Alkali Resistance

Alkali resistance was excellent, as was resistance to detergents and soap. Acid resistance was good, but not so spectacular as the alkali resistance; the coatings had excellent possibilities in dairies, for instance, where lactic acid resistance was required. There was good resistance to boiling water. They were not particularly resistant to alcohols and ketones, although films based on Versamid 115 were more resistant to solvents such as high-test gasoline than films based on Versamid 100. The abrasion resistance of the films was very good, and salt spray resistance excellent.

Dr. Wittcoff gave particulars of exposure tests to indicate the good durability of the films, and showed that they had reasonably good colour retention, although whites were slightly yellow to start with. The films chalked on exposure, but the surfaces could be washed to restore them to practically the original gloss.

Coating Over Rust

With regard to coating over rust, he said the polyamide resin was in its own right a corrosion inhibitor; that, coupled with the highly adhesive character of the film, accounted for the good results obtained.

Some questions were put to Dr. Wittcoff concerning the proportions of polyamide and epoxy resins used in the combinations. For Versamid 100 the proportions were 50:50, and for Versamid 115 they were 35 and 65. It was suggested that where there were variations in the proportions there would be differences in hardness and other properties according to the temperature of stoving. Dr. Wittcoff recalled the casting he had exhibited and said that if one used 70 parts of polyamide and 30 of epoxy resins one would produce a casting which was rubbery in properties, very flexible. But the low temperature properties of the casting he had exhibited were much better than the low temperature properties of the rubbery one; it would not embrittle at low temperatures, whereas the rubbery one probably would.

In connection with the coatings being applicable to wet surfaces, he was asked what happened to the moisture, whether it remained under the coatings. He said that the explanation given was that it would emulsify and go off with the solvent.

Replying to a question concerning the ability of the polyamide-epoxy resin combinations to protect woodwork exposed to marine conditions, he said that a good many people had painted boats with them. The problem of obtaining a finish to withstand such conditions was very difficult, but those combinations stood up very well. The competition with phenolic China wood varnishes, which were very cheap in the States, was difficult to meet.

Electrical Insulation

It was suggested that the use of polyamide-epoxy resin varnishes for insulation in electrical systems was surprising, in view of the large number of polar groups in the films, and Dr. Wittcoff was asked about the electrical characteristics that might be expected. He replied that in general the dielectric strength of the materials was high. It was not the presence of the polar groups in the films that was important, but their availability. There were chains of very complex type, zig-zag chains, which probably shielded some of the groups.

Next he was asked how a polyamide-epoxide resin film could be stripped off a surface, bearing in mind that they were so chemically resistant. He replied that the problem was the same as with any thermo-setting coating. It was certainly not easy to strip them; but one tried to soften them with the strongest solvent combination, perhaps cresols, and then scrape them off.

Adhesion

Another question concerned the adhesion of a conventional decorative paint applied on top of a polyamide-epoxy resin primer or undercoat, and his view was that the adhesion would be good. He would rather do it that way, because if it were done the other way round there would be better adhesion between the polyamide-epoxy resin film and the conventional paint coating than between the conventional coating and the substrate.

In view of the ability of the systems to repel humidity, he was asked whether that property had been put to practical use by

applying the systems to the walls of laundries, kitchens etc., and whether it would prevent condensation running down the walls.

He said that if one took a coated panel into a bathroom one would find moisture condensing on the walls and tiles, but the panel would be free from moisture, so that the systems might have an application in that direction.

Iscon gets Indian Contract

SIMON-CARVES have played a major part in securing for the British consortium Iscon (Indian Steelworks Construction Co. Ltd.) the largest single contract ever placed with a British company. It is for the new £85,000,000 integrated iron and steel plant to produce 1,250,000 ingot tons per annum at Durgapur.

Mr. D. T. Barritt, joint managing director of Simon-Carves, and Mr. Norman Hinton, financial director, have conducted all technical and financial negotiations with the Indian Government in New Delhi. Simon-Carves have had nearly 50 years' experience in carrying out contracts for Indian iron and steel producers with their resident technical staff in India.

As a member of Iscon the company will be responsible for the complete coal preparation plant, including a felspar jig washery and a coal stocking, blending and reclaiming plant on the Robins-Messiter system; three coke oven batteries, together with coke screening and handling plant up to the blast furnaces; the complete coke oven by-product plant; steam-generating plant to supply high-pressure steam to the steelworks; and a variety of equipment and services interconnecting various sections of the plant.

Displaying the Secretary

A REVOLUTIONARY copying machine, called the Secretary, is being displayed at the BIF at Olympia by the Minnesota Mining & Manufacturing Co. Ltd., who are manufacturing it in the UK.

A compact desk machine, 17 inches square and nine inches high, the Secretary produces copies of almost any document or plan in four seconds or less without the use of inks, negatives, stencils, chemicals, master copies or any kind of preparation or processing. The copy is produced by thermal reaction, and the Secretary will reproduce any typed, printed or written material that has a graphite or metallic content.

Oil Expansion Programme

INCREASED production of industrial cutting oils and of specialized and general purpose oils will result from the reorganization and expansion programme announced by Amber Chemical Industries Ltd. A new company—Amber Oils Ltd.—has been formed to handle the entire oil side of the original company, The Amber Chemical Co. Ltd. To this new subsidiary has been assigned the production and sale of the main types of cutting oil used by industry, of specialized oils (for heat treatment and wire drawing) and of general purpose oils (lubricants etc.).

Included here are four oils marketed under the brand names Sulfloid, Clearoid, Automa (straight cutting oils) and Accool (soluble cutting oil). According to a recent report of the Production Engineering Research Association, the use of Sulfloid straight cutting oil, with high grade steels, can result in up to 125 per cent longer tool life than can be secured with any other cutting oil of this type.

The Amber Chemical Co. Ltd. was founded as a private limited company over fifty years ago, and floated as a public company in 1948. It is now known as Amber Chemical Industries Ltd., and controls a large group of subsidiary companies of which Amber Oils Ltd. is the newest.

Canadian Exhibition

UK scientific and technical achievements since the war will be illustrated on the British Government stand at the Canadian National Exhibition at Toronto from 24 August to 8 September.

The display, which is being arranged by the Board of Trade, will include a model of the Atomic Energy Authority's power station at Calder Hall, Cumberland, and several exhibits showing recent progress made by the British pharmaceutical industry. An exhibit of dehydrated foods with practical demonstrations, is being organized by the Ministry of Agriculture, Fisheries & Food.

Italian Chemical Industry

Steady Development in 1955

THE Italian chemical industry continued to develop steadily in 1955. Most sections of the industry increased plant capacity during the year, and exports were maintained in spite of keen competition. An event of importance in the synthetic fibres field was the introduction of Terital, a polymethyleneglycolterephtalate textile fibre. In the field of tensioactive products, detersive powders replaced soap in one-fifth of its uses.

Two new factories for complex fertilizers in Porto Marghera and one for enamels in Garbagnate were erected in 1955. New plants went into operation in existing factories for the preparation of the following products: fertilizers in Vado Ligure; acetaldehyde from methane in Novara; esters of phthalic acid in Sesto S. Giovanni and Porto Marghera; sodium glutamate in Sesto S. Giovanni, Fontanellato and Cavarzere; tensioactive products in Milan; a new heat insulating material (based on mineral wool) in Spinetta Marengo.

Regular Operation

The fertilizer factory of Porto Empedocle went into regular operation in 1955, integrated by a plant for complex phosphonitrogenous fertilizers. Two other plants for the production of complex fertilizers were registered in Sicily.

The output of sulphuric acid in 1955 increased, and in comparison with 1954 (=100) showed an index number of 107. This increase is attributed mainly to a larger demand by the fertilizer and petroleum industries. Output of ammonia showed in 1955 an index number of 122 (1954=100) owing to a larger demand from the fertilizer and Solvay soda manufacturers.

Output of methyl alcohol increased in 1955 with an index number of 160 (1954=100), owing to the use of this product in new synthetic fibres and to the increasing use of formaldehyde in the manufacture of artificial resins. Production of acetic acid increased in 1955, with an index number of 110 (1954=100). Output of acetone decreased owing to the competition of cheaper acetone from France and Holland.

Italy's output of liquid chlorine increased 40 per cent over the 1954 figure, owing to larger applications in the field of plastics materials, water treatment and derivatives.

The output and sales of synthetic hydrochloric acid increased 30 per cent over 1954.

Considerable plant modernization was carried out in 1955 by manufacturers of synthetic organic dyes, resulting in a 10 per cent increase of production over the previous year.

In 1955 the output of synthetic resins and plastics materials increased 25-30 per cent over the previous year. The most important progress was achieved in thermoplastic resins, particularly in the production of polyvinyl chloride, polythene, polystyrene and acetovinyl resins.

National demand for tannic extracts decreased further in 1955, reducing sales by about 10 per cent from the 1954 figure. This is attributed to the large imports of tanned hides and the competition of leather substitutes. Exports, however, were good, and offset the drop in national sales. On the whole, manufacturers continued to work with a reduced rhythm, utilizing about 55-60 per cent of productive capacity.

Modernization

Modernization of plant was carried out by many manufacturers of explosive products. Production of inflammable nitrocellulose was discontinued during the year. Home demand showed little change over the previous year but exports decreased slightly, owing mainly to the restrictive measures adopted by many foreign countries.

The Italian petroleum industry continued improving and enlarging its plants in 1955. The productive capacity, which was increased by about 2,000,000 metric tons in 1954 was further increased by about 500,000 metric tons in 1955, attaining a total figure of about 23,000,000 metric tons.

Science Teaching in Schools

Industrial Fund Totals £2,900,000

A TOTAL of £2,900,000 has now been subscribed by 90 companies to the Industrial Fund for the Advancement of Scientific Education in Schools, which was formed last November to assist the teaching of science in the independent and direct grant schools by the provision of capital grants towards the building, expansion, modernizing and equipping of science laboratories.

When the fund was formed it was announced that the 17 founder members had undertaken to provide £1,500,000. Since that time 73 additional companies have agreed to support the fund. The committee who administer the fund now state that in order to carry out their concept about £600,000 is still required from industry. So far only those companies which are known to some members of the committee have been approached. A more general appeal had been held over until reliable estimates of the fund's requirements were known and substantial progress could be reported. A further and more general appeal will be made shortly.

Many Schools Apply

The first grants, totalling £85,000 have been made to three independent schools and one direct grant school. So far, 439 schools have applied for grants. The detailed questionnaire which these schools completed shows that the proportion of boys in the mathematics and science sixth forms is now 50 per cent of the total sixth, and while the total number of boys over the age of 13 has increased by rather over one-third since before the war, there are now two and a quarter times as many boys in the mathematics and science sixth forms. In many schools 20 per cent of the whole school over the age of 13 is in the mathematics and science sixths, and in some this figure exceeds 25 per cent.

Largely on account of these increases, the committee states, facilities for science teaching in the majority of schools are seriously overcrowded and inadequate. In independent and direct grant schools generally (as distinct from maintained schools) the critical problem is the lack of money for capital projects and not, to the same degree, the shortage of science teachers.

The committee has appointed four assessors to act as technical advisors both to the committee and to the schools. They are: Sir Graham Savage, C.B., formerly senior chief inspector of the Ministry of Education and thereafter chief education officer of the LCC; Mr. D. B. Briggs, formerly an HM inspector of schools; Mr. W. F. Bushell, formerly headmaster of Birkenhead School; Mr. A. G. McKimmie, formerly headmaster of Allan Glen's School, Glasgow, whose special province is schools in Scotland and Northern Ireland.

Brochure on Lab Design

The committee has also published an architectural brochure of current good practice for the building and equipping of school science laboratories, which include a table of standards of space and cost judged appropriate for the various types of buildings and equipment. It has also laid down certain principles for determining the qualifications, amounts and priorities for consideration for grants. These, in the main, are that grants will generally be restricted to the teaching of the fundamental sciences of physics and chemistry and of mathematics; that grants will not exceed two thirds of the cost of that part of the project which is admissible for consideration; and that priority will be given to schools having 250 or more pupils over the age of 13, and having at least 10 per cent of them in the mathematics and science sixth forms (that is, post 'O' level of the GCE).

Among the companies who have agreed to contribute to the fund are: Albright & Wilson Ltd., Associated Portland Cement Manufacturers Ltd., A. Boake Roberts & Co. Ltd., Britsh Celanese Ltd., British Enka Ltd., British Petroleum Co. Ltd., The British Xylonite Co. Ltd., Carless, Capel & Leonard Ltd., Cape Asbestos Co. Ltd., Cambridge Instrument Co. Ltd., Courtaulds Ltd., The Distillers Co. Ltd., Dorman, Long & Co. Ltd., Esso Petroleum Co. Ltd., Ferranti Ltd., Fisons Ltd., Foster Wheeler Ltd., Foxboro-Yoxall Ltd., Glaxo Laboratories

Ltd., Thomas Hedley & Co. Ltd., Imperial Chemical Industries Ltd., Laporte Industries Ltd., The Mond Nickel Co. Ltd., Monsanto Chemicals Ltd., Newton Chambers & Co. Ltd., Pilkington Bros. Ltd., The Power Gas Corporation Ltd., Reckitt & Colman Holdings Ltd., Scottish Agricultural Industries Ltd., Shell Petroleum Co. Ltd., The Telegraph Construction & Maintenance Co. Ltd., Tube Investments Ltd., Unilever Ltd., The United Molasses Co. Ltd., The Wellcome Foundation Ltd., and Whessoe Ltd.

Training Scheme

Chemical Engineering Opportunities

A SCHEME to give practical training to young men who are not entering university after leaving school but who are keen to take up chemical engineering as a career has been evolved by Kestner Evaporator & Engineering Company.

No specific academic qualifications are required for entry into the scheme but the boy must be genuinely interested in mechanical and scientific subjects. Instead of examinations Kestner will be satisfied by the recommendation of the headmaster or science master. A letter will also be required from the headmaster testifying to the educational ability, integrity, background and general personality of the boy, accompanied by a medical certificate of all-round fitness.

It is preferred that the boy should enter the scheme immediately after leaving school and before doing his national service.

The course will consist of 10 sessions taking five years to complete and during the period of training the boy must attend an approved technical school or college to study for the Higher National Certificate in chemical engineering or some similar approved examination.

During the course of training a weekly salary of £5 10s will be paid to cover cost of living in London and to provide some pocket money. In addition the following concessions will be made by the company:—

(1) All fees for technical school and reasonable allowances for special books and materials as required will be paid.

(2) Third-class return fares home will be provided on every public holiday.

(3) One day a week will be allowed off for attendance at technical school.

(4) Two weeks paid holiday will be given every year.

(5) At the end of a successful training period the company will issue a certificate of competence.

Kestner say that it is their intention to offer a permanent position to the trainee on completion of the training course wherever a suitable vacancy exists, but no guarantee can be given.

Address to Science Masters

ADDRESSING the Scottish branch of the Science Masters' Association at St. Andrews on 'The preparation of a boy for a scientific industry,' Dr. James Craik, chairman, Nobel Division, ICI Ltd., said the need to increase the number of scientific workers in British industry had repeatedly been stressed in recent years.

'As an industrialist,' he said, 'I can confirm the shortage of scientific staff, and welcome the attention that is at last being given to remedying it. Unfortunately, entry into the schools of science and technology in English universities is restricted to students who had specialized in science subjects at school from the age of about 15.'

The purpose of ICI's new transfer scholarship, Dr. Craik said, was to help remove this restriction by encouraging certain universities to provide special preliminary courses preparatory to their normal honour science courses, and by making it financially possible for students to afford an additional year at the university.

Option on Titanium Corp.

THE Anglo-American Corp. of South Africa has been granted a three months' option to buy the assets of the Titanium Corp. of South Africa, at Umgababe, Natal. The Titanium Corp. recently secured the rights to large quantities of beach sand containing ilmenite, a titanium-bearing ore. In recent months the prospects of mining ilmenite cheaply have greatly improved following the results of scientific work carried out in Britain and the US. Titanium Corp.'s shares were recently quoted at 4s 9d, with issued capital reported to be £300,000 in 1,200,000 5s shares.

Organic Phosphorus Insecticides—A Review

VI Parts—Part I : Introduction & General

by R. G. BARRADAS, B.Sc., A.R.I.C., A.R.T.C., M.R.S.H.
(Government Laboratory, Hong Kong)

SINCE the recognition of the insecticidal properties of dichlorodiphenyl-trichloroethane (DDT) by Dr. Paul Muller in 1939, the development of insecticide research has proved highly eventful. In addition to the chemistry and industrial processes involved, the field of insecticide synthesis and subsequent manufacture is concerned with scientific studies of insect control. But the matter does not end there, for the complicated and necessary legal aspects must always be closely considered before an insecticide is released for use by the general public.

The introduction of DDT has led to the development of other effective chlorinated hydrocarbons known by the trivial names Aldrin, Dieldrin, toxaphene, chlordane, hexachlorocyclohexane, heptachlor, etc., which differ to some extent from the DDT type of product in their mode of action and field of application. There is a tendency for these compounds to accumulate in the organism when they are applied continuously but their degree of acute toxicity is slight. They are essentially contact poisons with no real acaricidal action, and they may upset the balance between species of insects which are beneficial and harmful pests when they are used for plant protection.

Selective Insecticides

Accordingly, there is an important demand for specially selective insecticides which will preserve those insects which are helpful to mankind. The acaricide, chlorobenzilate, of the carbinol group and the aphicide, pyrolan, of the urethane group may be cited as typical examples.

The introduction of substances which have a very comprehensive range of action constitutes a striking advance in insecticidal practice. A large number of agricultural and horticultural insecticides is now available whose activity depends on the presence of organic compounds of phosphorus. The discovery of the insecticidal properties of this class of compounds arose from the work performed in Germany during the Second World War, particularly by Schrader and his colleagues. These workers were seeking new organic substances which would prove to be adequate and satisfactory substitutes for nicotine insecticides, the efficacy of which was already well-established at that time.

First Successful Substitute

The first successful substitute for the nicotine type of insecticide was a product called commercially Bladan, which was produced by a process devised by Schrader. This product was synthesized from a reaction between triethyl phosphate and phosphorus oxychloride essentially. For some time it was thought that the active principle of this product was hexaethyl tetraphosphate (HETP), and commercial materials bearing that name were put on the market. However, more recent investigations have indicated that the most toxic constituent is probably tetraethyl pyrophosphate (TEPP).

Since the development of the original HETP product, a considerable number of papers has been published on this subject with much emphasis on modifications to its synthesis. It is of interest to record that the discovery of this material as an insecticide came about as an offshoot of research on toxic war gases in Germany.

TEPP and HETP are 'systemic insecticides', compounds which are readily absorbed by a growing plant and translocated in the sap stream of the plant in amounts sufficient to render the plant toxic to insects that feed on it. Ideally, such insecticides should be effective long enough to protect the plant against insect pests during most of its growth, and yet exert no toxic effect either on the plant itself or on mammals using it for food. The importance of absorption and translocation of the insecticide is obvious, in that the parts of a plant inaccessible to ordinary external

methods of insecticide application can be protected.

Organic phosphorus insecticides are very effective in the control of a very wide variety of pests, but most of those available have the disadvantage that they are extremely dangerous to man unless handled with great care. Apart from HETP and TEPP, the following are some well-known examples of this class of compounds:— 0,0-diethyl paranitrophenyl thiophosphate (parathion, E 605), octamethyl pyrophosphoramide (Schradan, OMPA), bis-dimethyl aminophosphorus anhydride (Pestox), 0-(2-(ethylmercapto)ethyl)-0,0-diethyl thiophosphate (demeton, E 1059, Systox), 0-ethyl-0-*p*-nitrophenylbenzene thiophosphate (EPN), diethyl-*p*-nitrophenyl phosphate (paraoxon, E 600), Bis (isopropylamido)-fluorophosphate (Isopestox), and 0,0-diethyl 4-methyl umbelliferone thiophosphate (E-838).

Most Promising Compounds

The comprehensive action of these compounds makes the co-operation of beneficial insects unnecessary. Schradan and Systox appear to be the most promising compounds in the field of systemic insecticides. Entomological reports have shown them to be very effective miticides and aphicides generally.

Cautionary procedures must be adopted in the use of organic phosphorus insecticides because they are rapid action poisons which kill with all the symptoms of acute acetylcholine poisoning, and are very powerful inhibitors of cholinesterase and pseudo-cholinesterase enzymes. Exposure to amounts of less than one gram daily has been estimated as dangerous to man and it is believed that repeated exposure may have a cumulative effect. Absorption into the human system may also occur from inhalation and ingestion. The effect on public health is a very consequential issue, and scientists are actively engaged in collaborative efforts to minimize the risks attendant on using these substances.

Information on the recommended methods of first aid treatment, and other general medical aspects of organic phosphorus insecticide poisoning should be given the widest publicity. Atropine is the generally accepted antidote for organic phophorus insecticides which inactivate cholinesterase. The signs and symptoms resulting from excessive absorption are primarily those of marked parasympathetic stimulation. The common signs are giddiness, tightening of chest, blurred vision (non-reactive pin-point pupils), lachrymation and salivation.

It is essential to know that morphine is definitely not recommended as an antidote. Atropine blocks the parasympathetic effect on the heart and lungs, but weakness and muscular twitching are not controlled by this antidote. Even with very serious poisoning, atropine can completely protect the airway, but muscular weakness may be so extreme that artificial respiration is required. Doses of one to two milligrams of atropine should be given at the onset of symptoms to persons suffering from organic phosphorus compound poisoning. The treatment is repeated hourly until the pupils are dilated and the symptoms subside.

Early treatment with atropine is essential because the combination between cholinesterase and the chlorinesterase inhibitor is irreversible after a few hours. An individual who has been poisoned is unduly susceptible until cholinesterase is regenerated.

Increasing consideration, both for the welfare of the consumer of insecticide-treated edible crops and the operator in the farm and factory, has led to stringent regulations in various countries of tolerated spray residues on the crops following treatment, and preventive measures to personnel working with these products. An incentive is the urgent necessity for greater efficiency in the control of injurious pests and organisms causing plant diseases combined with the reduction of hazards to plants and animals. The search for new compounds of high insect toxicity and low mammalian health hazard is very intensive in most countries because of the universal need for increased food production to meet an ever-increasing population.

Recent Compounds

More recent organic phosphorus compounds which have found wide ranges of application in international agricultural and horticultural practice include the following:— bis(ethoxycarbonyl)-ethyl-dimethyl thiophosphate (malathion), 0,0-dimethyl-0-3-chloro -4-nitrophenyl thiophosphate (Chlorothion), 0,0-dimethyl-1-oxy-2,2,2-trichloroethyl phosphonate (Dipterex) and 2-isopropyl-4-methyl pyrimidyl-6-thiophosphoric diethyl ester (Diazinon, Basudin). These compounds and the ones mentioned earlier are commercially available in many forms.

The formulations include emulsions, aerosols, wettable powders, low concentration dusts for direct application, and dust concentrates and liquids for further processing by manufacturers into very popular household forms, e.g. fly mats, fly balls, etc. These products are continuously being tested officially and un-officially in Britain, Switzerland, Germany, Austria, Italy France, Holland, Denmark, Sweden, Norway, America, Belgian Congo, Japan, Hong Kong, and other countries. Detailed information concerning their use, recognition, registration, authorization and legislation are available from special Government Departments and recognized Institutions in the respective countries.

The rôle of the chemist in this specialized subject is manifold. One of his most important tasks is to determine at all times the insecticide at all stages of its usage, and this is not always an easy one. It is the purpose of this publication to review some of the more outstanding contributions to the literature with respect to the analytical chemistry of organic insecticides.

Difficult Problem

The problem of chemical analysis is a very difficult one, since the majority of the elements which constitute these compounds are the same ones which are present either in the soil or in the plant. For example, the determination of elemental phosphorus alone is not in itself a specific reckoning of the amount of known insecticide present. There is the possibility of some of these compounds inhibiting the natural increase of phosphorus content of any particular fruit or vegetable.

The qualitative identification alone of any of these compounds mentioned above presents innumerable problems. A considerable amount of personal ingenuity, technique, manipulation, and application of modern tools of analytical chemistry must be brought into play to differentiate the specific selection of certain functional groups and molecular configurations of these complex compounds. In contrast to the purely chemical approach to the analytical problems presented, there is the biochemical viewpoint on the subject, for example, the highly successful methods of measurement of anti-esterase activity. The added difficulty for the analyst is that he must frequently determine with accuracy trace amounts of these insecticides, examples of which are the estimation of minute amounts of these insecticides in spray residues and in post-mortem materials in connection with forensic investigations.

The properties of a selection of the more prominent organic phosphorus compounds that are now in commercial insecticidal use or are being currently tested are summarized in this section. The chemical and physical properties of these compounds have been compiled from literature and from data supplied by manufacturers, and although incomplete in some cases are included on pages 902 and 903 for the convenience of the reader.

High Purity Water

Miniature Deionizer by Elga Products

WATER of purity approaching that of conductivity water can be obtained, it is claimed, from the Elgastat Minor, manufactured by Elga Products Ltd., Railway Place, Wimbledon, London SW19.

This miniature deionizer is connected directly to a conventional metal still or to a reservoir of boiler condensate. The influent filters through a bed of strongly acidic and strongly basic Elgalite resins. The specific resistance of the effluent is 2-4 million ohms per cm., at least equal to that of triple quartz distilled water. A typical analysis of the effluent is as follows:—

Deionized Effluent Analysis	Results
Copper, Iron, Lead	Not detected, or at limit of detection
Silica	Below 0.1 ppm.
Chloride	Not detected
Ammonia	No coloration with Nessler's reagent
Sulphate	Not detected
Carbon Dioxide	Not present
*p*H value	6.6-7

The effluent is not, however, necessarily free of pyrogens and is therefore unsuitable for use as 'water for injections'.

The output is 10 litres per hour continuously and the total capacity is 400-500 litres at a cost of approximately ½d per litre.

Exhaustion of the resin is indicated by a colour change from dark blue to yellow. When the yellow colour band coincides with the exhaustion line at the base of the unit the cartridge is exchanged. Cartridges are regenerated by the company who will supply by post a freshly regenerated cartridge on receipt of the exhausted one.

TABLE 1A

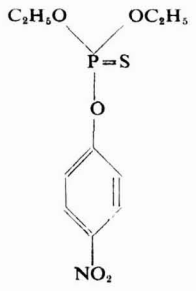
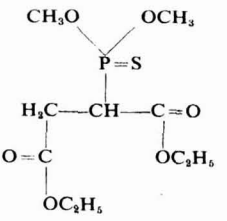
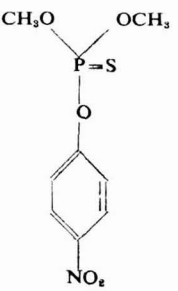
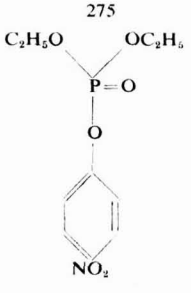
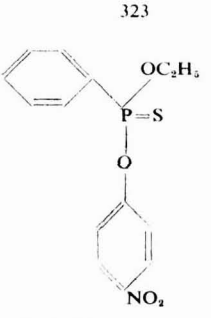
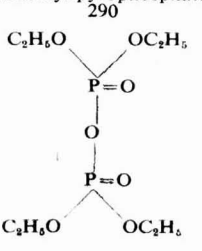
Insecticide	*Parathion*	*Malathion*	*Methyl Parathion*
Chemical name	0, 0-diethyl-0-*p*-nitrophenyl thiophosphate	bis (ethoxycarbonyl)-ethyl dimethyl thiophosphate	0, 0-dimethyl 0-*p*-nitrophenyl thiophosphate
Other names	E 605	4049	Methyl homologue of parathion
Molecular weight	291	330	263
Structural formula			
Empirical formula	$C_{10}H_{14}NO_5PS$	$C_{10}H_{19}O_6PS$	$C_8H_{10}NO_5PS$
Phosphorus content	10.63%	9.38%	11.78%
Appearance	Pale-yellow liquid	Yellow to dark brown liquid	White crystalline solid
Specific gravity	1.266 at 25°/4°C	1.23 at 25°/4°C	1.358 at 20°/4°C
Boiling point	157-162°C at 0.6 mm.	156-157°C at 0.7 mm. (slight decomposition)	—
Melting point	6°C	−7°C	35°−36°C
Refractive index	1.5370 at 25°C	1.4985 at 25°C	1.5515 at 25°C
Solubility in water	15-20 ppm at 20°-25°C	145 ppm	50 ppm at 25°C
Stability	Hydrolysis, at *p*H 5-6, 1% in 62 days at 25°C. Rapid in alkaline solutions to sodium diethyl thiophosphate and sodium *p*-nitrophenate. Darkens on exposure to sunlight.	Readily hydrolysed under alkaline conditions with loss of insecticidal properties.	Readily hydrolysed in alkaline solution. Half life approximately 2-5 minutes in normal alkali at 23°C. Stable for several days in neutral water.

TABLE 1B

Insecticide	*Paraoxon*	*EPN*	*TEPP*
Chemical name	Diethyl *p*-nitrophenyl phosphate	ethyl *p*-nitrophenyl thiobenzenephosphate	Tetraethyl pyrophosphate
Other names	E 600, oxygen analogue of parathion	O-ethyl O-p-nitrophenyl-*benzene thiophosphonate*	TEPP (commercial *preparation cont.* approximately 40% of tetraethyl pyrophosphate
Molecular weight	275	323	290
Structural formula			
Empirical formula	$C_{10}H_{14}NO_6P$	$C_{14}H_{14}O_4NPS$	$C_8H_{20}O_7P_2$
Phosphorus content	11.26%	9.59%	21.36%
Appearance	Reddish-yellow liquid	Off-white crystals	*Colourless liquid*
Specific gravity	1.269 at 25°/25°C	—	1.181 at 25°/4°C
Boiling point	148-151°C at 1 mm.	—	104-110°C at 0.08 mm.
Melting point	—	36°C	—
Refractive index	1.5060 at 25°C	—	1.4170-1.4180 at 25°C
Solubility in water	2500 ppm at 25°C	Essentially insoluble	Completely miscible
Stability	Hydrolyses very slowly in neutral water.	Slow hydrolysis above *p*H 7, but stable at *p*H 7 and below.	Rapid hydrolysis in neutral water ; half life at 25°C 6.8 hours, at 38°C 3.3 hours. Very rapidly hydrolysed in alkaline solution.

The Presentation of Science to the Public

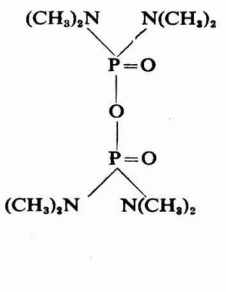
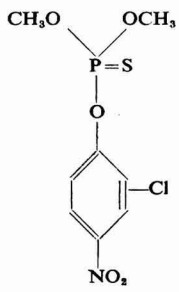
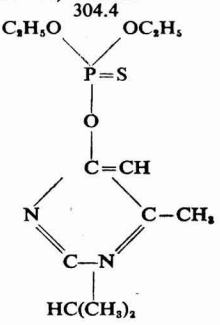
ON Wednesday, 21 March, a symposium on this very topical subject was arranged jointly by the London Sections of the Royal Institute of Chemistry, the Institute of Biology and the Institute of Physics. It was an unqualified success and attracted an audience of about 250 to the Senate House of the University of London.

The general theme of the evening appeared to be that in communicating information the scientist must have something to say, there must be a good reason for telling other people about it, and he must be able to tell them in an imaginative and succinct manner. As chairman, Mr. A. L. Bacharach put these principles into practice so well with all speakers that even BBC producers found their time as strictly rationed as is their wont with others 'on the air', and the result was a quickly moving and at times inspiring discussion.

Dr. Archie Clow, speaking on sound broadcasting, stressed the three principles above together with the necessity of good performance in a broadcaster when working from a script. While some scientists boasted that they never listened to radio talks, some of their writings suggested that they also did not read. In any event the speaker must not lecture, read his subject like a scientific paper or sound like words from a book. He must imagine himself speaking to one person only, and establish intimacy and personal contact with him, projecting his personality at the individual listener, otherwise he got 'the switch'.

As an authority on the written word Mr. A. W. Haslett deplored the modern tendency for over-specialization. It used to be possible for a man to read a book about say, a motor-car or wireless set and then set to and repair it. These were really introductions

TABLE 1C

Insecticide	*OMPA*	*Chlorothion*	*Diazinon*
Chemical name	Octamethyl pyrophosphoramide	0, 0-dimethyl-0-3-chloro-4-nitrophenyl phosphate	2-isopropyl-4-methy pyrimidyl-6-thiophosphoric diethyl ether
Other names	Schradan	—	G24 480, Basudin
Molecular weight	286	295.5	304.4
Structural formula			
Empirical formula	$C_8H_{24}N_4O_3P_2$	$C_8H_{10}NO_5PSCl$	$C_{10}H_{21}O_3N_2PS$
Phosphorus content	21.65%	10.49%	10.11%
Appearance	Colourless liquid	Brown-yellowish viscous liquid with ester like odour	Colourless liquid
Specific gravity	1.134 at 25°/4°C	1.437 at 20°/4°C	1.116-1.118 at 20°/4°C
Boiling point	118-122°C at 0.3 mm.	136°C at 0.2 mm. 112°C at 0.04 mm.	83-84°C at 0.002 mm.
Melting point	—	—	—
Refractive index	1.4612 at 25°C	1.5661 at 20°C	1.4978-1.4981 at 20°C
Solubility in water	Completely miscible	40 ppm	4,000 ppm
Stability	Rapid hydrolysis in strong acid solution and very slow in neutral and alkaline solutions.	Hydrolysis in water resembles that of methyl parathion. Hydrolysis in alkali very rapid.	Slow hydrolysis. More stable in alkaline solution than in a neutral or acid solution.

to science in one form or another but the opportunities for such literature were passing, and when only theory was available with no practice, interest flagged. Any science writer would be well advised to consider which article in his newspaper interested him most and model the approach to his subject on it. What interested him would then surely interest others.

Mr. James McCloy brought an entirely different approach to the matter—that of the television producer. Scripts were generally useless, for a professional actor was usually better than any scientist in interpreting them. Personality was all important and the anonymous commentary familiar in film production was not well adapted to television. Much more than in sound broadcasting was the importance of addressing and explaining visual effects to one viewer and Mr. McCloy gave a vivid demonstration of the difficulties that could arise in this direction. The key to effective television was the intimate close up and this was only successful when the performer had received some training in the art. There was a definite need for scientists to assist in television features but they had to realise that in this medium importance of subject was secondary to its presentation.

Value of Fan Mail

Opening the discussion for the Institute of Biology, Dr. Maurice Burton stressed the value of personal reminiscence, saying that even the value of 'fan mail' should not be disregarded. Even the most serious minded read some light literature but the great majority dropped anything 'heavy' that was unleavened and it might as well have been left unsaid.

Dr. Kenneth Pankhurst for the Royal Institute of Chemistry pointed out that in all forms of communication sincerity must be accompanied by enthusiasm. This was evident in normal public lectures, the best of which were invariably those delivered by competent, enthusiastic but unscripted lecturers.

Mr. Geoffrey Parr speaking on behalf of the Institute of Physics pressed for lucidity and clearness whether the person addressed be scientist or layman. Television and broadcasting were both ephemeral media and the only course of serious study was the written word. Much more use should be made of illustrations which could, when properly treated, give a rapid grasp of ideas with economy in words.

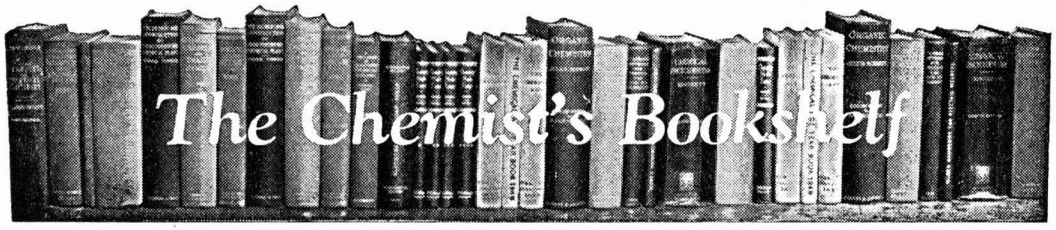
There were some 10 other contributors and it is perhaps regrettable that a non-scientist was not included to comment on the receiving end of the subject. The ideas of Independent Television were presented, the function of the Science Museum was discussed and the audience was reminded that all scientists are laymen outside their own particular spheres. The BBC were accused of publicizing novelties and 'soap opera science' rather than true knowledge. To counter this Dr. Ellingham wryly remarked that the label 'scientific' was often sufficient in itself to discourage interest.

Scientists were urged to come out of their ivory towers by some speakers and others urged them not to be commercially minded. It was said that if one aimed ideas and made them stick on top level politicians and little children the rest of the world would follow suit.

Full-Time Secretary

FOUNDED in 1945, the Society of Instrument Technology Ltd. has a membership of nearly 1,400; a number built up largely through the efforts of honorary officers without the help of either a full-time staff or permanent headquarters. Because of the continual growth of the Society and the recognition of the need for automation in industry, the Council has been conscious for some time that not only would the interests of members be best served by providing full time staff with office accommodation, but that such staff would relieve some of the burden on the honorary officers.

Though the courtesy of the Council of the Scientific Instrument Manufacturers' Association of Great Britain Ltd., an office has been taken at 20 Queen Anne Street, London W1, and a full-time secretary and clerical staff engaged. The Secretary is Commander A. A. W. Pollard, D.S.C., R.N. (Retd.), who recently left the Navy after more than 31 years' service in the Executive Branch. The office is now operating and all correspondence except that which affects the editorship of the Society's transactions should be addressed accordingly. Dr. Harold Moore, C.B.E., has consented to remain honorary editor for the time being. The telephone number is LANgham 4251/2.



QUANTITATIVE INORGANIC ANALYSIS: A LABORATORY MANUAL. By R. Belcher & A. J. Nutten. Butterworths Scientific Publications, London. 1955. Pp. viii + 337. Figs. 50. 25s.

The names of the authors lead one to expect this to be a stimulating book, and one is not disappointed. Until the appearance of this book the choice of a textbook of quantitative inorganic analysis, particularly for the student, has been restricted and unsatisfactory, and this is a welcome addition which will undoubtedly find wide acceptance. For the most part it is concerned with gravimetric and titrimetric methods, although some introductory experiments in instrumental analysis are included.

After the introductory chapter on apparatus and techniques, the gravimetric section contains a series of short monographs on the methods for determining 10 ions. In general, these first discuss the determination of the ion in some detail from the theoretical point of view and in a critical fashion. They then give an indication of the interferences that may occur. The detailed experimental procedure which follows is supplemented by a series of notes, often quite extensive, and finally other methods of determining the ion are outlined, and comments are made on these. A selection of the more important literature references is included for each determination.

The treatment in the titremetric section cannot, for obvious reasons, follow precisely the same pattern, but is of necessity based on reagents. The same general approach is, however, utilized.

A final chapter gives a useful introduction to the 'industrial' analysis of materials like steel and felspar.

There are many admirable things that one could select for comment. The treatment of the Mohr titration and of the gravimetric determination of sulphate both deserve mention. Both of these contain material not available in any other text-book known to the reviewer, and are obviously the result of a determination to treat these topics afresh from close personal knowledge instead of relying on other text-book accounts which are sometimes erroneous and often conflicting. The whole treatment of oxidation-reduction also shows the authors' wide knowledge of this field, to which they have made so many contributions in their researches.

The book should certainly run into a second edition before long, and it is with this in mind that the reviewer would suggest one or two additional topics to which the usual teaching course pays little attention, and which he would like to see the authors presenting in the clear way that they have written the rest of the book. Such topics are sampling, precision and accuracy. It is true that they are matters on which there is little general agreement even among analytical chemists. But it is also true that it is vital that the young analytical chemist (indeed, one might claim the young chemist) should have a full appreciation of their importance. They are, however, rarely dealt with in a satisfactory way, and it is felt that the present authors could improve materially on their normal presentation.

This book is clear, concise, up-to-date, and unequivocal. It is adequate without containing so much material that the learner is confused. It is a teaching text which the student will undoubtedly find of as much help to him after he has finished his training as it was during his training. And it will give useful guidance to many who have left their training period far behind.—CECIL L. WILSON.

HYDROGEN PEROXIDE. By W. C. Schumb, C. N. Satterfield, and R. L. Wentworth. 1955. Reinhold Publishing Corporation, New York. Chapman & Hall Ltd., London. Pp. 759. 132s.

In recent years the technology of hydrogen peroxide, unlike that of many inorganic chemicals has undergone very rapid development. At the start of the 20th century the product available commercially was dilute and unstable, and mainly suitable for use as a disinfectant and for the bleaching of materials such as hair, feathers and wool, which could not be suitably bleached with other chemicals. The introduction of the electrochemical process in 1908, by which persulphuric acid or its salts are formed and then hydrolysed, made it possible to produce a more concentrated, purer and more stable product. The greatest stimulus to the study of the properties and the methods available for the manufacture of hydrogen peroxide has, however, come from the military applications of this chemical. During World War II the uses of hydrogen peroxide as a military propellent were thoroughly investigated in Germany and considerable efforts were made to produce highly concentrated and stable solutions of hydrogen peroxide. The importance and military potential of this substance can be judged from the fact that during the last 10 years production and consumption of hydrogen peroxide in the United States have increased five-fold. This book is itself largely the result of military interest in the chemical, since it developed out of an extensive programme devoted to the study of hydrogen peroxide which was financially supported by the United States Navy. The authors are members of the staff of the Massachusetts Institute of Technology.

The volume provides a full account of the formation, manufacture, properties and uses of hydrogen peroxide, but the field of organic peroxides is excluded, and only an introduction is given to the organic and biological chemistry of hydrogen peroxide. One or two of the processes described for the manufacture of hydrogen peroxide are of interest, even though their successful commercial exploitation has not yet been fully achieved. The manufacture of hydrogen peroxide by passing an electric discharge through a mixture of 95 per cent hydrogen, five per cent oxygen and a small amount of water vapour was attempted in Germany and had the advantage of simplicity of reagents and low labour requirements but a very cheap source of electric power was necessary. Another process which has had more commercial success is based upon the autoxidation of reduced anthraquinone derivatives. The method was first developed in Germany during World War II but has since been taken up in the United States, although it does not seem likely yet to threaten the supremacy of the electrochemical (persulphate) process, which accounts for about 80 per cent of the world output of hydrogen peroxide.

Another interesting and useful account is that dealing with the concentration, purification, handling and storage of hydrogen peroxide solutions. The hazards associated with the production of highly concentrated solutions of hydrogen peroxide are dealt with and the materials suitable for use in contact with hydrogen peroxide are discussed. The treatment of the physical and chemical properties of hydrogen peroxide is particularly extensive and a full description is given of the stabilization of hydrogen peroxide, and of the effect of various factors upon its stability. Analytical procedures for the qualitative and quantitative analysis of hydrogen peroxide are described, and there is a lengthy account of the uses of hydrogen peroxide. It was estimated that in the United States in 1947 about 30 per cent was used for military purposes, and that of the remainder, half was consumed in the processing of cotton and rayon textiles. Of the miscellaneous applications one that has been developing considerably in the last ten years is its use in the manufacture of organic chemicals. The final chapter in the volume deals with inorganic peroxy compounds derived from metals and acids.

This is likely to prove a valuable work of reference on a most important inorganic chemical, and as such the book should have a wide appeal to all chemists.—G.S.E.

INDUSTRIAL FERMENTATIONS. Volume II. Edited by L. A. Underkofler & R. J. Hickey. New York, Chemical Publishing Co. Inc. 1954. Pp. 1x+578. $12.00.

Whereas the first volume of this work (THE CHEMICAL AGE, 1954, **71**, 734) was concerned with what may be called major fermentation including the production of

alcohol, butanol, acetic and other acids, glycerol and yeast, the present complementary book surveys more particularly the 'fine' aspects of fermentation. Its chapters have been contributed individually by a panel of authors, some of whom enjoy international reputations in the purely scientific field while all are well known in their specialized technical domains. Considering the breadth of the subject, a measure of heterogeneity must have been inevitable for the six parts of the book range from ketogenic processes, which incidentally include the fermentative production of such substances as 2- and 5-ketogluconic acids, through the production of 2:3-butanediol, various microbial enzymes, riboflavin and other vitamins, to the commercial production of antibiotics. A concluding section embraces such a miscellany of topics as the treatment of sewage, the fermentation of cucumbers, olives and sauerkraut, the genetics of and variation among microorganisms, and the selection and maintenance of suitable cultures.

So far from detracting from the whole work, it is this heterogeneity which mostly establishes the value of the volume. The qualification is suggested by the thought that the reader who, for instance, is actively interested in the microbiological oxidation of steroids with its numerous repercussions in medicine and biological science, will scarcely appreciate the following section on the processing of pickles. Nevertheless the writing of this book has resulted in bringing within two covers the description of a remarkable diversity of fermentative procedures. The compilation is additionally valuable in that it is perhaps the first of its kind in a field which has to a large extent only come into existence over the past 10 years.

Coming to certain details, the extensive bibliographies, numerous flow-steets and other practical details, photographs of fermentation plant and the inclusion in some instances of hitherto unpublished data are among a wealth of welcome features. Assay and analytical procedures are frequently though somewhat irregularly incorporated while other data such as the therapeutic usefulness of individual antibiotics and sometimes details of their chemistry are perhaps in some measure irrelevant. The subject matter necessarily reflects predominant US experience but for this very reason the book should prove very acceptable and carry its lesson to many other countries. Despite a few trivial typographical errors and an unavoidable tendency to topical details which must unfortunately lose some of its sharpness relatively quickly with the rapid progress in this field, this volume unquestionably represents a major landmark in the literature of fermentation.—

A. H. Cook.

PRACTICAL ORGANIC CHEMISTRY. 3rd Edition. By A. I. Vogel. Longmans, Green and Co., London. 1956. Pp. xxvii+1188. 60s.

'Look it up in Vogel'—this advice has been given to countless undergraduates and research workers since the publication of the first edition in 1948, and it is safe to say that they have seldom been disappointed. This book therefore needs no introduction to organic chemists, although it may be profitable to enumerate some of the reasons which account for its popularity. Apart from its accuracy, reliability and clarity, the most outstanding feature of this is its wide and well-balanced coverage. The extensive range of experiments enables teachers to design practical courses best suited to the particular needs of their students, and the great wealth of incidental information ensures that undergraduates who invest in the book will find it useful in their later work; the reviewer consults his battered copy of the first edition nearly every day.

The general plan of the previous editions has been retained, details of general technique and of methods of preparation being presented against a theoretical background, which now includes brief accounts of the electronic mechanisms of many reactions. This happy association of theory and practice ensures that undergraduates who use this book will not come to regard practical organic chemistry as an unrewarding branch of cookery. Numerous changes have been made during the preparation of the present edition and a glance at the list of additional experiments shows that the book gives an excellent coverage of recent developments; this feature should prove valuable to research workers as well as undergraduates.

Additional topics include the use of ion-exchange resins, the preparation of ketene and of Girard's reagents, synthesis with organic sodium, cadmium and lithium compounds, Oppenhauer oxidation, electrolytic

syntheses and many other important reactions and techniques. Some chemists may feel that the section on chromatographic adsorption is inadequate in view of the increasing importance of the technique; the reviewer could find no mention of partition or paper chromatography. A useful additional chapter provides a survey of semimicro techniques, and the appendix now includes an excellent, brief account of the applications of infrared and ultraviolet spectra to organic chemistry.

An account of the preparation of β-naphthylamine draws attention to the carcinogenic nature of this compound; a similar warning should have been included in the case of benzidine.

Many chemists will regret that Dr. Vogel has decided against the inclusion of references to the literature, apart from a selected bibliography and a few footnotes. In fact, certain references given in the first edition have now been omitted (e.g. one to a little known, but very useful paper on the drying action of calcium sulphate). Literature references covering important reagents such as lithium aluminium hydride would be especially welcome, and the reviewer feels that 10 or 20 pages of key references would greatly increase the well-deserved popularity of this excellent book.—J.C.P.S.

New Steel Process

The Hoesch works in Dortmund, West Germany, has announced the development of a process in which, it is claimed, iron ore can be reduced directly to steel with the help of 'metal fuels' (aluminium-silicon alloys). The new process is said to be 'in the last stage of experimentation'.

Next Week's Events

TUESDAY 24 APRIL

SCI (Agriculture Group)

London: The Chemical Society, Burlington House, Piccadilly W1, 5.30 p.m. 'Future Trends in Agricultural Production' by A. W. Marsden, M.Sc., D.I.C., A.R.C.S., F.R.I.C.

Institution of Chemical Engineers

London: May Fair Hotel, Berkeley Street, W1, 34th annual corporate meeting & annual dinner. 11 a.m. the meeting; 12 noon the President's Address—'The 'Technological Awakening'; 7 p.m. for 7.30 p.m. the annual dinner.

Oil & Colour Chemists' Association

London: The Criterion Restaurant W1. Annual general meeting 6.30 for 7 p.m.

Society of Instrument Technology

London: 26 Portland Place W1, 6.30 for 7 p.m. 'Dynamic Characteristics of Some Neutralization Processes & of Glass *p*H Electrodes' by Professor Ir. H. Kramers, M.I.Chem.E.

WEDNESDAY 25 APRIL

SCI (Plastics & Polymer Group)

London: Rooms of The Chemical Society, Burlington House, Piccadilly W1, 6 p.m. followed at 6.30 p.m. by paper entitled 'The Role of Abnormal Leakages in Polymer Degradation' by Dr. N. Grassie, B.Sc., Ph.D.

THURSDAY 26 APRIL

The Royal Society

London: Burlington House, Piccadilly W1, 4.30 p.m. Meeting for the election of foreign members followed by the reading and discussion of two papers; 'Carbohydrate Metabolism in Blood Cells Studied by Means of Isotopic Carbon' and 'Surface Behaviour of *Bacterium Coli*'.

The Chemical Society

Bristol: Chemistry Department, The University, 5.15 p.m. 'Magnetism & the Shape of Inorganic Molecules' by Professor R. S. Nyholm, D.Sc., A.R.I.C.

FRIDAY 27 APRIL

SCI (Food Group)

Blackpool: The Winter Gardens, 10 a.m. Joint meeting with the Royal Society for the Promotion of Health. Health Congress, Section E. 'Nutrition Education'; 'The Education of the Schoolchild and Adult in Nutrition'; 'Deficiencies in Educational Facilities'.

SCI (Liverpool)

Liverpool: Arts Theatre, The University, 5.30 p.m. 5th Leverhulme Lecture, 'The Source of Inspiration in Medical Research' by Sir Charles Dodds.

Publications & Announcements

NEWEST appliance for fighting fires involving bulk quantities of oils, spirits and other inflammable liquids is a new foam-making branchpipe only 18 inches in length and 6¼-lbs in weight—almost half the size and weight of previous models, announces The Pyrene Company. Known as Model FB5X, the new branchpipe is particularly suited for industries where inflammable liquids such as oils, petrol, alcohols, fats, waxes, naphtha, paints, varnishes, enamels and tar are used or stored. It instantly converts water into dense, fire-smothering foam which it delivers at the rate of 500 gallons per minute, blanketing the flames and safeguarding against re-ignition. The branchpipe may be set to project water only for extinguishing freely burning materials and for cooling down purposes.

* * *

COPIES of *Neoprene Notebook*, a monthly technical and industrial bulletin on Neoprene synthetic rubber, are now available. Readers who would like to receive a regular copy should write to Durham Raw Materials Ltd., 1-4 Great Tower Street, London EC3, the UK distributors of Neoprene. A copy of 'Facts about Hypalon' will be included with each issue of the *Neoprene Notebook*.

* * *

A NEW concept in Access tools was introduced to an invited audience at the Royal Festival Hall, London, last week by Access Equipment Ltd., of Neasden, London. It was the Zip-Up staging, so named because it can be erected speedily by unskilled workers. Two types of the staging were demonstrated—the Span and the Stairway. The Span type is designed to provide length of overhead access rather than height, while the Stairway provides all of the height needed for industrial purposes. Built in sections providing tiered platforms at three feet and six feet increments of height, the Stairway has an internal ladder (or stairway) built into it.

* * *

IMPROVEMENTS have been made to the Holmes-Connersville blowers, boosters and exhausters. The new models are known as H type machines. The essential differences between the new types and the other models are described in a folder which has recently been produced by the firm. The main alterations are the redesigned glands with deeper stuffing boxes which, it is claimed, have proved to be absolutely gas tight. The overall length has been reduced by incorporating the outer bearings in the main headplate and gear box casting. The mechanical strength of the machine is greatly increased by the reduced length and larger diameter shafts, and by bolting the cylinder on to the baseplate. Holmes-Connersville machines are made by W. C. Holmes & Co. Ltd., PO Box No. B7, Turnbridge, Huddersfield.

* * *

AUTO-CONTROLLED electric heat is the theme of a brochure published by Barlow-Whitney Ltd., 2 Dorset Square, London NW1. There is Barlow-Whitney equipment available for industrial heating of every description is the claim made in this brochure which deals with portable and small everyday standard appliances produced for factory, workshop and general use. All equipment described is electrically heated with automatic thermostatic control or switching devices. Among the products made by this company may be mentioned: electric glue pots, wax pots and droppers, plastics dip pots and tanks, immersion heaters, hotplates, tinning pots, melting pots, soldering irons, ladles and muffles, small electric furnaces, industrial ovens, kettles and wax tanks, and air heaters.

* * *

TO meet the requirements of the chemical and process industries, Sigmund Pumps Ltd., Team Valley, Gateshead 11, have developed the B-N series of stainless steel chemical pumps. These pumps are available for outputs from five gpm up to 200 gpm against heads from 10 ft. up to 250 ft. Special attention is claimed to have been given to sealing. A selection of methods is available, and many of these can be utilized on the pump without modification of the shaft or stuffing box. The seals used are of well-known manufacture and are readily obtainable. The steel used for the major part of the pump is of the following composition; Cr 18 per cent, Ni 9.5 per cent, C

(max) 0.07 per cent, Mo 2.75 per cent. Samples of this steel (18/8/3) are available from the company for testing.

* * *

A REPRINT from the *Journal of Scientific and Industrial Research* (1955, **14 B**, 540-2). 'A New Technique in Textile Dyeing' by V. B. Chipalkatti, has been published by the Shri Ram Institute for Industrial Research, 19 University Road, Delhi 8, India. This article describes a new approach to the problems of dyeing textile fibres. In the conventional dyeing process four factors adversely influence the rate of dyeing. (1) The increasing solubility with temperature of the dye in water; (2) The tendency of the dye to diffuse into the water; (3) The small concentration gradient of the dye across the fibre cross-section; (4) The lack of an effective temperature gradient across the fibre cross-section. All these factors are favourably influenced when the aqueous medium is replaced by molten metal or hot oil says this article. The latest approach, which the article describes in some detail, is to replace the metal or oil bath with a fluidized solids bed made up of sand or glass beads. The fluidized bed is claimed to be cheaper to work and to have many other advantages over the metal or oil bath. Examples are described, with photographs, of the superior results obtained by this new process.

* * *

THE 1956 Directory of the Association of British Insecticide Manufacturers gives details of the products and services offered by the Association's member firms. It is divided into three sections. The first lists the names, addresses, telephone numbers, telegraphic addresses and products of member firms. The second section gives details of the products and services offered by these companies under the following headings: aerial application products, aerosols, banding materials, foliage fungicides, fumigants, haulm destroyers and defoliants, insecticides, systemic insecticides, insecticides and fungicides combined, plant growth substances, poison baits, seed dressings and seed disinfectants, soil treatment chemicals, thermal disseminators ('smokes'), weedkillers, wetters, spreaders and stickers, miscellaneous products, applicators, and contract services. The third section is a list of proprietary and trade names and marks. A comprehensive index to the products and services section completes this useful directory.

* * *

FOUR new brochures have been published by the Talbot Stead Tube Co. Ltd., Green Lane, Walsall. They are (1) Stainless Steel Tube Catalogue, (2) Stainless Steel Fittings Catalogue, (3) Range of Products Booklet, (4) Table of Steels used for Metior Stainless Steel Tubes. The third publication is also available in French and German. Talbot Stead, who are part of the Tube Investments organization, manufacture stainless steel tubing for a wide range of industrial purposes including: electric power, the chemical industry, atomic energy, the brewing industry, the dairy industry and the textile industry. Among examples of the applications of steel tubes given in the first brochure may be mentioned a small distillation plant, a cooler for gases, a melting pan for confectionery and a cider chiller. Bimetal tubing can be supplied in cases where the inside and outside of the tube are subject to attack from different materials.

* * *

AN article on butadiene in the April issue of *ICI Magazine* states that the company is to make a special range of Butakon copolymers by combining butadiene with other chemicals. A plant is now being erected for this purpose at Wilton by ICI's Plastics Division. On completion later this year, the plant will be capable of producing about 10,000 tons per annum of butadiene copolymers. The article states that the scheme 'represents one of the biggest chemical projects under development within ICI at the present time, and the capital exceeds £4,000,000. It involves the collaboration of three Divisions: Billingham Division, who will supply the butadiene; General Chemicals Division who will supply acrylonitrile and methyl methacrylate; and Plastics Division who will be responsible for the manufacture, development and sales of the polymers produced.' The largest group of products to come from the new factory will be oil-resisting synthetic rubbers, for the manufacture of petrol and oil hose, for various gaskets and washers such as those used in aircraft hydraulic equipment and for flexible tanks for storing fuel.

HOME

New Factory

Electro-Chemical Engineering Co. Ltd., 161 Queens Road, Weybridge, Surrey, will shortly open a new factory and office building at Forsyth Road, Sheerwater, Surrey.

Fertilizer Plant Contract

M. Hall & Co. Ltd., London, have been awarded a contract stated to be worth £2,000,000 in connection with the construction of a concentrated fertilizer plant at Billingham-on-Tees, Co. Durham, for ICI Ltd.

Compoflex Centralize Works

As part of a plan to centralize and expand their production of flexible hoses, the Wimbledon, Surrey, factory of Compoflex Co. Ltd. was closed on 14 April. The production capacity and machinery is being transferred to the main Compoflex factory at Oldham, Lancashire.

Chemical Safety Council

The Association of British Chemical Manufacturers and the Association of Chemical & Allied Employers have set up a British Chemical Industry Safety Council to correlate the various safety activities in the chemical industry. The Safety Council will establish sub-committees dealing with the medical, statistical, and technical aspects of the problem.

UK Glass Exports

UK exports of glass and glassware reached the record total of £19,800,000 in 1955, an increase of £5,900,000 over 1954. In 1938 the UK had an adverse balance of trade, importing £3,000,000 worth more than was exported. In 1955, UK exports of glass exceeded imports by £14,800,000.

Mechanical Handling Exhibition

Buyers from 50 countries have applied for information and tickets covering the Mechanical Handling Exhibition & Convention at Earls Court, London, from 9-19 May. The exhibition, which will be opened by Sir Miles Thomas, will cover more than 400,000 sq. ft. and will be the largest of its kind in the world. An international convention, the first of its kind, will run concurrently. A full programme of industrial films has also been arranged. Tickets of admission are obtainable from Mr. H. A. Collman, *Mechanical Handling*, Dorset House, Stamford Street, London SE1.

Benzole Association AGM

The annual general meeting of the National Benzole & Allied Products Association will be held at the Grosvenor Hotel, Victoria, London SW1, on 25 April at 2 p.m.

Minister to Open Production Exhibition

Mr. Iain Macleod, Minister of Labour & National Service, will open the 1956 Production Exhibition to be held at Olympia from 23 to 31 May. Sir Leonard Lord, K.B.E., president of the Institution of Production Engineers, will be President of the exhibition.

Pyrex Rollers

Pyrex rollers which are used in the printing and duplicating industries are being manufactured by James A. Jobling & Co. Ltd. A silken smooth surface is claimed for these rollers and changes of dimensions with temperature are very small. Jobling say they are the first firm to make these rollers in this country. Previously they were imported from America.

Surface Activity Congress

The Second International Congress of Surface Activity will be held in London from 8 to 12 April next year with Lord Brabazon as president of honour and Sir Eric Rideal as the president. Membership fee of the congress is £4. Applications should be made to the Honorary Secretary, Second International Congress of Surface Activity, 14 Belgrave Square, London SW1.

Industrial Accidents & Diseases

Fatal accidents in February in the UK totalled 106, eight more than in January, but nine fewer than in February last year. Of these, four were recorded from chemicals, soaps and allied trades. Six cases of epitheliomatous ulceration (skin cancer) were reported from which one death resulted. Of 22 cases of chrome ulceration, 17 were contacted by workers in the manufacture of bichromates.

Cutting Machine Exhibition

An exhibition of the complete range of oxy-acetylene cutting machines made by British Oxygen will be held at the company's sales technical service department, North Circular Road, Cricklewood, on 14 to 18 May.

• OVERSEAS •

Pharmaceutical Industry Production Up

The West German pharmaceutical industry produced approximately DM 1,150,000,000 worth of goods in 1955, 6.5 per cent more than during the previous year.

Anti-Sunburn Pill

An anti-sunburn pill containing 8-methoxypsoralen has been produced by three University of Oregon doctors. It was discovered in a search for weapons against skin cancer.

Irish Superphosphates Quota

The Irish authorities have issued an order continuing the suspension of the quota on superphosphates, ground mineral phosphates and compounds manures until 31 March 1957.

US Military Deferment

US chemists are now able to complete their active duty for military training in from three to six months and perform the balance of their military obligation in the Reserve. Formerly they were required to perform active military service for two or more years, plus service in the Reserve.

New Dutch Soda Centre

Delfzijl, a small seaport in the extreme north of the Netherlands, is about to be transferred into an industrial centre. This change is being brought about by the development of a rich salt deposit near Winschoten, Groningen, which will form a large soda industry. Close to the new soda factory, which will produce 170,000 tons of soda a year, the Royal Netherlands Salt Industry will build a chlorine factory.

New du Pont Polish

After years of research E. I. du Pont de Nemours & Co. has just developed a polish designed to clean, wax, and glaze the finish on new cars and those whose finishes are still in good condition. The polish, called 'No. 7 New Car Wax', is a triple action paste which is wiped on and off without rubbing. It contains a cleaning agent to remove road haze, a wax to provide a polish, and silicones to add a glaze.

US Chemical Employment

Employees in the US chemical industry total 830,000, 11 per cent more than in 1951, according to figures issued by the US Department of Labour.

Timber Processing Output Up

Output of A/S Borregaard, Norway's biggest timber processing concern, increased in 1955 from 495,000 to 549,000 tons, the highest in the company's history. In addition to pulp and paper, the company is now producing artificial fibres and a wide range of chemicals.

US Tungsten Production

US domestic production of tungsten concentrates increased in 1955 for the sixth consecutive year. From less than 3,000,000 lb. (contained tungsten) in 1949 production has increased each year by an average of more than 2,000,000 lb. to £15,669,000 lb. in 1955.

Australian Petroleum

Australia's new role as an exporter of petroleum products is expected to save the country about £A22,000,000 annually in foreign exchange, reports the Petroleum Information Bureau. For the first time, Australia is in a position to export these products.

Food Technology

A series of conferences in modern food technology will be presented by the Massachusetts Institute of Technology in a two-week special summer programme from 18 to 29 June. Special attention will be given to developments in rheological measurements of foods, radiation sterilization, automation and the food industry, and knowledge of nutrition including geriatrics.

Atomic Development

The Canadian Government has instituted a new programme to encourage the participation of private industry in atomic development. An industrial assistance office will be established at Chalk River, Ontario. Special emphasis will be placed on encouraging private industry to take an active part in the development of atomic energy. Technical information of particular interest to industry will be distributed.

· PERSONAL ·

DR. J. S. D. BACON, senior lecturer in biochemistry at the University of Sheffield, has been appointed head of the new department of biochemistry at the Macaulay Institute of Soil Research at Craigiebuckler, Aberdeen. He takes up his duties in September.

SIR GRAHAM HAYMAN was re-elected president of the Federation of British Industries for a second year at the annual general meeting of the federation on 11 April. Sir Graham is chairman of the management committee of the Distillers' Co. Ltd., and has been particularly associated with the company's activities in the field of chemicals and plastics. He is president and former chairman of the Association of British Chemical Manufacturers.

AIR CHIEF MARSHAL SIR JOHN NELSON BOOTHMAN, K.C.B., K.B.E., D.F.C., A.F.C., F.R.Ae.S., will join the board of Kelvin & Hughes Ltd. as technical sales director on 1 May. Sir John who was AOC of Coastal Command before he retired after 35 years with the Royal Air Force, won the Schneider Trophy outright for Great Britain in 1931. With Kelvin & Hughes his technical and administrative experience will be utilized in furthering the world-wide commercial activities of the company in the fields of marine, industrial and aeronautical instrumentation.

MR. J. H. PENNINGTON has been appointed manager of Technical Ceramics Ltd., of Towcester, Northants, a newly formed company for the development and exploitation of ultrasonic materials and techniques. For the past two years Mr. Pennington has been in charge of special products at the pilot plant of the chemical and metallurgical division of The Plessey Company Ltd. at Towcester, Northants. Prior to joining Plessey, he spent some years with E. K. Cole Ltd. as technical representative. Among the activities that Mr. Pennington will direct at Technical Ceramics will be the development of new applications for piezoelectric ceramics. Uses of these materials are already very diverse and special emphasis is being placed on the design of ceramic transducers for use with high power equipment.

Changes in the directorate of British Cotton and Wool Dyers' Association Ltd. are announced. MR. J. KERR MCCALLUM, vice chairman, retired on 31 March and was succeeded by MR. EDGAR ISLES. Mr. G. MARR, MR. T. C. SCHOLES and MR. J. A. YOUNG have been elected to the board as from 1 April. MR. PETER CALDWELL, chairman, retires in June: he will be succeeded by Mr. Edgar Isles. MR. H. CUNLIFFE will then become vice chairman.

MR. KENNETH DAY and MR. JOHN DENTON have been appointed directors of Ernest Benn Ltd., the book publishing subsidiary company of Benn Brothers Ltd., publishers of THE CHEMICAL AGE.

The Workington Iron & Steel Co. announces that MR. J. LAIRD of the commercial research department of the United Steel Co. Ltd. has been appointed commercial manager of the branch and will take up his duties on 1 May.

MR. T. WINTRUP hitherto described as sales manager (engineering) will in future be known as sales manager (general engineering) of The Distington Engineering Co. Ltd.

Obituary

COLONEL C. AINSWORTH, MP for Bury (Lancs) and a pioneer in mineral khaki dyeing, has died aged 82. He founded the firm of Charles Ainsworth & Co., dyers and finishers, Ramsbottom, of which he was chairman and managing director. It is believed he was one of the first dyers of khaki cloth in this country.

Wills

Mr. WILLIAM R. SHARP, of Twickenham, Middlesex, a director of Clover Paint & Composition Co., Fenner & Alder, paint manufacturers, and the Ebonite Container Co., among other companies, left £257,965 net (duty paid £184,132).

The late MR. FREDERICK WILLIAM DENT, of 34 Westbourne Avenue, Harrogate, who was connected with the family business of tar distillers at Selby, left £16,398 (net £16,026, duty paid £1,607).

Law & Company News

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.)

SOUTHERN WHITING CO. LTD. Croydon.—6 March, mortgage further securing to Reunion Properties Co. Ltd. £10,800 due to mortgages from Cimex-Fraser Tuson Ltd. secured by a charge dated 17 February, 1956, until such sum is reduced to £6,000; charged on chalk pit and land at Pratts Bottom, Chelsfield, together with petrol pump, tank, machinery and buildings etc. *Nil. 13 January, 1955.

Satisfactions

EAST RIDING CHEMICAL CO. LTD. Hull.—Satisfactions 19 March, £7,500 (not ex.) registered 24 January, 1947, £2,500 (not ex.) 15 July, and £1,000 (not ex.) registered 7 October, 1949.

ERINOID LTD. London, EC, plastics manufacturers.—Satisfaction 19 March, of notes registered 12 January, 1951 and 6 May, 1952, to the extent of £100,000.

New Registrations

Scotts Medications Ltd.

Private company. (564,181). Registered 5 April. Capital £2,100 in 2,000 "A" ordinary shares of £1 and 2,000 "B" ordinary shares of 1s. Objects: To carry on the business of manufacturing and pharmaceutical chemists etc. Directors: Clarence W. Scott, 17 Garrard Road, Banstead, Surrey, Ralph Scott, 159 Bromley Road, Catford, London SE6, and Denise M. Blackman, 3 Conway Gardens, Mitcham. Reg. office: 48 Dover Street, London W1.

Harcourt Wordsworth Ltd.

Private company. (563,558). Capital £100 in £1 shares. To carry on the business of analytical and consulting chemists and bacteriologists etc. Directors: C. H. Wordsworth and Mary J. H. Wordsworth, of 41 Wear Bay Road, Folkestone, Kent, and Clifford J. Saunders, 90 Grange Road, London W5. Registered office: 41 Wear Bay Road, Folkestone, Kent.

Surface Coating Synthetics Ltd.

Private company. (563,532). Capital £100 in £1 shares. To carry on the business of manufacturers of and dealers in synthetic and natural resins and resinous substances, materials, products and components of plastics, oils, solvents, paints, varnishes, lacquers, polishes, waxes and chemicals of all kinds etc. Subscribers (each with one share): F. Williamson and J. E. C. Perry, of 1 Serjeants Inn, London EC4.

Mixing and Separating Equipment Ltd.

Private company. (562,858). Capital £1,000 in £1 shares. To carry on the business of manufacturers and repairers of and dealers in machines, mechanical objects, technical and chemical technical objects and parts thereof, scientific and technical instruments etc. Subscribers: George Conrad and Cyril J. Pollard, of 11 Old Jewry, London EC2.

Shervil Manufacturing Co. (Meopham) Ltd.

Private company. (563,913). Capital £1,000. To carry on the business of manufacturers of and dealers in cleansing and abrasive materials. Directors: Charles E. Sherwin, Mrs. Antoinette T. Sherwin and Roland E. A. Sherwin of Dashwood Court, Meopham, Kent. Registered office: Dashwood Court, Meopham, Kent.

Richardsons Westgarth Atomic Ltd.

Private company. (564,419). Registered 9 April. Capital £250,000 in £1 shares. Objects: To carry on the business of physicists, metallurgists and chemical, electronic, mechanical and electrical engineers, and to design and manufacture nuclear reactors and all types of apparatus and equipment for the generation of power from atomic energy etc. Directors: Harry Fothergill, Tintern, St. George's Hill, Weybridge, Surrey, Oliphant J. Philipson, 43 Lowndes Square, London SW1, and James R. Mackay, Highpoint, Hexham, Northumberland, all directors of Richardsons Westgarth & Co. Ltd.

Company News

F. W. Berk & Co.

A final ordinary dividend for 1955 of 7 1/12th per cent, as forecast, on £1,280,000 is announced by the board of F. W. Berk & Co. The capital was raised to that level last October by a rights issue of three for five at 6s 3d per 5s share.

Doulton & Co. Ltd.

The company earned a net profit of £154,588 compared with £102,497 in 1954. The directors have recommended the payment of a dividend of 17½ per cent on the ordinary stock, an increase of 2½ per cent over the rate for the last six years.

Glaxo Laboratories Ltd.

Glaxo Laboratories Ltd. announce an interim dividend on the Ordinary stock of 6¼ per cent for the year ending 30 June, 1956, which will be paid less tax on 14 June. This is in line with the policy statement contained in the chairman's review of last year's report and accounts. A progress report on the first half-year's trading will be made available early in May.

Premier Dyeing & Finishing (Holdings)

The first annual general meeting of the company was recently held at Leek, Staffordshire, when Mr. John Kirkland, the chairman and managing director, presided. After charging £20,000 for taxation there is a net profit of £23,338, £12,949 of which being profits prior to incorporation and not available for dividends, has been added to the carry forward. The balance of £10,389 is available to the holding company and the directors have recommended a dividend of 7½ per cent (actual), less tax, for the period from 6 July, 1955, to 31 December, 1955.

Gas Purification & Chemical Co.

The company has issued 58,000 5s shares in consideration of the acquisition of the share capital of Electric Audio Reproducers, of Isleworth, Middlesex. Electric Audio specializes in the development and manufacture of sound reproducing and amplifying equipment. Gas Purification has also acquired the share capital of Pultra, a company which manufactures micro equipment, for the nominal sum of £1 in consideration of a guarantee of the repayment of indebtedness of that company totalling about £35,000.

F. W. Hampshire & Co. Ltd.

Group trading profit of F. W. Hampshire & Co. Ltd., manufacturing chemists, for the year ended 5 December, 1955, amounted to £117,864, compared with £119,950 for the previous year. A total dividend of 16⅔ per cent is the same as for 1954.

Market Reports

LONDON.—The firm price conditions continue on the industrial chemicals market, and a steady flow of new business for home account has been reported covering a fairly wide range of uses. Enquiry for shipment has been good in volume, and new bookings have been on a fair scale. The routine soda products have been moved in good quantities against contracts particularly such products as chlorate and yellow prussiate of soda. Among other active items are formaldehyde, borax, boric Acid and hydrogen peroxide. The lead oxides have been in steady request with the prices lower as from 18 April. The new basic price for dry red lead is £142 15s per ton, litharge £144 15s per ton and dry white lead £147 15s per ton. Activity in the coal tar products market continues reasonably good with creosote oil and cresylic acid in steady request.

MANCHESTER.—With the exception of sulphate of copper, which is again easier in sympathy with the metal, there has been little change in chemical prices on the Manchester market during the past week. Caustic soda and most of the other leading ammonia and magnesium products, have met soda compounds, as well as the potash, with a steady demand against contracts, and replacement business is coming forward satisfactorily, with a fair number of home and shipping enquiries reported. Seasonal activity has been maintained in the fertilizer section, and a steady demand for most of light and heavy tar products has continued.

GLASGOW.—The past week has been much steadier in the Scottish heavy chemicals market, with the bulk of orders being for nominal current requirements. Deliveries against contracts have also been steady. Prices have continued reasonably firm, but in regard to copper derivatives, a fall in price has to be reported. The demand for fertilizers remains seasonably steady.

CLASSIFIED ADVERTISEMENTS

SITUATIONS VACANT

The engagement of persons answering these advertisements must be made through a Local Office of the Ministry of Labour or a Scheduled Employment Agency if the applicant is a man aged 18-64 *inclusive, or a woman aged* 18-59 *inclusive, unless he or she, or the employment, is excepted from the provisions of the Notifications of Vacancies Order,* 1952

BENN BROTHERS LTD. have vacancy for an Advertisement Representative in Birmingham and the Black Country for certain of their Trade Journals. Full-time appointment working from Birmingham Office, so residence in or near that city necessary. Applicants should write in strict confidence, stating age and salary required, with details of career to date, to: The Managing Director, Benn Brothers Ltd., Bouverie House, Fleet Street, London, E.C.4.

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Duties will include the control of water treatment plants, trade waste treatment and radio-active effluent treatment and disposal systems, special laundry for contaminated protective clothing and the decontamination of plant and equipment. The post may involve short tours of overseas duty.

Applicants should have an honours degree in chemistry or the A.R.I.C. or equivalent qualifications and at least three years experience in the industrial chemistry field. Experience of water treatment would be an advantage.

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Contributory Superannuation scheme. Married officers now living outside the Establishment's transport area will be eligible for housing on one of the Authority's estates; alternatively assistance towards legal expenses incurred in house purchase may be payable; until housed a lodging allowance may be available.

Requests for application forms by **POSTCARD** to the Senior Recruitment Officer at the above address not later than 2nd May, Quote reference 1104/38.

UNITED COKE AND CHEMICALS COMPANY LTD., producers of organic chemicals from coal, are expanding their range of products and require a **SALES REPRESENTATIVE.** An honours degree is desirable and experience of sales or development work involving unaccompanied visits to outside firms is essential. Experience of the plastics industry would be a great advantage. Age 27/35. Salary according to qualifications and experience. Pension scheme. Reply, giving personal details and account of education, qualifications and experience to the Commercial Manager, 34, Collegiate Crescent. Sheffield 10

EXPERIENCED CHEMISTS are required by Johnson, Matthey & Co., Limited, in their central research laboratories at Wembley. The work will be largely concerned with improving methods of extraction of precious and other metals, and research into their applications. Candidates should hold at least a Pass Degree or equivalent standard, but some appointments will be filled by candidates holding higher qualifications, and preference will be given to those possessing appropriate research experience. Basic salaries range up to £900 a year, plus free lunches and an annual bonus, and are determined according to the qualifications and/or experience of the candidate. All appointments will be to the established and superannuable staff.

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Candidates should write for a detailed form of application to the Director of Personnel, Courtaulds Limited, 16 St. Martins-le-Grand, London, E.C.1., quoting the reference H.10 for the Mechanical Engineer and H.11 for the Chemical Engineer.

YOUNG Scot (preferably 23-30) wanted to sell Chemical Products in Scotland for expanding Northern England firm. Knowledge Soap, Rubber, Textile, Grease Industries useful. Reply, stating qualifications— **BOX No. C.A. 3467, THE CHEMICAL AGE, 154, FLEET STREET, LONDON, E.C.4.**

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PATENTS

THE Proprietors of Patent No. 631325, for "Manufacture of Hydrocarbons," desire to secure commercial exploitation by licence or otherwise in the United Kingdom. Replies to Haseltine Lake & Co., 28, Southampton Buildings, Chancery Lane, London, W.C.2.

THE Proprietors of British Patent No. 647,887 for **"NEW OR IMPROVED PROCESS AND APPARATUS FOR THE MANUFACTURE OF ZINC OXIDE",** desire to enter into negotiations with a firm or firms for the sale of the patent or for the grant of licences thereunder. Further particulars may be obtained from **MARKS & CLERK, 57 & 58, LINCOLN'S INN FIELDS, LONDON, W.C.2.**

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