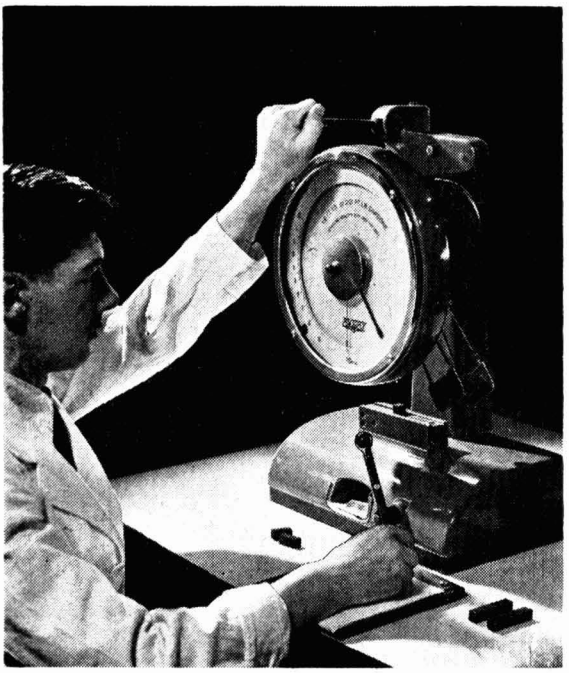
THE Chemical Age

VOL. LXX | 1 MAY 1954 | No. 1816

COMBATING CORROSION



The C.I.D. at work

(Corrosion Investigation Department)

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The many types of equipment used by St. Helens technologists include the Izod apparatus, illustrated here. It plays an important part in developing and controlling the production of that versatile servant of the chemical industry, ebonite.

St. Helens resources for the manufacture and application of anti-corrosive compounds are backed by modern facilities for research and development, and the fullest co-operation is extended to the chemical industry.

The following standard compounds are available :—

NATURAL RUBBER
A number of anti-corrosive grades for general application for temperature conditions up to 160° F. (70° C.).

HEAT-RESISTING NATURAL RUBBER
Especially for general application and where elevated temperature conditions exist—up to 212° F. (100° C.).

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A resilient lining designed to give maximum resistance to abrasive conditions.

EBONITE (HARD RUBBER)
To give protection against very severe corrosive conditions.

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A special grade of ebonite for use on equipment subjected in operation to physical shock and impact.

POLYCHLOROPRENE (NEOPRENE)
Suitable for conditions which involve elevated temperatures and/or oils, solvents and greases.

POLYVINYL CHLORIDE (P.V.C.)
Particularly suitable for the storage of Nitric and Chromic Acids at normal temperatures and up to 140° F. (60° C.).

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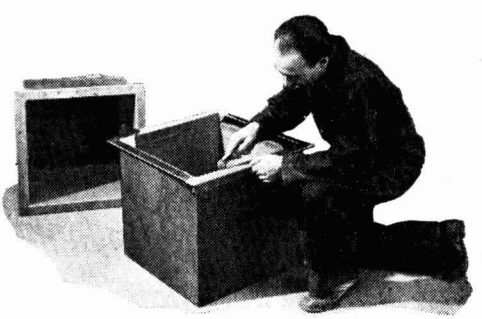

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Volume LXX
Number 1816

The Chemical Age

Established 1919

The Weekly Journal of Chemical Engineering and Industrial Chemistry

BOUVERIE HOUSE · 154 FLEET STREET · LONDON · EC4

Telephone : CENTRAL 3212 (26 *lines*) *Telegrams :* ALLANGAS · FLEET · LONDON

CONTENTS · 1 MAY 1954

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Thought for Food

ALMOST six months ago we took a random survey of contemporary food chemistry advances for our topic (see THE CHEMICAL AGE, 1953, **69**, 1005), and perhaps no apology is needed for repetition. Of all his eternal needs food is one to which the thoughts of man, whatever his age, return again and again. The fact that there is much less discussion today about world food supply and demand is not so much a reflection of statistics as it is a consequence of narrowing outlooks and the resurgence of nationalism. It is true that world food production has risen since the end of the war, but the pace of population expansion has in no way slackened. The balance is still precarious, although in the Western world the food/population ratio in fact and in prospect has certainly made most striking improvement. In a world more and more concerned with economic and military fears the echoes of FAO's earlier post-war messages have sadly faded; but the modern revival of Malthusianism is not discredited in all quarters of the world.

Preservation of food is no less important than production. Indeed, for modern communities with ready access to industrial facilities and equipment, the minimisation of storage losses can offer even more opportunity for raising total availability than direct increases in production. Bigger crops that cannot be handled without gross wastage do not necessarily provide more food. This dilemma rears its head on most British grassland farms today whenever a more intensive use of fertilisers is introduced. Unless the farm similarly expands its capacity to preserve the raised output of grass — as silage, by drying, or at the lowest level as hay — the greater crop merely grows to fibrous waste. Preservation, with minimal losses of quantity and quality, is and must be a forefront sector of the scientific food front. A recent paper by Dr. R. G. Tomkins of the DSIR Ditton Laboratory (*Journal of the Science of Food and Agriculture*, 1954, **5**, 161) has revealed the numerous unsolved problems that are still associated with fruit and vegetable preservation. To imagine that most difficulties have been disposed of by cold storage is only a popular illusion. Low-temperature injury to fruit is a common occurrence. Bananas may lose their ability to ripen, apples may turn brown. The reasons for these 'break-down' events are undetermined. Worse still from a practical viewpoint, 'the time of exposure to low-temperature required to produce low-temperature injury varies greatly from variety to variety and from year to year.' The liability to this type of storage loss cannot be predicted. It may surprise scientists in other fields but cold storage practice is still 'largely empirical and attended with risks and subsequent losses.' In England soft fruits cannot be distributed to all parts of the country without severe losses; and the ever-popular Cox's Orange Pippin apple cannot be stored for longer than four or five months, an unhappy limitation both for producers and consumers.

A general conclusion readily drawn from Dr. Tomkins' paper is that we do not know nearly enough about the 'pure' chemistry of fruits and vegetables. The technologies of quantitative production and of large-scale preservation have made much faster progress than fundamental research. It is, for example, suspected, largely on a basis of experience, that apple trees heavily fed with nitrogen yield 'high-nitrogen' fruit of poor-keeping quality. We do not know whether

this is because a higher content of protein encourages higher enzyme activity, or whether it is a disproportionate increase in the non-protein nitrogen content that leads to physiological ailments. The danger of excessive nitrogen feeding has not been newly recognised, and it is therefore surprising that the obvious research line to follow—what happens to the nitrogen in the fruit and how its form is related to keeping quality—has yet to be thoroughly studied.

In our previous survey of the food research front we dealt briefly with the potentialities of antibiotic substances as food preservatives. An American paper published only a few weeks ago (*Journal of Agricultural & Food Chemistry*, 1954, **2**, 298) has summarised the present prospects of this new chapter in preservation. It is emphasised that there are two basic principles in preservation, (1) the killing of all spoilage organisms by heat and perhaps by irradiation, and (2) the suspension of growth of spoilage organisms, e.g., cold storage. It may be possible for a suitable antibiotic or a mixture of such substances to inhibit the growth of spores during a long enough period to permit full distribution and consumption of fragile foods. On present evidence this must, however, be regarded as a most speculative possibility. There is much more hope that antibiotics could function as synergists for existing methods of preservation, e.g., by substantially reducing the intensity of heat treatment needed. Subtilin, so far the most closely investigated antibiotic in this field, has given promising but not consistent results of this kind in such difficult tasks as vegetable puree preservation. The long-established problem that food quality itself is impaired by the heat treatment required to control spoilage may be significantly eased. One difficulty that may delay rapid progress is the instability of the antibiotic additive; its effectiveness must not decline halfway through the storage period of the preserved foodstuff. That is why a mixture of antibiotics rather than one such substance may eventually take the lead in this still infant subject.

Canadian investigations using ice with a minute content of aureomycin to retard deterioration in freshly caught fish have also been recently published (*Journal of Agricultural & Food Chemistry*, 1954, **2**, 372). Remarkable reductions in bacterial count have been obtained, e.g., red spring salmon after 14 days post-landing storage had 212,000,000 bacteria per gram with ice storage but only 12,000,000 per gram with storage in cold sea water containing 2 ppm. of aureomycin. Organoleptic testing showed that the antibiotic method delayed the onset of staleness for four or five days longer than ordinary ice preservation. The importance of four or five days in fresh fish distribution cannot be under-estimated. There are also indications that aureomycin can similarly lengthen the safe keeping period of fresh meat, for promising results were obtained with minced beef.

Two lesser samples at random from the contemporary reports of food research have dealt with a search for the 'origin of chicken flavour' and the removal of sodium from the composition of milk. Does the flavour of chicken come from the bones, the fat, the skin, or the flesh? This question may seem fatuous to non-gastronomes but to the poultry canning industry it is of great importance and, again rather surprisingly, there has been little fundamental knowledge about it. A new US study has shown that the flavour is mainly derived from the actual meat, much less from the skin and bones, and hardly significantly from the fat; moreover, the principal precursors of chicken's characteristic flavour are constituents of the meat that can be readily extracted by cold water. As for milk without its normal sodium content, this is needed by people with heart disease or high blood pressure who are put on a low-sodium diet. Sodium-free milk is now being sold at about twice the ordinary price in Los Angeles; actually only 90 per cent of the sodium content has been removed. The process used is based upon ion exchange, a contribution to natural and complex food technology directly made by inorganic chemistry.

As we were forced to remark before, no one could hope to survey the entire front of advancing food chemistry today; but it is perhaps worth taking an occasional cross-section sample at random.

Notes & Comments

Iron & Steel

THE annual report for 1953 from the British Iron and Steel Federation is an impressive document and not unexpectedly it particularly reflects the industry's 'de-nationalisation' and the continuation of production expansion. A rise of 7.3 per cent or 1,200,000 tons of steel over 1952 is certainly commendable, and despite increased competition abroad the tonnage of British steel exports was slightly raised. The leading type of export is now galvanised sheet, with tubes, pipes, and fittings in second place. The Commonwealth Dominions remain the largest buyers (34.2 per cent) and this with The Colonies' purchases added to it becomes 53 per cent. Iron ore imports reached a record height in 1953 but this is mainly a reflection of freer conditions for sterling trade and does not imply reduced activity or desire to utilise home-produced ore. 46.5 per cent of the ore used was home-produced, a slightly better figure than in 1950 though a little lower than in 1951 and 1952. The principal sources of imported ore are Norway and Sweden, with French North Africa in second place, and Newfoundland third. These three sources totally provide us with rather more than 60 per cent of our imported iron ore. An interesting newcomer is the Conkary iron ore field in West Africa; in its first year it has supplied almost a third as much as Newfoundland. Another new source expected to begin supplies in late 1954 is Labrador.

Research Under-stressed

ONE criticism can be made of the report. It is admirably divided into sections but surely more space than the equivalent of a single page might have been devoted to research, especially as it is said that over 200 different investigations are being carried out by the Research Association, by member firms acting co-operatively, or as sponsored projects elsewhere. An appendix giving more detailed information would not have been out of place, especially as a three-page appendix has been devoted to the drive for iron scrap salvage. These are times when the contribution, real or potential, of research should never be under-stressed.

Market Research & Chemicals

A SMALL book, published by a group of consultants, has summarised contemporary opinion on marketing research in the chemical industry. Indeed, these last six words form the book's title (by R. S. Aries and Associates, New York, 1954. Chemonomics Inc. 56 pp.). The principal impression left after perusing it is the heavy demand upon skilled staff created by any truly systematic investigation of a particular chemical's potentialities. Several blue-prints for usage-research are outlined. But the efforts involved and their cost must be formidable for any but the largest organisations, and even then a background of large-scale production, actual or prospective, must be assumed if eventual results are to justify the expenditure. Small and moderate-sized companies are bound to look for short-cuts in these procedures. Time was—and not by any means distantly—when a company producing or able to produce a specific chemical would be content to develop a few likely 'usages,' risking neither haste nor energy diversion in trying to develop all possible markets in the same initial phase. Is this today a pathetic anachronism? Frankly, we doubt it. In commerce, chemical or not, the use of brains and initiative seems to us much less cumbersome than the slavish use of systematic screening procedures that exhaustively classify market prospects. Was it not Bragg who said soon after the first world war, on being told of the fabulous cost of research programmes across the Atlantic, 'Well, we haven't the money so we must use brains instead?'

The Advertising Approach

THE least cumbersome procedure discussed in this new American book is the approach by advertising, whereby a company with a chemical in

search of new uses describes it in technical or trade journals. The offering of samples and the invitation of inquiries produces a useful volume of market information to be investigated. This is praised for its selectivity and lower costs, but criticised because it produces a 'tremendous problem' in screening the results, does not reach all possible users, and may give a bad impression if samples are sent out before the product is perfected. These disadvantages are surely exaggerated. A 'tremendous' screening problem is welcome for it could only arise if there was a wide-ranged and voluminous market prospect. If a poor sample is sent out, that is a strategic error just as likely to be made in any approach to market exploration. Modifications in quality to suit specific uses can in any case be discussed in follow-up contacts. Nor is the fact that some potential users may not be 'netted' by advertising a major catastrophe. 100 per cent efficiency in this direction cannot be guaranteed by any system of market surveying. Although the advertising approach is given faint praise in this study of market development, it is interesting to read that it is used by some of the biggest US organisations—Dow, Du Pont, and Monsanto—to introduce newly developed chemicals. A special advantage is not mentioned, yet it is a most important one. Not only the product but the name and reputation of the producer is advertised, and prestige is no minor influence in chemical marketing.

New Polythene Containers

'TUBOPLAST' polythene flexible bottles and tubes were launched on the market in this country at a special exhibition held by Cascelloid Ltd. in their London showrooms at 9 Conduit Street, from Monday to Thursday, 5-8 April.

In addition to Tuboplast, Cascelloid made special displays of the other types of packaging for which they are now well known: clear acetate display boxes made on the Trans-Bo-Matic machine; flexible polythene bottles of special designs with spray or insufflator attachments; heavy acid containers in polythene protected by strong Vanesta containers for the transport of valuable chemicals; specialised packaging consisting of PVC wallets and holders of all descriptions; and polythene layflat bags in various forms printed in many attractive designs and colours. Also on show at this exhibition were inexpensive metal foil trays for packaging food products and many other uses.

Following the exhibition Cascelloid issued the following statement: 'Tuboplast was welcomed by many manufacturers who are looking for an inexpensive and efficient container for their products. We can truthfully say that the show was a great success.'

A corner of the London showroom of Cascelloid Ltd. during their recent exhibition

Quasi-Arc's New Laboratories Opened

Research & Development Facilities Provided

THE new research and development laboratories of The Quasi-Arc Co. Ltd. were opened at Bilston, Staffordshire, on 31 March by Mr. J. S. Hutchison, chairman of the British Oxygen Group of Companies. Mr. F. C. S. L. Lewin-Harris, chairman of Quasi-Arc, presided.

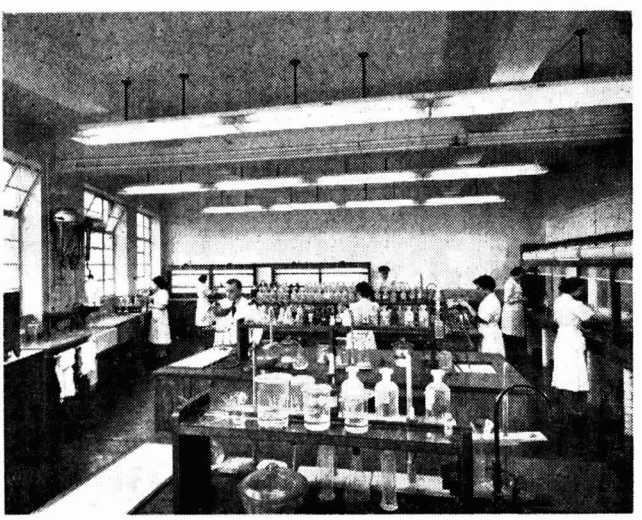
The laboratories, which occupy an area of approximately 11,000 sq. ft., are said to be unique in the equipment and the service provided for the development of new electrodes and the quality control of electrode production, as well as basic research for the welding industry. Housed in a single storey building constructed to allow for a second storey when needed, the laboratories are fitted with the most up-to-date equipment and are of the latest design.

In addition to its activities in developing new electrodes and improving existing products, Quasi-Arc's research and development department is also responsible for the quality control system, which plays an important part in electrode production at Bilston. Wire, other raw materials and blended powders for electrode coverings are checked for composition and other features before they are released to production; electrodes are examined and samples tested at several points during manufacture to ensure that consistently reliable products, conforming to close specifications, are always supplied to the user. A complete historical record is available of every carton of electrodes packed.

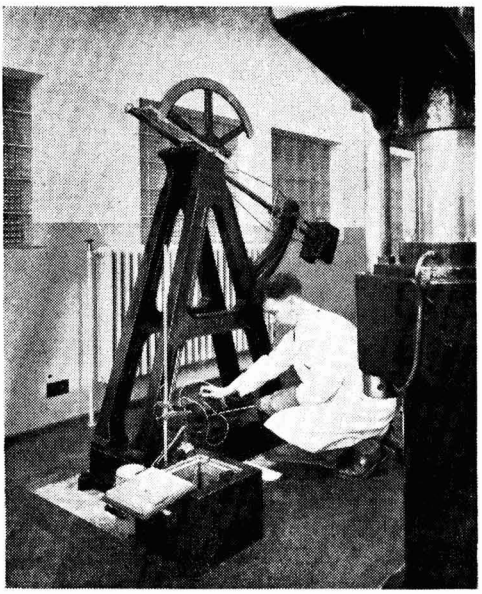
Electrode development is constantly in progress in the search for electrodes to weld new materials or having special welding characteristics, and for new and better covering materials. Research work on problems common to the development of a number of electrodes or on basic problems concerned with weldability is also always in hand, either as individual researches carried out by Quasi-Arc, or in conjunction with other laboratories.

Service to users of welding is an important part of the work of the department in investigating problems encountered and advising on materials and techniques.

The eight laboratories in the new block are devoted to electrode development, chemical analysis, spectrographic analysis, mechanical testing, physical testing, metallography and petrology, X-ray diffraction and industrial radiography. Of particular interest in so far as equipment is concerned is a pilot plant for the small-scale experimental manufacture of electrodes, including powder blending, paste mixing and electrode extruding machinery. In the spectrographic laboratory a Hilger quartz and glass prism spectrograph with Judd-Lewis comparator



The chemical analysis laboratory in the new research and development block of The Quasi-Arc Company Ltd.



Preparing for impact testing a butt welded specimen at 40° in the mechanical testing laboratory

and photo-electric microphotometer provides speedy and accurate analysis of raw materials and electrode coverings. In the metallographic laboratory a Vickers' projection microscope, binocular research and petrological microscopes will be used mainly for research into the constitution of weld metal. A Newton Victor Raymax X-ray diffraction unit with a maximum output of 10 mA at 100 kV, is used in the examination of the constitution and structure of alloys and investigating minerals and their impurities. A 250 kV Newton Victor X-ray unit in the industrial radiographic laboratory has capacity for radiography of mild steel up to 3 in. in thickness.

The Quasi-Arc Co. was established in London in 1911 and was the first company of its kind in the British Commonwealth. Today with associated companies, Quasi-Arc is said to be the largest manufacturer in the Commonwealth of electrodes and equipment for arc welding, with factories and agents throughout the world.

Active and efficient research has always been the key to progress in electric welding, and Quasi-Arc claims a long record of successful leadership in this field. The first all-welded ship, the first all-welded bridge, the first all-welded gasholder, were welded with Quasi-Arc products and with the Quasi-Arc organisation advising on the design and construction. Armour plate was first successfully welded with electrodes developed and manufactured by the company.

The use of arc welding has increased fourfold in the engineering industry during the past 15 years; Quasi-Arc production is six times pre-war, and continued research is being directed towards developing more efficient designs and manufacturing methods for both electrodes and welding equipment. The company's electrode manufacturing plant has been made by the company to its own designs and incorporates a number of patented features.

An important part of The Quasi-Arc Company's activities lies in fostering more widespread knowledge of the possibilities of electric welding through promotion of efficient design for work to be fabricated by welding, together with guidance to users on technical problems (metallurgical and practical), the layout of welding shops, and the training of welding engineers, foremen and operators.

Mathieson Buy Marketing Company

Mathieson Chemical Corporation, a basic manufacturer of ethylene glycol and methanol and until now supplier of these anti-freeze ingredients to US Industrial Chemicals Co., has absorbed the USI anti-freeze sales personnel and will market the 'USI Permanent' glycol type, and 'Super Pyro' methanol type anti-freezes formerly marketed by USI. Mathieson plans to expand merchandising activities that have been carried on in connection with these products and will utilise the three USI packaging plants at New Orleans, Chicago and Baltimore. Mathieson will also continue to utilise packaging points at Chicago and Rochester, N.Y.

Salt Research Institute at Bhavnagar

The Indian Prime Minister, Mr. Nehru, declared open at Bhavnagar on 10 April the Central Salt Research Institute, twelfth in the chain of National Research Laboratories started by the Government of India. The Institute will help the salt industry to improve the quality of salt from various sources and will conduct research on economic recovery of by-products and their utilisation for manufacture of other materials.

BIF 1954, Castle Bromwich

A LARGE number of stands representing the chemical engineering, chemical and allied trades will be included in the Castle Bromwich (Birmingham) section of the British Industries Fair, which opens on Monday next (3 May) and will continue until 14 May.

An interesting experiment is being made by the Association of British Chemical Manufacturers. Because of the lessening interest among individual exhibitors in the Chemical Section of the Fair in recent years, the Association is staging a comprehensive exhibit on which 20 of the leading chemical companies will have separate display units. Following are brief descriptions of these:—

Albright & Wilson Ltd. will devote their display exclusively to silicones. A series of photographs will illustrate their new £1,000,000 plant at Barry, South Wales, and silicone production in general terms, together with the wide range of products now available. From their extensive stock of chemical products A. Boake, Roberts & Co. Ltd., will lay emphasis on plasticisers and stabilisers for the plastics industry, synthetic lubricants, metallic stearates, inhibitors, intermediates and pharmaceutical, aromatic and food chemicals.

Wide Fields of Application

As well as borax and boric acid, Borax Consolidated Ltd. will show a wide range of borates. Their display will illustrate some of the manifold industrial applications of boron products, from the older uses in glass, pottery and vitreous enamels to the newer developments, such as nylon and boron steels. The range of laboratory reagents produced by British Drug Houses Ltd. includes more than 6,000 chemicals and laboratory materials, and this company's exhibit can do no more than suggest the tremendously wide field of application.

British Glues & Chemicals Ltd. will display their own range of products, also those of their associate companies—Croid Ltd., B. Young & Co., and Personality Beauty Products Ltd. The display of British Titan Products Co. Ltd. will be diagrammatic, tracing the manufacture of titanium oxide from the supply of raw materials to the distribution of the final product.

W. J. Bush & Co. Ltd. will be exhibiting a selection from their range of aromatic, fine and pharmaceutical chemicals, which will be as comprehensive as the limited space permits, while Coalite & Chemical Products Ltd. will be showing an interesting range of products derived from coal by the 'Coalite' process of low temperature carbonisation. The number and diversity of soap and chemical products made by Joseph Crosfield & Sons Ltd. are so great that for display they will be divided into three main groups: soaps and soap powders, silicates and detergents, and edible oils and fats.

Petrochemicals & Plastics

Some of the ways in which the Distillers Co. Ltd. has recently contributed to the activities of the British chemical industry and its dependents will be outlined in the display of that company, emphasis being put on petrochemicals and plastics. Hickson & Welch Ltd. will draw attention to their intermediates for dyestuffs, colours and pharmaceuticals, also their technical grade insecticides.

I.C.I.'s showcase has been designed to illustrate the immense range of their products and their many uses. Dioramas will show the part played by I.C.I. chemicals in agriculture, in the health services and in industry. Attention will also be drawn to the comprehensive literature prepared by I.C.I. on all these subjects. Imperial Smelting Corporation Ltd. will feature fluorine chemicals. A flow chart will show the production of anhydrous hydrofluoric acid, and other fluorine chemicals will be indicated and illustrated.

All three English subsidiaries of Laporte Industries Ltd.—Laporte Chemicals Ltd., Laporte Acids Ltd. and Laporte Titanium Ltd.—will be represented on the ABCM stand. Hydrogen peroxide and related percompounds are the products for which Laporte Chemicals are perhaps best known, but they are also recognised for a large range of other high quality chemical products.

Surface active agents and detergent products, particularly primary fatty alcohol sulphates, will be displayed by Marchon Products Ltd. Attention will be focused on a new form of sodium lauryl sulphate, this

being Empicol L.Z.V., which is Empicol L.Z. powder in the form of dust free compact needles. Products and themes chosen by Monsanto Chemicals Ltd. for display are Lustrex polystyrene for industrial plastic mouldings; Aroclors as capacitor impregnants and heat transfer media; Pyroclor as a transformer fluid; Silesters, organic silicon chemicals for use in the foundry trade; Permasan and Permasan 116 for use in wood preservation; and sodium benzoate for corrosion inhibition.

Surface Coatings

The new Epikote resins which have created keen interest among formulators and users of surface coatings and in the plastics and adhesives fields will be featured by Shell Chemical Manufacturing Co. Ltd. Various grades of alum and aluminium sulphate used for water purification, paper manufacture and trade effluent, will be shown by Peter Spence Ltd., also activated alumina desiccant in various grades, and mixed catalysts based on alumina for use in industry in general and the petroleum industry in particular.

In addition to citric acid and their range of fine chemicals, John & E. Sturge Ltd. will make a special feature of their newly developed grades of precipitated calcium carbonate, used in the plastics, paint and paper industries. United Coke & Chemicals Co. Ltd. will display a range of chemicals derived from the carbonisation of coal at their Orgreave and Brookhouse works and other coke oven plants of the United Steel Companies Ltd., with whom they are associated.

Apart from the ABCM stand, others of interest will include the following:—

The stand of Bakelite Ltd. will feature the wide range both of plastic materials available and of important applications for them. Among these will be included many recently developed materials which still further enlarge the potential field of application.

A powder type hand cleanser, designed for use in industry, will be demonstrated for the first time by Borax Consolidated Ltd. on Stand D178. Known as Boraxo (Braxo), this cleanser is claimed to combine the effectiveness of a heavy duty cleanser with the mildness of a baby soap, and will efficiently remove grease, grime and chemicals from workers' hands.

Modern laboratory furniture, the construction of which has been based on experience gained through long association with architects and research chemists, will be displayed by Cygnet Joinery Ltd. Ancillary fittings, such as plastic-coated service fittings, plastic extraction fans, etc., will also be featured.

J. Collis & Sons Ltd. will display mechanical handling equipment, behind the functional design of which lies more than 80 years' technical experience and research. Each appliance is generously designed with a conservatively rated capacity which the manufacturers claim will ensure trouble-free service under the arduous conditions brought about by the mechanisation of industry.

Dust control equipment displayed by Dallow Lambert & Co. Ltd. will include, for the first time, the new Auto-Shaker, which will be shown in operation, fitted to a Dustmaster unit dust collector. This device consists of a slow-speed geared motor and the necessary control gear, which is interlocked with the fan motor. The shaker can be operated for a set period of time and re-sets itself after completion of the cycle.

Among the exhibits of Electromagnets Ltd. will be a swarf separator, high intensity electromagnetic conveyor head unit and various types of permanent magnetic separators. Entirely new is the Select-O-Load lifting magnet control system, which gives an extremely fine degree of control over the amount of material picked up or dropped by a lifting magnet.

Laboratory test sieves to British and USA official standards will be shown by Endecotts (Filters) Ltd. Also on this company's stand will be commercial quality sieves, in brass, tinned steel, stainless steel and copper, together with fabricated gauze products filters, strainers, etc.

Activated Earth

The Fullers' Earth Union Ltd. will show the effect of using activated fullers' earth for oil bleaching. This stand will also display various grades of earth, including the Fulmonts, which are useful catalysts in various reactions such as polymerisation and alkylation. Insecticide carriers may also be seen.

Autolec electrode type steam raisers and water heaters will be featured by G. W. B. Furnaces Ltd. Prominence will be given to the 'Powermaster' oil or gas fired boiler. This is the first completely self-contained, packaged boiler of its type to be available in Great Britain and is suitable for operating

on all types of fuel oil or on gas firing.

Exhibits shown by G. A. Harvey (London) Ltd. will give an indication of the varied types of heavy industrial equipment they produce, ranging from the smallest high pressure autoclaves for 3,000 lb. working pressure to fractionating columns weighing 220 tons and gas oil separators made from 3 in. thick mild steel plate of 4 ft. 6 in. dia. and 170 ft. long. At the other end of the scale are steel desks and tables of completely new design, cupboards, shelving, lockers, storage bins, etc.

Shown by Alfred Herbert Ltd. among a variety of exhibits will be their Atritor-Dryer Pulveriser, which is universally used for firing boilers, metallurgical furnaces and kilns and also has a wide application in the grinding and drying of chemicals, clays, chalk, fertilisers, etc. Grinding and drying are performed in one operation and the machine is compact and simple in operation.

The Hymatic Engineering Co. Ltd. intend showing mobile air compressor sets with displacements ranging from 9-50 cu. ft. per minute, all based on the perfected Hydrovane rotary design. Powered either by petrol engine or electric motor, each has a volumetric efficiency of more than 90 per cent at pressures up to 100 psi.

Titanium, Terylene & PTFE

Of particular interest on the stand of the I.C.I. Metals Division will be the display of wrought titanium. Apart from a general display of metal products in copper, aluminium and their alloys, there will be special exhibits showing specific applications in various industries. The potentialities of 'Terylene' will be featured on the 'Terylene' Council's stand, while the I.C.I. Plastics Division's stand will be devoted to the uses being found for their thermoplastic and thermosetting materials in the engineering industry. A good deal of prominence will be given to polytetrafluoroethylene, which is now being produced on a commercial scale in the UK and is available in quantity for the electrical and engineering industries, also for specialised applications. Nylon moulding powder will also be given prominence.

Corrosion has been estimated to be costing British industry £200,000,000 a year and the most successful method of combating it is chemical pre-treatment. Jenolite Ltd. are specialists in this process and in a variety of other industrial chemical applications. They will seek on their stand to show that they are experts in all aspects of metal finishing.

A plastic television cabinet on the Lorival Plastics stand is said to be the first 'collapsible' plastic cabinet ever designed. Shown with numerous other products in a wide range of materials, it will illustrate the comprehensive nature of the Lorival service to the industrial plastics user.

Benn Brothers, Ltd., publishers of 'The Chemical Age,' will occupy Stand A427 at Castle Bromwich (telephone, Birmingham Fair 213).

Claimed to be the first British firm to produce metal finishes by chemical immersion without the use of electric current, Metal Processes Ltd. will have on their stand a long row of tanks heated by gas rail burners and containing all their various dipping solutions. With the assistance of trained demonstrators, visitors to the stand will be able to carry out sample immersions of small metal plaques.

Distillation equipment in heat and corrosion resistant metals will be displayed by Metal Propellers Ltd. The most interesting exhibit will be a section of a 2 ft. 6 in. dia. Monel distillation column which, when complete, will contain 40 of the new Shell patented Turbogrid trays, which the company is now manufacturing under licence.

Exhibits on the Royal Doulton Potteries' stand will comprise two main groups—electrical porcelain insulators and industrial porous ceramics. The main feature will be the striking and effective way in which certain types of insulators have been used in the construction of the stand, to demonstrate the general mechanical functions they perform in service. Working models will demonstrate some of the more interesting applications of porous ceramics.

A new barrier cream which, used in conjunction with normal protective measures, minimises the risk of skin irritation when handing synthetic glues and resins, will be shown for the first time on the stand of Rozalex Ltd.

Latest developments in sanitary ware and associated equipment will be shown on the stand of Shires & Co. (London) Ltd.

Good Progress Made

The Burma Pharmaceutical Industry

SINCE first we announced details of the agreement between the Burmese Government and Evans Medical Supplies Ltd. (THE CHEMICAL AGE, 1953, **69**, 874), considerable progress has been made with the plans for The Burma Pharmaceutical Industry. At a Press conference in London on 26 April, Mr. R. W. Oxtoby, general manager for the new organisation, gave an account of this progress.

40 Acre Factory Site

After some difficulty (Mr. Oxtoby said) a suitable site of 140 acres had been selected for development near the Hlang River and the Insein Road about eight miles from Rangoon. The actual factory site will consist of 40 acres and the remainder will be used for an animal farm and to provide an outlet to the river for effluent disposal and for wharfs. The plans are well advanced for the various buildings to be erected as well as for the roads and railways required and the machinery is being ordered while the building is going up. As there are no services to the site, wells are being dug for water and a diesel generator for electricity is being installed. The cost of site preparation and building and equipping the factories will cost several million pounds.

All contracts have had to be placed with the approval of the Burmese government and as communications with Burma are poor this has meant some delay. However, many of these contracts have now been awarded and work on them is progressing. Machinery and equipment for the alcohol distillery will be supplied by The A.P.V. Co. Ltd. of London and the same company will do the engineering work on the yeast factory. Fermzymetera SA, of Luxembourg, will provide the processes for yeast manufacture. Carr, Rudd & Partners, of London, are the consulting engineers for boilers, power and air-conditioning.

The buildings will include:— (1) Main pharmaceutical factory comprising raw material store, drug grinding, galenical and tablet manufacture, filling rooms and sterile products laboratories. (2) A biological institute for the preparation of sera and vaccines. (3) An alcohol distillery capable of producing 2,400 gallons per day. (4) A yeast plant providing half a ton of dry medicinal yeast per day. (5) Administrative buildings —offices, canteen and laundry, workshops, garages, boiler house, generator station, etc. (6) Farm buildings for the large and small animals required for vaccine and sera production and biological testing.

The Burmese Government are enthusiastic about the alcohol and yeast plants and these will be among the first buildings constructed. Present plans are for 1,000 tons of broken or imperfect rice a month to arrive by river to feed these two plants. The distillery will be designed so that production can be altered to produce whatever grade of ethyl alcohol is in greatest demand at any particular moment. The yeast is intended for distribution among the undernourished sections of the population through schools, hospitals, etc. The alcohol is mainly intended for meeting the needs of other industries now being developed by the Government, e.g. the paint and aluminium industries.

Building operations are being planned to enable an early start to be made with such work as the manufacture of tablets before the factories are completed. The corner stone was laid on the site on 23 April by the Prime Minister of Burma.

OCCA *Exhibition*

PREVIOUSLY held at Borough Polytechnic, the Technical Trade Exhibition of the London Section of the Oil and Colour Chemists' Association was this year held at the Royal Horticultural Society's Old Hall, Westminster. It was the sixth annual exhibition, and from Wednesday to Friday last week the hall was crowded with interested visitors.

The exhibition, which was first held in 1949, is particularly intended to give junior chemists in the paint, printing ink, oil and colour industries an opportunity to learn, at first hand, details of technical progress in the materials they are likely to use. That they were taking advantage of this opportunity could be seen from the presence of a large number of younger technologists.

There were altogether 49 exhibitors in this year's display, and almost every aspect of paint and printing ink manufacture was covered. Moving the exhibition from Borough Polytechnic meant that all the stands could be accommodated in one hall, a welcome improvement.

Research in Sugar Chemistry

Some West Indian Work of Industrial Importance

THE Imperial College of Tropical Agriculture in Trinidad was founded as the West Indian Agricultural College in 1921, on the recommendation of a committee, appointed by Viscount Milner, then Secretary of State for the Colonies, to conduct research and provide instruction in tropical agriculture. The report of the College for the year 1952-53, besides describing much research of purely agricultural interest, gives in the report of the sugar research scheme some interesting details of chemical work being carried out.

Investigations of the formation of cane-juice evaporator scale have shown progress. A new method of rapidly cleaning evaporator heating surfaces by the use of ethylene diamine tetra-acetic acid has shown promise; a study of the use of an electrical device has failed to prove any beneficial effect. The addition of sodium fluoride at the clarification stage of the process gives a brilliantly clear juice and at the same time greatly diminishes the amount of scale-forming salts. No correlation could be found between the concentrations of calcium and magnesium and the amount of scale formation.

Extensive studies of clarification and settling properties of juices from different varieties of cane and from different soils have shown the importance of the phosphate content of the juice. A cane grown on one estate in British Guiana contained hardly any phosphate and would not settle at all until phosphate had been added to the juice; but the same cane grown in Trinidad had an appreciable phosphate content and offered no difficulties in working. The effect of the addition of various materials to the clarified juice was examined: dicalite gave no increase in settling rate; Krilium had little effect; bauxite slightly increased the settling rate.

Cane Juice Analysis

Investigations on the minor constituents of cane juice have been continued, and detailed analyses of amino acids, carboxylic acids, phenols and mineral components of juice are being made throughout the life of cane grown with varying levels of fertiliser treatment. Similar analyses are being made on cane grown under drought conditions.

An examination of the constituents of fusel oil as separated in a Trinidad distillery has been undertaken. The oil was found to contain 55 per cent of amyl alcohols (mainly *iso*-amyl alcohol) and 10 per cent of *iso*-butyl alcohol, the residue being composed of ethyl alcohol and water and small amounts of esters. The butyl and amyl alcohols are readily separated from each other and from the other constituents. The separation could be effected in any distillery possessing modern equipment, and it might prove profitable to the industry.

Lactic Acid Derivatives

Work has continued on a process for the manufacture of lactic acid derivatives from the reaction of lime with molasses. It has been found that maximum conversion of molasses into lactic acid takes place after 11 minutes heating at 220°. Because other substances are also formed, a fundamental study of the reaction is being undertaken. *n*-Butyl, *iso*-butyl, *n*-amyl and *iso*-amyl lactates have all been made directly from the molasses-lime reaction.

Another process which has now reached the pilot plant stage is the production of levulininc acid from molasses by its reaction with catalytic amounts of mineral acid. Yields up to 80 per cent of the theoretical have been obtained and the product converted into the potentially valuable calcium and ferrous salts (for medicinal use) and the sodium salt (of possible use as an anti-freeze agent).

Some work on the industrial utilisation of raw sugar itself has been undertaken, in particular studies on the fermentation of sugar with *Aspergillus terreus* and *parasiticus* to yield itaconic and kojic acids respectively. A process for the conversion of sucrose into crystalline glucose and fructose has also been worked out.

Finally, some purely chemical work has been done on the Diels-Alder reaction of β-acetylacrylic acid derived from levulinic acid and several compounds prepared for examination as anthelmintics.

The Export Situation

Changing Pattern of Business Revealed

THE continuing increase in the value of British chemical exports is due largely to the increasing trade in the new synthetic organic compounds—dyes, medicinals, essences and plastics—and most of Britain's 'traditional' exports continue to fall. The alkali position continues to improve, however, and the figures for coal tar are striking, although they do not quite offset the rapid decline in the other coal and oil crude products. Solvents are still high, although there is a slight falling-off in demand. Fertiliser exports remain in a very poor position.

Trade with the US is still very disappointing, but exports to Scandinavia and Australasia are kept at their usual level. Increasing trade with both India and Pakistan continues, but the most striking increase is in exports to Egypt.

TABLE 1
VALUE OF EXPORTS IN £ : PRINCIPAL COMMODITIES

	Mar. 1954	Jan. 1954	Mar. 1953
Acids, inorganic	51,662	53,221	45,153
Copper sulphate	498,264	492,067	664,556
Sodium hydroxide	463,260	386,023	165,221
Sodium carbonate	184,274	135,069	118,703
Aluminium sulphate	29,726	36,548	35,686
Bismuth compounds	33,986	39,868	28,932
Calcium compounds, inorganic	54,295	50,772	73,949
Magnesium compounds	49,662	64,781	28,937
Nickel salts	53,534	53,458	66,878
Potassium compounds, ex. fertilisers, bromides and iodides	31,780	44,285	31,679
Glycerine	10,460	67,037	37,504
Ethyl, methyl, etc., alcohols	157,996	170,507	66,832
Acetone	77,257	87,637	39,974
Lead tetra ethyl	219,754	291,715	354,715
Total for chemical elements and compounds	**4,954,594**	**4,783,569**	**4,324,441**
Coal tar	134,915	59,642	47,984
Cresylic acids	43,670	35,986	68,206
Benzole	191	108	332,297
Creosote oil	155,743	154,490	105,084
Total from coal tar, etc.	**360,082**	**266,352**	**580,546**
Indigo, synthetic	85,605	84,037	92,837
Total for synthetic dyestuffs	**830,127**	**980,502**	**486,261**
Medicinal and pharmaceutical products, total	**2,955,873**	**2,825,718**	**2,461,876**
Essential oils—			
Natural	42,341	40,113	30,573
Synthetic	96,847	89,329	67,237
Flavouring essences, etc.	96,339	86,622	80,424
Total for essential oils, perfumes, etc.	**2,003,239**	**1,597,292**	**1,582,853**
Ammonium nitrate	269	84,734	88,661
Ammonium sulphate	232,203	318,859	587,242
Total for all fertilisers	**284,754**	**494,141**	**729,461**
Plastics materials, total	**2,019,971**	**1,941,748**	**1,470,278**

TABLE 2
VALUE OF EXPORTS IN £ : PRINCIPAL CUSTOMERS

	Mar. 1954	Jan. 1954	Mar. 1953
Gold Coast	376,417	280,913	304,742
Nigeria	348,253	360,138	351,792
South Africa	921,104	828,570	865,949
India	1,562,742	1,242,446	825,064
Pakistan	405,492	374,310	47,759
Singapore	358,496	287,042	282,865
Malaya	294,821	275,817	325,033
Ceylon	182,673	216,064	239,033
Hong Kong	367,269	366,882	551,031
Australia	896,164	1,410,303	820,695
New Zealand	515,432	428,640	234,457
Canada	454,914	554,336	506,288
Eire	603,381	550,813	502,242
Finland	201,047	212,433	147,037
Sweden	629,994	447,428	431,560
Norway	241,053	207,423	249,386
Denmark	378,534	308,122	361,370
Western Germany	287,227	325,230	221,418
Netherlands	661,820	696,286	664,322
Belgium	360,550	367,654	377,706
France	506,553	422,287	399,784
Switzerland	234,589	218,912	147,929
Italy	520,613	400,841	632,568
Spain	145,605	105,388	68,363
Portugal	202,154	99,731	187,978
Greece	45,783	202,006	68,981
Turkey	50,906	91,815	205,475
Israel	66,899	104,892	72,068
Egypt	335,775	288,008	60,930
US	666,774	523,775	757,419
Argentina	398,528	536,617	90,184
Total value of chemical exports	**17,273,004**	**16,355,795**	**14,826,880**

THE latest article in the refresher course series currently being published by the *British Medical Journal* is one by Ronald E. Lane, M.D., M.Sc., F.R.C.P., Nuffield Professor of Occupational Health, University of Manchester, on 'Laboratory Investigations in Suspected Industrial Poisoning.' Among the industrial poisons dealt with in the article are lead, mercury, arsenic, carbon monoxide, aromatic amino- and nitro-compounds, trinitrotoluene, benzene, DNOC and organic phosphorus insecticides.

Indian Newsletter

FROM OUR OWN CORRESPONDENT

IN a recent symposium on 'Electrochemical Processes and their Application to Indian Industry,' at Karaikudi, over 50 papers were presented and discussed. The lignite deposit of South India, characterised by its low ash and freedom from sulphur and phosphorus impurities, has rendered itself suitable for the manufacture of calcium carbide in an arc furnace with local lime. The carbide is superior and one pound of it gives 3.8 cu. ft. of acetylene, which is above the BSS limit for the material.

The electrolytic preparation of chemicals by using rotating electrodes has received much attention. The basic factors involved in the formation of sodium chlorate from brine with a rotating graphite anode have been investigated. With rotating anodes, high purity cuprous oxide, for use in anti-fouling compositions, ammonium persulphate for hydrogen peroxide manufacture, and calcium gluconate have been prepared. *p*-Aminophenol has been prepared from nitrobenzene using a rotating cathode, and crystals of sodium hydrosulphite have been prepared using sodium chloride and sulphur dioxide as raw materials.

The electrolytic oxidation of organic compounds on the surface of porous carbon tubes as electrodes offers several advantages; quinone and chlorobenzene from benzene, ethylene glycol and ethylene chlorhydrin from ethylene and chloral from alcohol have been prepared. The electrolytic reduction of acetylene to ethylene has been successfully undertaken in a different work, as also the reduction of nitric acid to hydroxylamine.

Laboratory experiments, designed to utilise the large deposits of sodium sulphate and the waste liquors of rayon factories, have indicated the commercial possibilities of getting caustic and sulphuric acid by the electrolysis of sodium sulphate. Formaldehyde vapour at 85° when subjected to a silent electric discharge can either be decomposed or polymerised according to requirements. The production of heavy water, development of a new primary wet cell, chemical analysis of electroplating solutions, recovery of chemicals and metals from waste products, use of pyrophosphate, fluoborate and sulphamate baths for electrodeposition and electroplating are some of the other lines of work conducted in India.

* * *

The Alkali and Chemical Corporation (a subsidiary of Imperial Chemical Industries Ltd.) have erected a new varnish unit for making raw materials required for the paint industry. Imperial Chemical Industries (India) Ltd. have installed a new technical service station in their factory at Calcutta, for rendering assistance to customers in their problems. Some extensions have been made to their caustic soda plant which resulted in increased production of caustic and chlorine. The crude benzene hexachloride plant, which had been working below the plant's rated capacity owing to some technical difficulties, has now been improved with a view to reaching target production soon.

* * *

Hindustan Insecticides Ltd., which will take over the control and management of the Government-owned DDT factory near Delhi, has been registered as a private limited company with an authorised capital of Rs.10,000,000 (£750,000). A five-member board of directors has been constituted with the nominee of the Government as the chairman. It may be recalled that a DDT factory with an annual production of 700 tons was started in the middle of 1952, as a joint venture of the Government of India, World Health Organisation and the United Nations Children's Emergency Fund, and will start production very shortly. The Minister for Production, Government of India, has stated that the starting of a second DDT plant in South India is engaging the attention of the Government. Benzene hexachloride is already being manufactured in India by the Alkali and Chemical Corporation and the demand for the product is good. The Tatas are going in for a 1,500 ton per annum plant and then competition may be expected to be keen.

* * *

Chemical porcelain satisfying the British and American standard specifications, for use as crucibles, dishes, funnels and other laboratory ware, has now been manufactured successfully at the Central Glass and Cera-

mic Research Institute, Calcutta. A wide range of blue, brown and green, underglaze and on-glaze colours have been prepared and tested to be suitable for porcelain and earthenware by the same Institute. The processes in respect of chemical porcelain and colours are being offered to industry for exploitation.

* * *

It is learnt that talks are in progress in New York between Indian industrialists on the one hand and American financiers and World Bank representatives on the other for starting a private industrial development corporation in India with indigenous and foreign capital. The venture has the blessing of the Government of India and already an American mission has visited India in this connection. The corporation is expected to have a capital of Rs.50,000,000 (£3,750,000) of which 70 per cent will be contributed by India, 20 per cent by Britain and the rest by America. To this may be added another Rs.70,000,000 (£5,250,000) equivalent in Indian counterpart funds of $15,000,000 out of the grant given to India by the US Foreign Operations Administration. After the corporation has been set up, the World Bank may be approached for a loan.

Allegation Denied

Annual Meeting of Bowmans Chemicals

AT the annual meeting of Bowmans Chemicals Ltd., at Warrington on 23 April, the chairman, Mr. E. G. Turner, refuted all the allegations made in a circular letter sent to shareholders by Mr. W. G. Black, of Belevdere, Kent (THE CHEMICAL AGE, 1954, **70**, 895).

Referring to the requisitioning of an extraordinary meeting for the purpose of changing the board of directors, Mr. Turner stated that the requisitionists were Mr. D. A. Marsh-Smith (formerly technical director of the company), the wife, mother, father and brother-in-law of Mr. Marsh-Smith, and Mr. W. G. Black and Mr. G. F. Harrison (a former employee). 'One wonders,' he continued, 'whether the "smear campaign" instituted in the Press and in the circular letters is . . . . a family vendetta waged on behalf of Mr. Marsh-Smith, who at the extra-ordinary general meeting of last May was allowed to resign from the board as an act of grace rather than be removed by an overwhelming vote of the shareholders.'

Mr. Turner, speaking of allegedly inaccurate tax returns in the past, said he had just had official confirmation that the net taxes underpaid in respect of the years 1944-52 amounted only to £1,312 12s. 4d. and that the company was not to be asked for a penalty or even interest.

Mr. Marsh-Smith had opposed any restriction of production in the latter part of 1952, said Mr. Turner, and as a result heavy stocks—far too heavy for the demands being made—were built up. 'Now,' Mr. Turner went on, 'Mr. Black complains that we have been "eating down" stocks. Of course we have—and very wisely.'

Sales More than Doubled

Regarding Mr. Black's reference to 'the great success of the process developed by Mr. Marsh-Smith, on which the company is now largely dependent,' Mr. Turner said the sales of edible lactic acid and calcium lactate (the refinement of which, he presumed, was the process referred to) accounted for 9.4 per cent of the total sales in 1953 and in the five months to 31 March last for 21 per cent.

Mr. Black had also drawn attention to a mortgage to secure £25,000 having been executed on certain of the company's properties. 'To the layman,' Mr. Turner continued, 'this implies that the company has borrowed £25,000. It has not done so. The debenture trust deed gave the company the right to arrange overdraft facilities from the bank and to give security for them.' Very probably the company would not make use of those facilities, but the ordinary fluctuations of trade must be catered for.

After Mr. Turner had answered numerous questions, there was a vote of 19 to seven in favour of no more questions being put and the report and accounts were adopted on a card vote by 261,810 votes to 52,530. Mr. C. C. Posnett was re-elected as a director.

When the meeting agreed that Chalmers Wade & Co. be elected auditors in succession to Bertram Silcock & Co., Mr. N. J. Williams, representing the latter firm, said a position had arisen in which they could not feel confidence in the executive directors and they had tendered their resignation as auditors.

Safe Operation of Oil Refineries

by A. G. THOMSON

OWING to the nature of its products and processes, an oil refinery presents potential fire, explosion and toxic hazards which cannot be eliminated. Yet experience has shown that if suitable precautions are taken the refining industry is not a dangerous one, for oil has been refined in Britain for ninety years with very few disastrous fires or explosions in refineries. The industry's fine safety record is particularly impressive in view of the very rapid progress which has taken place in recent years.

Not only has the total refining capacity been expanded more than ten times since 1947, but operating temperatures and pressures are far higher than those formerly employed. Whereas a quarter of a century ago, Shell refineries—for example—did little more than distill a topped fuel down to bitumen, a comprehensive range of products, many of which are highly volatile, is manufactured nowadays.

Design Precautions

In a previous article it was shown that fire and explosion hazards can be greatly reduced by studying safety requirements before any new construction work is undertaken. The principal precautions taken by the designers may be summarised as the allocation of as much space as possible to each unit in order to localise any outbreak which might occur; isolation of the principal sources of danger; fire-proofing of load-bearing members; bunding of storage tanks; the use of approved (usually Buxton-certified) electrical equipment; and an adequate drainage system.

Storage tanks are equipped with pressure and vacuum relief systems, as required by the Factories Act. Provision is also made for dumping the contents of vessels safely in the event of an emergency, separate drop-outs being available wherever possible for hot liquids, cold liquids and vapour.

Safe operation of refinery plant is largely a matter of sound engineering, regular maintenance, and good housekeeping, supplemented by education and training of operatives and very strict control over all potentially dangerous operations. While fire and explosion remain the principal hazards, the growing importance of the chemical side of the industry has made it increasingly necessary to protect operators from the toxic effects of chemicals. This type of hazard has for many years been presented by certain refining reagents, and also by tetraethyl lead.

In general the problems on the special solvent side are similar to those of the chemical industry, but fire-fighting techniques are influenced by the fact that most of the solvents are miscible with water.

Petroleum products will only burn when vapour and oxygen are present in the appropriate proportions and at the ignition temperatures. The successful extinguishing of oil fires depends, therefore, on eliminating one or more of three factors; vapour, air or heat.

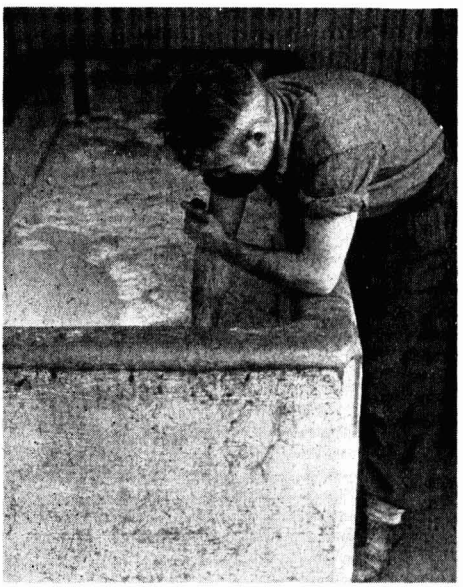
Enough vapour is usually formed to create a combustible mixture with air above the liquid surface when the vapour pressure of a product is approximately 0.15 psi. The temperature at which this condition exists corresponds roughly to the flash point of the product. In order for combustion to occur, one volume of petrol vapour requires a minimum of 16 and a maximum of 99 volumes of air. Before an explosion can occur a mixture of vapour and air within these limits must be brought to ignition temperature.

Volatility & Flashpoint

The various grades of petrol are mixtures of many hydrocarbons of differing volatilities The flash point of each grade is largely governed by the most volatile component and is therefore well below ordinary atmospheric temperatures. Petroleum products heavier than petrol have lower vapour pressures and, therefore, higher flash points.

There are three main groups to be considered, the first being the lighter hydrocarbons, which have a flash point below 73° F. This group includes petrol and certain solvents of the lower boiling point range. The second group comprises kerosenes, white spirits and solvents which have a flash point above 73° F. but below 150° F. A third group is formed by the higher flash products, which include fuel oil and lubricating oils with flash points ranging up to 550° F. Crude oils range from light vola-

Industrial Safety



Courtesy of Shell Refining & Marketing Co., Ltd.

The large alkali bath in the Duosol plant at Stanlow refinery, for the quick immersion of employees who may be splashed with acid

tile liquids to extremely heavy products, but often contain sufficient light oil components to bring them into the low flash point class.

One of the main risks to be avoided is, of course, the use of naked lights. The precautions taken in oil refineries therefore include the prohibition of smoking, carrying of matches, and use of naked lights or non-flameproof lamps and torches in dangerous areas. These regulations are strictly enforced, under penalty of instant dismissal for conscious or unconscious infringement. The general practice is to provide special smoking bays in safe localities and to allow the men time off for an occasional cigarette.

Depending on the vapour concentration, the heat from electric sparks can be sufficient to ignite combustible mixtures of petroleum vapour and air. Within 50 ft. of any point where an inflammable concentration of vapour is normally liable to occur, it is standard practice to use Buxton certified flameproof equipment and totally enclosed flameproof motors. No maintenance or repairs may be carried out until all voltage has been cut off; before electrical apparatus or wiring is brought into use after repair, adjustment or removal, it is thoroughly examined by a competent person. All wiring and apparatus in dangerous areas is inspected at least twice a year.

When handling volatile petroleum liquids, precautions must be taken to avoid the generation and accumulation of electrostatic charges. Static electricity may be generated by the handling of materials and by the operation of belts, pulleys, and other moving equipment. After long and careful research it has been established that, when pumping light petroleum products, static electricity only constitutes a potential hazard when the oil in the pipeline is contaminated with air, water, and other impurities.

This hazard can therefore be avoided by restricting the rate of pumping for a sufficient period to allow air or water mixture present in the pipeline to be completely displaced. The restricted speed limits the development of static charges and allows time for them to be dissipated before reaching the tank to which the oils are being pumped. In many instances the contents of pipelines are completely displaced within half-an-hour or less at a pumping rate of one metre per second. The rate of pumping is also restricted throughout tank draining operations, which inevitably involve the handling of oil/water mixtures.

Care must be taken to ensure electrical continuity in any system involving the movement of light petroleum products. When filling road cars, rail tank cars, barrels, etc., the wire bonding of the filling hose usually provides the required contact, but frequent electrical tests are carried out in order to ensure the continuity of the wire bond.

Toxic Hazards

Toxic hazards must also be considered. Generally speaking, men can work safely for unlimited periods in atmospheres where there is less than 0.05 per cent of petroleum vapour present, corresponding to 5 per cent of the lower explosive limit. Where the petroleum vapour ranges from 0.05 per cent to 0.10 per cent (i.e., 5 per cent-10 per cent of the lower explosive limit) periods of work should be alternated with short intervals of rest in fresh air. Above these limits, it is unwise for men to work without appropriate breathing apparatus.

While the toxic limit on the hydrocarbon

side may be rather lower than the lower explosive limit, neither aspect can be overlooked. Thus more stringent precautions are necessary when men are exposed to benzene vapour, because of its cumulative toxicity. In tanks or vessels which have contained benzole mixtures, men can safely work unprotected for periods not exceeding eight hours in any one week, if the concentration of hydrocarbon vapour does not exceed 0.05 per cent. For higher concentrations, or for longer work in atmospheres containing 0.01 per cent or more benzene, it becomes necessary for positive pressure airline masks to be worn.

Further precautions are required if there is a possibility that the atmosphere may be deficient in oxygen; e.g., after vessels have been purged with an inert gas, or when a fire has occurred in a confined space.

The instruments used for gas testing purposes are known as explosimeters, or combustible gas indicators. An explosimeter contains two filaments in a balanced circuit, one of which is in the path of the atmosphere to be tested while the other remains in a compartment of fresh air. The presence of inflammable vapour causes a rise in the temperature of the heated detector filament and a consequent increase in the resistance of the filaments. The disturbance of the balance thus produced is recorded on a dial, calibrated in percentage of the lower explosive limit of the particular vapour to be tested. All instruments in regular use should be calibrated frequently against a standard instrument, which in turn is checked regularly by the 'flame tube' method.

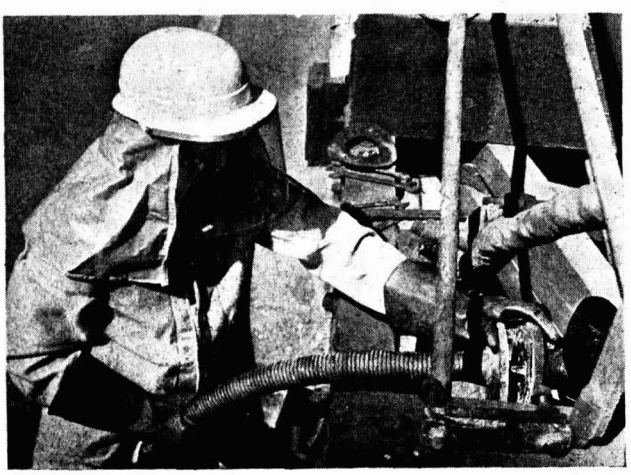
Industrial Safety

While the maintenance of plant in safe condition is normal practice in any industry, the handing of corrosive substances at high temperatures and under pressure necessitates very thorough engineering inspection at very frequent intervals. During shut-down periods refining units are inspected for structural weaknesses or corrosion. Equipment is tested for thickness and sound welds and its safe operating life is determined.

Because of the nature of petroleum and petroleum products, the procedure for gas-freeing tanks and vessels is controlled by regulations based on many years of experience. Generally speaking, it consists of as thorough drainage as possible, followed by natural or forced ventilation, steaming, water replacement, or inert gas purging.

Natural ventilation, where practicable, is usually a quick and convenient method of dealing with the more highly volatile products. It is carried out by opening manholes and fitting windsails and can be accelerated by ejectors and exhauster fans. An advantage of fitting ejectors to the pipelines of a tank is that the gases removed are drawn from the lowest part of the vessel where the highest concentrations of petroleum vapour are likely to be found. When vessels or tanks that have contained sulphur-rich products are gas-freed by natural ventilation, a stage may be reached when there is an explosive atmosphere within the confined space at a time when sufficient oxygen

[*A Shell photograph*



Shell Haven refinery: protection for an operator coupling a flexible discharge hose to an acid tank car

Industrial Safety

is present for the pyrophoric material to ignite. This hazard can be avoided by combining air ventilation with steam or water for injection or by inert gas purging. The water displacement process consists in displacing the vapour by air as a result of repeated filling and emptying, and is impracticable for large tanks.

As a rule, gas-freeing operations require to be supplemented by the manual removal of sludge and rust before sparking tools and naked flames can be safely used. In a confined space an elaborate system of certificates and permits ensures that no operator is allowed to enter a closed vessel before he can safely do so and that no work is carried out in an atmosphere which is liable to affect the men.

Issue of Permits

Before any repair work can be carried out a gas-free certificate based on personal inspection is issued by a suitably qualified person. For work involving the use of naked flames or spark-producing tools, a fire permit must also be obtained. As a further precaution, no maintenance or repair work can be undertaken in any area, whether dangerous or safe, until a clearance certificate has also been obtained. Clearance certificates are issued to cover the emptying of vessels or pipe-lines, the release of pressure and vacuum valves, the cooling of equipment to safe temperatures, and the elimination of mechanical hazards.

Certificates are issued only by persons capable of assessing each situation accurately, who are selected on the basis of practical experience rather than purely academic qualifications.

Manual cleaning is under continuous supervision and control, because it is liable to result in the release of trapped gases. For example, lead lining may become perforated and acid may be present between the lining and the wall of an agitator, resulting in the release of hydrogen when lining is cut out. Again, the removal of scale or rust from ordinary storage tanks may release vapour and set up dangerous conditions.

Inflammable vapours released during the gas freeing of tanks which have contained volatile products may travel considerable distances when conditions are favourable, converting areas normally regarded as safe into temporary danger zones. Since petroleum products are heavier than air, it is also necessary to be on guard against the possible accumulation of gas pockets in any totally or partially enclosed space, particularly at low ground levels, which might constitute an explosive hazard.

Respirators and protective clothing of various types are issued to refinery workers and their use is compulsory in certain circumstances. The basic principle, however, is to ensure a safe atmosphere wherever possible by suitable ventilation and to use breathing apparatus for routine purposes only when this is not practical. Goggles are provided for use where corrosives or solvents are handled. An air-line mask with life-line must be worn when work has to be carried out in an atmosphere containing more than 0.10 per cent of gas.

All persons entering tanks used for storing leaded gasoline are required to wear blower-type airline hose masks, heavy acid-proof gloves, rubber boots, and special overalls, shirt, underwear and socks. At each meal break they must change their clothing and clean their faces and hands. At the end of the day they again change their clothing and have a shower bath, the discarded clothing being sent to the laundry. Similar precautions are taken by workers handing TEL even though this highly toxic chemical is transported in drums or bulk and handled in properly enclosed systems. Workmen operating in any vessel or area in which a potential hazard exists are always under observation by at least one person who is also wearing suitable protective equipment.

Medical Care

All refineries have well equipped medical departments. Apart from the first aid units, there is a qualified doctor in attendance whose duties include the regular examination of workers engaged on any jobs liable to cause occupational diseases. As a result of the scrupulous care taken the dermatitis problem is very small and medical supervision soon weeds out any persons who are susceptible to this disease.

The fine record of Britain's oil refining industry is due in no small measure to the co-operation of the operating staff, who are specially trained to follow the specified procedures for operating and maintaining their units and to deal promptly and intelligently

with any emergency. Should any emergency arise when the plant manager is not present, the operating crew are the final arbiters and are expected to make an immediate decision and act on it.

The Fire and Safety Department are responsible for educating employees in safety principles and for seeing that the regulations are observed. Each new employee is handed a copy of the regulations on engagement and undertakes to abide by them. In all refineries there are safety committees which discuss regulations, disseminate information, and make suggestions.

Safety Notebook

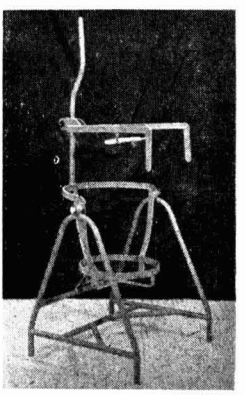
SPEAKING at a meeting in Edinburgh on 17 April, Dr. D. G. Evans, assistant general secretary of the Medical Practitioners' Union, urged the organisation of an 'occupational health service' going beyond the measures at present laid down in the Factory Acts. Dr. Evans, who is an industrial medical consultant, maintained that far too little attention was being paid to preventing occupational diseases and accidents, and that more priority should be given to preventive measures, instead of blindly going on treating ailments and injuries which need never have occurred. Each day new organic substances were introduced into industry and many could have definitely harmful effects on human beings. The possible effects on workers in radioactive substances were not fully known, and in agriculture there was no statutory obligation for farmers to provide safeguards against toxic insecticides for their workers.

The most common occupational complaints—apart from those induced by dust—were dermatitis and carbon tetrachloride poisoning. Ten times as much sickness in industry, however, was caused by colds, coughs, varicose veins and other ailments which could be attended to quickly on the job. He suggested that there should be far greater supervision and much earlier diagnosis and treatment. Industrial accidents averaged 700,000 a year—three times the number of road accidents—and every year £14,000,000 was lost in wages to the workers.

Dr. Evans said there should be an immediate increase in the staff administering the Factory Acts, and the existing provisions should be drastically tightened up. In all factories there should be more control over the first-aid system, and, where there were more than 250 workers, a State registered nurse should be employed. The next step would be to build up a comprehensive occupational health service, closely integrated with the National Health Service, but with its own preventive, curative and creative aspects.

* * *

A NEW carboy tilter which has advantages over existing types is the 'Safe-Way' model manufactured by Powell & Co., 'Drum Master' Works, Burry Port, Carmarthenshire. In this tilter the sliding clamp rests firmly upon the top of the glass bottle (from which it is insulated by heavy gauge rubber tubing) and the clamp does not touch the iron skip or hamper at all.



By this means the usual metal ring surrounding the neck of the bottle (which so often corrodes, and may cause fracture of the glass neck during cold weather) is rendered superfluous. Thus there is also uninterrupted access to the neck of the bottle when pouring, so reducing danger of spilling. Moreover, it has been possible to dispense with the usual chain or hinged bar across the front of the carboy, which so often rusts or corrodes away.

This new safety device is made from tubular steel and the sliding clamp has powerful jaws that do not damage the handle. It is finished with two coats of anti-corrosive paint.

Safety Notebook

THE Sigmund Rover 1S/60 ultra-lightweight fire pump, produced by Sigmund Pumps Ltd., Team Valley, Gateshead 11, represents a considerable advance in modern fire protection. For many years Sigmund hydraulic engineers have applied their efforts to the design of a fire pump which can give the fire fighter the essential qualities demanded by the vital urgency of the job—light weight, small bulk, easy and quick starting, fast priming, and absolute dependability at all times. Now the latest advances in gas turbine design and development by the Rover team of engineers have been brought together with Sigmund hydraulic experience.

By combining the advantages of the latest Rover lightweight gas turbine with those of the Sigmund high speed centrifugal pump, the new 1S/60 unit is claimed to give outstanding advantages not obtainable previously by any equivalent portable petrol driven fire pump. It can be operated on diesel, paraffin, or petrol fuel.

Sigmund Rover 1S/60 pump

IGNITION of sodium chlorate was thought to have been the probable cause of a fire which caused the deaths of a woman, her husband and another man in a seed shop in Leeds recently.

At the inquest, Dr. J. E. Garside, of the Fuel Department, Leeds University, said that no analysis of the debris could yield any conclusive information about the origin of the fire. In the shop a considerable quantity of various fertilisers was stored in sacks near a wooden cask which had contained sodium chlorate. It was reasonable to assume that the fire started from ignition of the sodium chlorate, probably on the floor round the cask. Dr. Garside added that from the point of view of fire hazard sodium chlorate was a very dangerous substance.

A verdict of 'Accidental Death' was returned in the case of each victim of the fire.

* * *

THE leakage of benzole from an I.C.I. storage tank on the banks of the River Colne at Huddersfield led to police warning factories along a ten-mile stretch of the river against drawing water for a time. They pointed out that there was a danger of explosion if benzole floating on the river surface came into contact with a naked light. A few hours later it was reported that the leak had been traced and sealed.

* * *

TRIALS of 'Terylene' protective clothing are being conducted all over the country under the severe working conditions met with in electro-plating, chemical filtration and the acid treatment of metals, and results so far show that it has outstanding resistance to acids and other chemicals. In one factory where cotton dungarees had become of no further use in less than six months, 'Terylene' garments have shown no sign of degradation after being used in acid conditions for more than a year.

'Terylene' is claimed by I.C.I. to have greater resistance to mineral or organic acids, such as sulphuric, hydrochloric and hydrofluoric, than any other fibre, and to be unsurpassed in its resistance to oxidising agents, including hydrogen peroxide, sodium hypochlorite and bleaches. Moreover, it has adequate resistance to alkali for a textile fibre; it will, for example, withstand the alkaline conditions employed in mercerising and in dyeing with vat colours.

Wearing 'Terylene' overalls, an I.C.I. Metals Division worker cleans metal strip in an acid bath

Safety Notebook

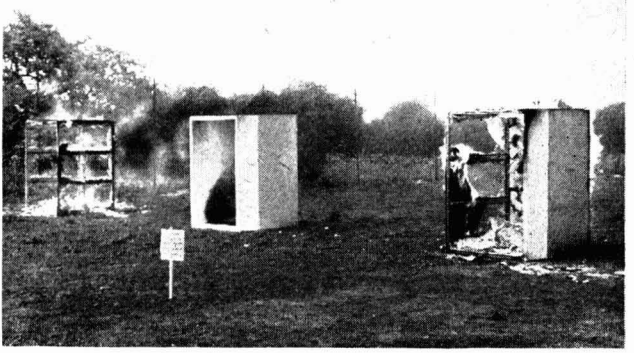
A CHEMICAL coating with remarkable properties for protecting inflammable building materials against fire is Albi-'R', produced by Albi-Willesden Ltd., 6 De Vere Gardens, London, W.8. When exposed to a flame, this fire retardant compound puffs up to form a protective insulating mat, which not only prevents the spread of flame beyond its point of origin, but retards considerably the transmission of heat to and through the coated surface.

Albi-'R' is supplied in powder form and is mixed with clean water to prepare the ready-to-use material. It can be applied by brush or spray and when set has a dry, hard, white, non-chalking finish. The manufacturers claim that it will retain its fire-retardant properties for a minimum of 12 years. It has been tested and approved by Government and independent laboratories throughout the world.

The photograph illustrates a field test of Albi-'R' fire retardant coating, carried out by courtesy of Boots Pure Drug Co. Ltd. Box 1 (left) was untreated; the inside of Box 2 (centre) and band around outside were coated with Albi-'R'; and the inside and band around outside of Box 3 (right) were given two coats of oil paint, overpainted on the right-hand panel only with Albi-'R'. The boxes were fired simultaneously with equal amounts of fuel and spirit. The photograph shows condition after eight minutes, as follows: Box 1, collapsed 1½ min. later; Box 2, fire out, box undamaged; Box 3, side panel treated with Albi-'R' remains intact and cold to the touch.

* * *

CYLINDERS of argon and nitrogen were used by two employees of the Saturn Oxygen Co. to combat a fire which broke out in an acetylene generating house at that company's works at Sunderland, thereby averting a possible explosion. Two other men, who were repairing a generator, were burned about the face and neck by a flash of flame.



A field test of Alibi-'R' fire-retardant coating

Metallising for Industry

THE latest Dohm enterprise takes this well-known company into an entirely new field —and into what may almost be described as a new industry—vacuum metallising on a jobbing basis. Artificial jewellery, perfume bottle tops, headlamp reflectors, cabinet handles, furniture fittings, car badges—these are just a few of the products being turned out by the Dohm vacuum metallising plant at Enfield. The technique of coating plastics, metals, glass, etc., with thin films of metals by vacuum deposition is not new in itself, and it has for many years been used for products of a scientific nature. But application of the process to more utilitarian and industrial purposes is comparatively recent.

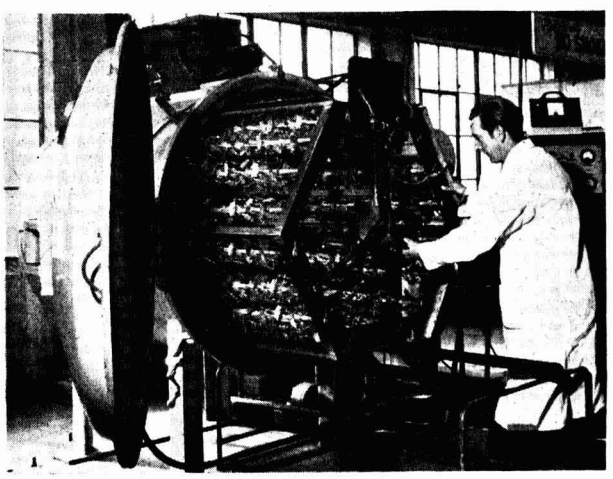
The process consists of applying a preliminary lacquer base to the articles by dipping or spraying. They are then placed in a vacuum chamber from which the air is extracted to approximately 1/1,000,000 atmosphere. At this stage the coating takes place. This is achieved by 'firing-off' aluminium from hot tungsten wires while the articles are rotated to ensure an even coating and perfect finish. A final protective coat of clean lacquer is applied and if a colour is desired, a dye is then used. Any colour finish may be thus obtained without losing the high sheen imparted by the metal coating.

Among advantages of vacuum metallising over electro-plating are: the finish is definitely non-tarnishing and needs no polishing; the process is a dry one which makes it most suitable for applying to plastics and glass; any colour may be obtained; a high brilliance is given by aluminium, its reflective capacity being 90 per cent compared to chrome's 60 per cent; and costs may be substantially lower.

Soap Films Gas Analysis

IN our issue of 10 April (THE CHEMICAL AGE, 1954, **70**, 829) we published a paper which was read before the Midlands Society for Analytical Chemistry by Mr. W. J. Gooderham, of the Fulham Laboratory of the North Thames Gas Board, entitled 'The Use of Soap Films in Gas Analysis and Gas Calorimetry.' In this paper Mr. Gooderham referred to a soap film gas analysis apparatus.

We have been informed by Griffin & Tatlock Ltd. that they are the makers of this apparatus to Mr. Gooderham's design and that they have arranged specially to demonstrate it to all those who may be interested. This facility is afforded any day, preferably by telephone appointment. The address is Kemble Street, Kingsway, London, W.C.2, and the telephone number is Temple Bar 2621. Griffin & Tatlock regret that the apparatus cannot be conveniently demonstrated in client's laboratories as the apparatus is not readily portable for the large number of visits necessary.



Loading articles to be metallised into the vacuum chamber

IN THE EDITOR'S POST . . .

'Pocket Book of Chemical Technology'

SIR.—Your review of the 'Pocket Book of Chemical Technology' in the issue of 20 March has just been brought to my attention. I always value constructive criticism which will enable us to improve later additions, but I fear that in the present case most of the points made by your reviewer are irrelevant and frequently show that his examination of the book can only have been perfunctory.

If I may permit myself a detailed reply to some of the matters raised I would like to point out the following:—

(1) Blank half pages have been left intentionally to reduce disturbance of the pagination in subsequent editions, and to enable readers to add their own notes.

(2) An extensive temperature conversion chart has been included because in many modern processes temperatures which were previously considered outside the normal range are now used, and conversions can be carried out more quickly from the chart than by calculation.

(3) Re tables of atomic weights. The first table is the International Table of Atomic Weights, in which the elements are arranged alphabetically, whereas the second table shows the elements arranged according to the atomic number for use in conjunction with the table of inorganic properties, as explained on the opposite page.

(4) The diagrams have been included because they are very useful to people who are not specialists in the topic of the particular chapter; the fluid flow charts are important, and would hardly be usable if they were any smaller.

(5) The complaint about the omission of trivial and alternative names is a little difficult to understand, but I wish to point out that trade names are included in the list of plastic materials, and that common names of chemicals appear in the chapter 'Common Names of Minerals and Other Substances.'

L. MITLIN.

London, N.2.

The book reviewer has a reputation to maintain just as has the author. In fairness to Mr. Mitlin we felt obliged to publish his letter; in fairness to our reviewer we feel obliged to publish the following.—The Editor.

SIR,—I am sorry that Mr. Mitlin should have taken exception to the review of his pocket handbook. I could not of course anticipate that the blank spaces were to be filled in future editions, and will merely add that it is an insurance seldom practised in other handbooks. The value of an extended temperature conversion chart may well be a matter of opinion, I felt it to be unnecessary, the more so because in dealing with temperature extremes it is frequently more convenient to work in the Absolute Temperature Scale. After re-reading the explanation facing the table of atomic weights I am still not convinced that there is any virtue in duplication. If, however, two alternative arrangements must be included it would be fair to insist that one of them at least should be accurate and up-to-date. The International Table of Atomic Weights is, unfortunately, undated, but the values given for eight of the elements differ from those current in 1953. The value for beryllium was changed from 9.02 to 9.013 five years ago, while those for aluminium, scandium, silicon, phosphorus, potassium, iodine and krypton were altered in 1952.

I did not quarrel with the inclusion of diagrams, which are always extremely helpful, but a diagram does not become any clearer because it occupies most of the page, rather than a corner of it. As an example, the block diagram illustrating the process of rectification could have been reduced to one-third of its size without loss of clarity.

I had hoped to find in the table of organic properties some attempt to give the alternative chemical names, but in fact this table gives only a single name for each compound, and this name appears to have been chosen arbitrarily from the trivial, systematic, or Geneva alternatives: thus methanol, but ethyl alcohol. A selection of the more commonly used trade names for plastic materials was given, as Mr. Mitlin rightly points out, at the bottom of each column dealing with a specific plastic material.—J.R.M.

Zirconiated Tungsten

For Argon Arc Welding

NEW Murex zirconiated tungsten electrodes have recently been developed for use in the argon arc welding process. These electrodes have the important advantage of greater resistance to contamination than the pure tungsten and thiorated tungsten electrodes which have hitherto been generally used in this welding process.

Non-Consumable in Theory

It will be appreciated that electrodes used in argon arc welding are in theory non-consumable, since they do not contribute to the weld metal. However, in practice considerable wastage occurs mainly owing to the regrinding which is necessary to keep the electrode tip free from contamination.

One of the most important requirements of an electrode of this kind is that it should retain a suitable point during welding in order to limit the width of the weld and to maintain a consistently stable arc throughout the welding operation. These conditions apply only to DC welding and in particular to thin sheet welds and high speed automatic welding.

A pointed electrode will obviously become more easily contaminated than one with a broader working surface because in operation it will be hotter. During welding, contamination of the point occurs through particles of metal or oxide thrown up from the molten pool of the weld. Obviously the electrode can also be directly contaminated by touching the molten pool or by contact with the filler wire.

In the case of a pure tungsten rod, contamination means immediate regrinding. This is because contamination lowers the melting point of the tungsten and deterioration occurs rapidly. It is also difficult to maintain a suitable point with this type of electrode for similar reasons.

Thoriated tungsten electrodes, which incorporate thoria to increase their emission, have certain advantages over the pure tungsten type. It is easier to maintain a suitable welding point when using thoriated tungsten electrodes because they offer greater resistance to contamination than the pure tungsten rods and they also enable the arc to be re-struck more readily. However, direct contamination either by contact with the molten pool or filler wire necessitates the immediate regrinding of the electrode and in this respect it has, therefore, very little advantage over the pure tungsten type.

The zirconiated tungsten electrode has now been developed as a further advance in this type of electrode and it shows a considerable improvement over the thoriated tungsten electrode in its resistance to contamination. Even if the zirconiated electrode is deliberately allowed to touch the molten pool and the filler wire during welding, contamination, although present, does not 'wet' the point of the electrode and form a globule on the tip as in the case of pure tungsten and thoriated tungsten rods. Indeed it is possible to continue welding with zirconiated electrodes after contamination whereas pure tungsten and thoriated rods would require immediate regrinding.

Zirconiated electrodes are slightly higher in price than the tungsten types, but users of these electrodes who know that wastage due to regrinding is far greater than burn-off in the arc, will be quick to appreciate that the saving achieved by using the zirconiated type will outweigh by far its slightly higher cost. Apart from economies in material and labour there is the equally important point of considerably less interruption in the flow of work.

Testing Rubber Latex

THE British Standards Institution have now issued BS. 1672: Part 2, 'Methods of testing rubber latex: Chemical and physical tests.' This includes some relatively new tests which have become important because of the information they provide about the chemical and physical condition of latex under test. Only recently have they become sufficiently standardised and internationally recognised for inclusion in a British Standard.

The document covers methods for the determination of mechanical stability, KOH number, coagulum, specific gravity, copper, iron and nitrogen. Several tests in addition to these have been considered for inclusion, but have been omitted from this issue either because the results by known methods are considered to be unreliable or because they do not yield information of general value when applied to uncompounded latex. Copies (3s. 6d.) may be obtained from the British Standards Institution, Sales Branch, British Standards House, 2 Park Street, London, W.1.

PRINCIPLES OF BIOCHEMISTRY: By M. V. Tracey. Sir Isaac Pitman & Sons Ltd., London. Pp. 194. 20s.

This is a most stimulating and refreshing book. It seems inevitable that in all scientific subjects a template should be laid down in the course of years, which ever after determines the form of its written exposition. Perhaps this is all as it should be; the student wants his facts set out in an orderly fashion—it is necessary for him to know, say, the chemistry of the carbohydrates before he makes his assault upon their metabolism. It is the method of the first-year lecture-room and its characteristic is much the same as that of a journey by main-line railway. A good general impression of a new tract of land may be obtained, though many subtleties of topographical relationship will remain undiscovered, and even unsuspected. It is Dr. Tracey's distinction to have written an illuminating book which cuts across these grooves of the orthodox approach, and by setting old facts in new contexts, opens up for us new vistas in fields we had previously thought well scanned.

That, 'the activities of living organisms and their existence depend solely on the fact that there are mechanisms by which the sum of the energy flux that occurs on the surface of the earth can be diverted and the final degradation of light energy to heat energy delayed . . .' may perhaps be regarded as the statement which gives the best frame to Dr. Tracey's intent; for throughout he is concerned primarily with those substances and mechanisms through which the organism seeks to manipulate energy and bind it to its own peculiar needs. His preliminary appraisal of the various forms of chemical energy which are utilised by organisms, and of the ways in which such energy is made available by enzyme action, is followed by a consideration of the problems of multicellular organisation in relation to survival, and lastly of the adaptations both in organisation and in metabolism imposed upon plants, animals, and parasitic forms of life, by reason of their dependence upon different types of energy supply.

It is the great virtue of Dr. Tracey's approach to his subject that it is always leading the reader to a consideration of the biological significance—one is tempted to say the biological 'necessity'—lurking behind each detail of the massed chemical knowledge we have of metabolic processes; in doing so he frequently throws revealing light on some apparently gratuitous chemical observation, showing that Nature did not nod, but that competition or environment dictated radical, chemical terms for survival.

This book is specially recommended to those biochemists whose basic training has been in the 'pure' sciences; it should prove an outstandingly valuable addition to the 'required reading' of all students taking biochemistry as part of an honours course. —F. H. MALPRESS.

ORGANIC CHEMISTRY: A BRIEF COURSE. By R. W. Getchell. McGraw-Hill Publishing Co. Ltd., London. 1954. Pp. vi + 278. 32s.

According to the dustcover, the purpose of this book is 'to furnish a background for majors in home economics, nursing, agriculture, physical education and similar applied fields as well as liberal arts curricula where less than a year of organic chemistry is required.' It is a competent elementary textbook with useful sections on the chemistry of plastics, synthetic fibres, vitamins, hormones, medicinals, etc. As in some other recent texts, aliphatic and aromatic compounds are discussed together in the same or adjacent chapters. However the book has little to recommend it in preference to similar British textbooks which are available at a fraction of its price.

The printing and paper conform to the high standard which we have come to expect from American publishers.—J.C.P.S.

HOME

Application Turned Down

The proposal of Mr. F. Townson, of Oldham, to open a whale oil refinery in Milnrow, Rochdale, has been turned down by Milnrow UDC on the grounds that it would seriously interfere with amenities. The buildings were previously used by an Anglo-American petroleum company.

More Coke Ovens

Modernisation of the coke ovens owned by Monckton Coke & Chemical Co. Ltd. has been taken a further step by the lighting up of a new battery of nine ovens. The coke oven plant now consists of 41 coke ovens and towards the end of May the plant will be producing 3,700 tons of coke weekly.

Summer Outing Planned

Arrangements have been made for Crop Protection Panel members of the Agriculture Group, Society of Chemical Industry, to visit the Lenton Experimental Station of Boots Pure Drug Co. Ltd., on 24 June. The journey will be made by train from St. Pancras to Nottingham and thence by coach to Beeston for lunch before proceeding to the experimental station.

Still Going Up

The Ministry of Materials' selling prices for tungsten ores of standard 65 per cent grade and ordinary quality continue to rise. From 27 April wolframite went up from 225s. to 235s. plus 10s. charge, and scheelite from 220s. to 230s., plus 10s. charge, both per long ton unit, delivered consumers' works.

Fuel & Power Symposium

The Graduates' and Students' Section of the Institution of Chemical Engineers held their annual symposium at Battersea Polytechnic, London, on Friday, 23 April. The subject was 'Fuel and Power in the Chemical Industry' and the chairmen of the two sessions were Professor T. R. C. Fox, of Cambridge University, and Sir Harold Roxbee Cox of the Ministry of Fuel and Power. Professor F. H. Garner, of Birmingham University, summed up at the end of the proceedings. It is hoped to present an abbreviated version of some of the papers at a later date.

Tour of Oxford

The London Section of the British Association of Chemists is arranging a conducted tour of Oxford colleges on Sunday, 23 May. Full details may be obtained from the hon. organiser, Mr. H. Warson, Hinchley House, 14 Harley Street, London, W.1.

Microchemical Apparatus Standard

The British Standards Institution has just issued Part E2, 'Micro-beakers,' of the series BS. 1428, 'Microchemical Apparatus.' This standard specifies the construction and dimensions of tall, squat and conical microbeakers of glass or silica, in sizes from 1 to 20 ml; and also of three sizes of glass covers for use with these beakers or with other items of microchemical apparatus. Copies of this standard may be obtained from the British Standards Institution, 2 Park Street, London, W.1, price 2s.

Cosmetic Chemists' AGM

The annual general meeting of the Society of Cosmetic Chemists of Great Britain will be held on Friday, 21 May, at St. Ermin's Hotel, Caxton Street, London, S.W.1. The formal part of the meeting will be for members only, but it is expected that this part of the meeting will be over by 7.30 p.m., when visitors are invited to hear a talk by the president, Dr. R. H. Marriott, entitled 'Looking at Things.' After the talk there will be a social gathering of members and visitors.

Chemicals for Hungary

Messrs. Biddle Sawyer and Co. and East Anglia Plastics were among the 22 companies which took part in the trade negotiations with Hungary, in Budapest, at the beginning of April. Immediate business signed amounted to £350,000, of which chemicals came to over a quarter, but a much larger amount of trade has been projected for the near future. British exports include substantial quantities of copper sulphate for use in Hungarian vineyards, plastics and antibiotics. Peak chemical exports to Hungary were in 1948 when they amounted to £274,000. It is hoped to approach this figure in 1954.

• OVERSEAS •

Refinery Closure Reprieve

The Standard-Vacuum Oil Company's new £6,000,000 oil refinery at Wentworth, Durban (South Africa), won a last minutes' reprieve from a close-down order (see THE CHEMICAL AGE, 24 April, p. 946) on 22 April when it promised to take steps to overcome the smell from the refinery. After the company agreed to install new plant if necessary, to allow independent engineers to examine the plant, and to establish a 'complaints office,' the Council rescinded the order calling on the refinery to cease production until pollution was stopped.

Cement in Jordan

The Hashemite Kingdom of Jordan's first cement factory is now in operation. The plant, which can produce 200 tons daily, was completed recently at a cost of £1,000,000.

Aluminium Case Settled

A settlement has been reached in the action taken by the US Department of Justice last year to cancel a contract for the sale by Aluminium Ltd. of 600,000 tons of Canadian aluminium to the Aluminium Co. of America during 1953-58. It was alleged that the contract gave the latter company competitive advantages and threatened to impair competitive conditions in the US aluminium industry. Deliveries under the contract will now continue without threat of interruption.

Encouragement for Israel Fertilisers

The Palestine Economic Corporation (PEC) has agreed to lend Fertilisers and Chemicals Ltd. $1,500,000 in return for rights to market two-thirds of the plant's production. The announcement, following a meeting of Government and PEC representatives, stated that PEC will hand over $1,000,000 in cash and $500,000 in State of Israel Bonds as a loan for a five to seven year period at a 'low rate of interest.' It is learnt that Fertilisers and Chemicals Ltd. now intends to complete three chemical plants for the manufacture of dicalcium phosphate, potassium sulphate, and ammonia. It is now expected that the first two plants will be finished towards the end of this year, and the ammonia plant at the beginning of 1955.

Caribbean Salt

Sir Hugh Foot, Governor General of Jamaica, flew last week to the Turks Islands dependencies, for his annual visit. He was accompanied by two experts from Imperial Chemical Industries for investigation of the production and marketing of salt, an industry which is vital to the island's welfare. The experts were made available under the colonial development and welfare scheme.

Polish Vanillin Manufacture

It is reported that a plant is to be set up at Wloclawek, in Poland, to manufacture vanillin from cellulose lye.

Import Ban Lifted

Cement imports were banned in Iraq when production started at the Baghdad factory of the Iraq Cement Co., a national enterprise set up in the post-war period. As, however, production at the factory nas been suspended because of flood damage, the Government has lifted the ban for six weeks and has authorised purchases of cement from abroad to the extent of 5,000 tons, under open licence.

Synthetic Petrol for India

The question of planning and erecting a synthetic petrol plant as a long-term measure is now under the consideration of the Indian Government, the Deputy Minister for Natural Resources and Scientific Research told the House of the People recently. He said this was apart from the three oil refineries which were being set up —two near Trombay and the third at Visakhapatam. The question of production of synthetic petrol from lignite at Neiveli in the south was also under consideration.

Admiral Strauss to Address MCA

Admiral Lewis L. Strauss, chairman of the Atomic Energy Commission, and the Rt. Hon. C. D. Howe, Minister of Trade and Commerce and Minister of Defence Production of Canada, will address some 600 members of the Manufacturing Chemists' Association and the Synthetic Organic Chemical Manufacturers' Association at the 82nd annual meeting of MCA at White Sulphur Springs on 3-5 June. Admiral Strauss will discuss recent momentous developments in atomic energy.

• PERSONAL •

DR. H. H. CHAMBERS, A.R.C.S., D.I.C., A.R.I.C., who has been chief chemist of the Sondes Place Research Institute (Mactaggart & Evans Ltd.), Dorking, since its formation, has been appointed Director of Research and will be generally responsible for the management and operations of the Institute.

The United Steel Companies Ltd. announce that MR. T. S. KILPATRICK, director and commercial manager of Workington Iron and Steel Company, has been appointed a director of Distington Engineering Co. Ltd. Mr. Kilpatrick will, from 3 May, be commercial manager of both companies.

At the annual meeting of the Council of the Association of British Pharmaceutical Industry held on 22 April, officers were appointed for the ensuing year as follows:—*President*: MR. J. F. BOUCHER, M.P.S. (Ferris & Co. Ltd.); *vice-president*: MR. C. M. HILL (The British Drug Houses Ltd.); *hon. treasurer*: MR. H. C. H. GRAVES, B.Sc. (Vitamins Ltd.). MR. C. L. SAUL, B.A. (Boots Pure Drug Co. Ltd.) has succeeded MR. J. C. HANBURY, M.A., B.Pharm., F.P.S., F.R.I.C. (Allen & Hanburys Ltd.) as Immediate Past President. Mr. Hanbury has been co-opted a member of Council.

After 43 years in the Department of the Government Chemist, DR. J. R. NICHOLLS, deputy government chemist, has retired. His services are to be retained in another capacity, and his successor is MR. E. H. NURSE.

MR. KENNETH ROSS, formerly manager of the Anglo-Iranian oil refineries at Abadan, has been appointed by the Department of Atomic Energy as Director of Production in the department's Industrial Group at Risely, Lancashire, as from 1 June. Mr. Ross joined the Anglo-Iranian Oil Co. Ltd. in 1926 and seven years later went to Persia, where he was promoted works manager of the company in 1946. As general refineries manager he was in charge of the last party to leave Abadan in October, 1951. He joined the firm of Costain-John Brown Ltd. in 1952.

SIR GEORGE BAILEY, chairman of Associated Electrical Industries Ltd., and of Metropolitan-Vickers Electrical Co. Ltd., has been elected president of the British Electrical and Allied Manufacturers' Association for the ensuing year. MR. D. D. WALKER, chairman and joint managing director, Evershed & Vignoles Ltd., continues as chairman of the BEAMA council; and MR. E. H. BALL, managing director of the British Thomson-Houston Co. Ltd., as vice-chairman.

DR. J. M. COULSON, Reader in Chemical Engineering at Imperial College, has been appointed to the Chair of Chemical Engineering, King's College, Newcastle-on-Tyne, and will commence his duties on 1 October. Dr. Coulson, who is 43 years old, is an associate member of the Institution of Chemical Engineers.

A presentation has been made to MR. G. R. NELLIST, M.Inst.F., to mark his retirement from the position of secretary of the Newcastle-on-Tyne section of the Society of Chemical Industry, after six years' service. He has been succeeded by MR. R. G. HARRIS. Mr. Nellist is divisional chemist, National Coal Board, Durham Division.

MR. MICHAEL J. CURRY has been elevated to the post of director of the Application Laboratory of the Chemical Division of Celanese Corporation of America. He will be in charge of application research and technical service programme assigned to the laboratory, which is located at Summit, New Jersey.

MR. DAVID D. HECHT has been promoted to the post of manager of the product development department of the Chemical Division of Celanese Corporation of America. In his new assignment he will be responsible for all market and customer relationship aspects of the development of new chemical products. Mr. Hecht for the period 1941 to 1949 was with the Plastics Division of the company, transferring in the latter year to the Chemical Division. For the last five years he has been director of the application laboratory at Summit, NJ.

Publications & Announcements

A NEW booklet, 'Organic Acids,' has just been published by Carbide & Carbon Chemicals Co., a Division of Union Carbide & Carbon Corporation. This booklet discusses in detail the eight organic acids which are sold in commercial quantities by the company (acetic, butyric, 2-ethylbutyric, caproic, 2-ethylhexoic, crotonic, sorbic and succinic acids). It tells of their uses in many industries, and gives their physical properties, specifications, shipping data, and constant boiling mixtures. The sections on physical properties and specifications will be helpful in suggesting uses, and in determining proper handling and storage procedures. Selected references are included. An important feature of this booklet is an entire section devoted to the specifications and test methods used by Carbide for its organic acids. These laboratory control tests comprise some of the standard ASTM methods, as well as new methods that have been specially developed by the Company's own laboratories. The reader will, therefore, be able to use the booklet as a guide in his analytical laboratory when working with these organic acids. Copies of this new booklet, F-4768, are available from Carbide & Carbon Chemicals Co., 30 East 42nd Street, New York 17, N.Y.

* * *

A COMPLETELY revised edition of 'The Properties of Tin' has now been issued by the Tin Research Institute. The original compilation was published by the Institute in 1934 and was reprinted in 1937; for some years it has been out of print awaiting full revision. The new edition aims to present all the published atomic and nuclear, physical, physico-chemical and metallurgical data concerning pure tin, but does not give data for tin alloys, which are covered in a separate publication of the Institute. For many quantities, the literature provides alternative values according to the various investigations but sometimes the user may prefer to have a single recommended value based upon recommendations of acknowledged authorities; wherever there is adequate justification, therefore, one recommended value is given. The book, which has 55 pages, is intended for libraries and research laboratories to whom it will be distributed, free of charge; for private readers there is a charge of 2s. 6d. in part defrayment only of printing costs. Copies are available from: Tin Research Institute, Fraser Road, Greenford.

* * *

MONOGLYCERIDES, which are used in large tonnage in various food products and in many cosmetic and industrial products, are chiefly interesting because of their water dispersibility, but this property is not desirable in certain cases. For example, in protecting cheese from drying out or raisins and prunes from absorbing moisture and becoming sticky, an edible waxy moisture-proof barrier is needed. Flexible, light coloured waxy coatings which are not hygroscopic are also of interest in many industrial applications. This has been accomplished by acetylating an edible monoglyceride. Such a product is now available on a commercial scale, manufactured and sold by the Glyco Products Co. Inc., Brooklyn, N.Y., under the name of 'Monocet.' It is soluble in certain proportions in methanol, ethanol, toluol and naphtha. When heated it is soluble in vegetable or mineral oils, acetone and ethyl acetate. 'Monocet' is tasteless and is bland in odour. The melting point, 36°-46°, of this white was-like product suggests its use in place of other waxes with melting points in this range. It has been considered of great interest in certain applications in place of cocoa butter, beeswax, partially hydrogenated fats, etc. Suggested uses for 'Monocet' are as coatings for cheese, dried fruits, nutmeats, fruits, vegetables, meats and fish, as a plasticiser for chewing gum and brittle waxes and for special industrial and textile fibre coatings.

* * *

ALMOST complete replacement of glass by polythene for ampoules of concentrated volumetric solutions is announced by BDH, Poole, Dorset. Glass is retained only for ampoules of iodine, potassium dichromate, ceric sulphate and potassium permanganate solutions. The ampoules remain of approximately 2 fl. oz. capacity and prices are unchanged. Among recent additions to the catalogue of BDH chemicals are *n*-butyraldoxime; *cis*-dichloroethylene; trimethylamine hydriodide; and triphenyl phosphite, which is now in industrial production in this country, and is likely to find many interesting applications.

Next Week's Events

MONDAY 3 MAY

Society of Chemical Industry

London: Chemical Society's Rooms, Burlington House, Piccadilly, 6.30 p.m. Joint meeting of London Section with Oils and Fats Group. T. P. Hilditch: 'The Fats: A Story of Nature's Art.'

Institute of Metal Finishing

Glasgow: 39 Elmbank Crescent, 7.30 p.m. Hothershall Memorial Lecture, 'Electrodeposition Researches of the National Bureau of Standards, Washington,' by Dr. W. Blum.

TUESDAY 4 MAY

Society of Chemical Industry

London: Chemical Society Lecture Theatre, Burlington House, Piccadilly, 6.30 p.m. Corrosion Group annual general meeting, followed by discussion on 'Corrosion and Design.'

Institute of Metal Finishing

Birmingham: James Watt Memorial Institute, Great Charles Street, 6.30 p.m. Hothershall Memorial Lecture, 'Electrodeposition Researches of the National Bureau of Standards, Washington,' by Dr. R. Blum.

WEDNESDAY 5 MAY

Institute of Metal Finishing

Manchester: Engineers' Club, Albert Square, 7.30 p.m. Hothershall Memorial Lecture, 'Electrodeposition Researches of the National Bureau of Standards, Washington,' by Dr. R. Blum.

THURSDAY 6 MAY

Chemical Society

London: Burlington House, Piccadilly, 7.30 p.m. Centenary Lecture, 'The Story of the Isoquinoline Alkaloids,' by Dr. R. H. Manske.

Bangor: University College of North Wales (Department of Chemistry), 5.45 p.m. H. M. Powell: 'Atoms and Molecules in Cages.'

Dundee: University College (Chemistry Department), 5.15 p.m. Professor E. A. Guggenheim: 'The Relation Between Theory and Experiment in Physical Chemistry.'

Society of Chemical Industry

Salisbury, Wiltshire: Microbiological Research Department, Experimental Station, Porton. All day visit by Microbiology Group. R. Elsworth and L. R. P. Meakin: 'Laboratory and Pilot Plant Equipment for the Continuous Culture of Bacteria, with Examples in its Use'; D. Herbert: 'Aeration as a Limiting Factor in Bacterial Growth'; E. O. Powell: 'Populations of Bacteria: The Average and the Individual.'

The Royal Society

London: Burlington House, Piccadilly, 4.30 p.m. The Leeuwenhoek Lecture: 'Soil Metabolism,' by J. H. Quastel.

FRIDAY 7 MAY

Royal Institute of Chemistry

Reading: The University, London Road. Joint meeting of London Section with Society for Analytical Chemistry (Microchemistry Group), preceded by visit to Huntley and Palmer Ltd., 2.15 p.m., or alternatively to National Institute for Research in Dairying, Shinfield, 2.30 p.m. Demonstrations in Agricultural Chemistry Research Laboratory, 5.45 p.m.; symposium on 'Microchemical Methods in Biochemistry,' Zoological Lecture Theatre, 6.15 p.m.

Chemical Society

London: The Senate House, University of London, W.C.1, 6.30 p.m. Reception and conversazione.

Belfast: Queen's University (Chemistry Lecture Theatre), 7.45 p.m. Dr. J. H. Baxendale: 'Oxidation in Aqueous Solutions.'

Dublin: Trinity College (Chemistry Department), 7.45 p.m. Joint meeting with the Werner Society. Professor C. A. Coulson: 'Past, Present and Future in Theoretical Chemistry.'

Southampton: The University (Chemistry Department), 5 p.m. Joint meeting with University Chemical Society. Dr. H. R. Barton: 'The Stereochemistry of Cyclohexane Derivatives.'

Institute of Fuel

Cardiff: South Wales Institute of Engineers, Park Place, 6 p.m. South Wales Section annual general meeting.

Institute of Metal Finishing

Sheffield: The University (Mappin Hall), St. George's Square, 6.30 p.m. Hothershall Memorial Lecture, 'Electrodeposition Researches of the National Bureau of Standards, Washington,' by Dr. R. Blum.

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.)

DIAC LTD., Croydon; plastic manufacturers. 12 March, £24,000 (not ex.) charge to Westminster Bank Ltd.; charged on company's interest in two agreements both dated 12 January 1954, and in the premises comprised therein. *Nil. 18 June, 1953.

FERRAND LUTTMER LTD. (formerly Ferrand Luttmer Plastics Ltd.), Felpham; plastic manufacture. 19 March, £750, second debenture to H. Smith, Reading; general charge. *£9,200. 28 December, 1950.

JOHN CLARK & CO. (MANUFACTURING CHEMISTS) LTD., Sheffield. 16 March, charge to Barclays Bank Ltd., securing all moneys due or to become due to the bank; charged on 75 and 77 West Street, Sheffield.

Satisfactions

ASSOCIATED SILICAS LTD., Sheffield. Satisfaction 13 March of debenture registered 10 August, 1945.

BRITISH CELANESE LTD., London, W. Satisfaction 20 March of debenture stock registered 24 September, 1946 to the extent of £10,145.

FERRAND LUTTMER LTD. (formerly Ferrand Luttmer Plastics Ltd.), Felpham; plastic manufacturers. Satisfaction 17 March of debentures registered 21 June and 15 October, 1948, and 16 March and 6 October, 1949.

INDUSTRIAL & SCIENTIFIC INSTRUMENTS LTD., London, W.C. Satisfaction 15 March of bill of sale registered 26 November, 1953.

BIOREX LABORATORIES LTD., London, E.C. Satisfaction, 23 March, of debenture registered 6 April, 1951.

ROBERT DEMPSTER & SONS LTD., Elland, engineers. Satisfactions, 23 March, of mortgage and debenture registered 22 December, 1920.

INDUSTRIAL CHEMICALS LTD., London, W.C. Satisfactions, 24 March, £5,000 registered 11 April, 1950, £5,000 registered 5 January, 1951, £5,000 registered 20 September, 1951, £5,000 registered 9 July, 1952, and £2,250 registered 16 March, 1953.

New Registrations

Titanium Intermediates Ltd.

Private company. (531,753). Capital, £1,000. Objects: To carry on the business of manufacturers of titanium chemicals required as intermediates in the manufacture of titanium metal; chemical manufacturers and manufacturers of titanium tetrachloride, and to adopt an agreement between British Titan Products Co. Ltd. and Peter Spence and Sons Ltd. Directors: J. V. Outhwaite, B. T. Minter, R. W. Ancrum, F. D. Spence, F. S. Poole and J. Maddock.

Modern Technical Developments Ltd.

Private company. (531,975). Capital, £100. Consulting, analytical and research chemists, chemical engineers, chemical manufacturers, etc. Directors: Phillip M. Fisk, Stanley E. Bowrey and Laurence E. Cook. Reg. office: Ivy Farm, Wiltshire Lane, Eastcote, Pinner, Middx.

Company News

British Industrial Plastics Ltd.

Treasury consent has been obtained by British Industrial Plastics Ltd. for the capitalisation of £415,696 from reserves for a one-for-two scrip issue to ordinary shareholders.

Greeff-Chemical Holdings Ltd.

The directors of Greeff-Chemical Holdings Ltd. propose issuing 800,000 5s. ordinary shares by way of capitalisation of reserves in the proportion of one for each 5s. ordinary unit held. Treasury consent has been obtained.

Reichhold Chemicals Ltd.

A final dividend of 10½ per cent is being paid by Reichhold Chemicals Ltd., making 13½ per cent for 1953. No dividend was paid for 1952. Profit for 1953 came to £85,775, compared with £31,049 the previous year, after tax of £150,440 (£56,778).

Record UK Oil Usage

And Growing Home Output

STATISTICS of UK oil consumption in 1953 have just been published by the Petroleum Information Bureau on behalf of the UK Petroleum Industry Advisory Committee. These show that consumption (exclusive of bunkers for ships engaged in foreign trade) totalled 19,002,695 tons compared with 17,510,285 tons in 1952.

One of the largest increases occurred in demand for motor spirit (consumption 5,739,955 tons as against 5,440,552 tons in 1952). This demand was divided between premier grade spirits (consumption 2,452,632 tons) and standard grades (3,287,323 tons). Last year, as a consequence of the erection of catalytic cracking plants in Britain at a cost of over £20,000,000, premier grade spirits were on sale in this country for the first time since the war.

Other items showing a major increase included gas/diesel and fuel oil—which altogether accounted for 5,532,465 tons (excluding refinery consumption) against 5,098,194 tons in 1952.

Another table shows the growing output of home-refined products. Last year, our refineries produced 25,395,959 tons against 22,490,363 tons in 1952. While fuel oil (10,747,120 tons) was the largest single product, the biggest increase occurred in motor and aviation spirit which amounted to 6,243,355 tons (1952 output: 4,935,418 tons). Gas and diesel oil also showed an appreciable increase. Among products supplied from indigenous materials, benzole came to 233,622 tons against 175,493 tons in 1952.

Imperial Chemical Industries Ltd.

The board of I.C.I. Ltd. recommend a final ordinary dividend of 9 per cent (less tax), making with the interim of 6 per cent a total of 15 per cent for the year 1953 (against 13 per cent for 1952). Group profit before taxation amounts to £36,968,150 (£29,617,134 for 1952) after charging £11,551,012 for depreciation (£10,138,595). UK and overseas taxation, based on the income of the year, amounts to £17,209,526) (£13,816,787) after reducing by £1,154,968 (£2,014,522) in respect of past overprovisions and after increasing by £815,276 (nil) representing the estimated net income tax benefit due to initial allowances for 1953 taken to reserve for deferred income tax liability. Group profit after taxation is therefore £19,758,624 (£15,800,347). The net income for 1953 is £17,604,068 (£13,489,956). The final ordinary dividend will be payable on 30 June to members on the register on 10 May. For the purpose of payment, transfers must be lodged not later than 3 May. The annual general meeting will be held at Friends House, Euston Road, London, N.W.1, on 17 June at 10.30 a.m.

Market Reports

LONDON.—An active inquiry has been reported from most sections of the industrial chemicals market during the past week, and the demand for export continues on a good scale. There have been no important price changes other than a reduction in the basis prices for the lead compounds. The new quotations operating from 20 April are: dry white lead £128 15s. per ton, dry red lead £122 10s. per ton, and litharge £124 10s. per ton. In the coal tar products market there is a good request for creosote oil and for the benzoles, toluols and xylols, and supplies of other items are being steadily absorbed.

MANCHESTER.—Steady to firm conditions have been maintained on the Manchester market for heavy chemical products and the advances indicated here a week ago have been well held. Leading industrial users in the Lancashire area, including the textile and allied trades, are taking good deliveries against existing contracts and fresh inquiries as well as actual new bookings during the past week have been on a fair scale. In the market for fertiliser materials there is still a steady movement of supplies of the compounds, sulphate of ammonia and one or two other lines. Most descriptions of both light and heavy tar products are meeting with a good demand.

GLASGOW.—As was expected the earlier part of the week was quiet due to the Easter recess. However, trading generally has come away very well indeed during the latter half of the week, although the tone is somewhat quieter for spot deliveries, but considerable business has been placed for forward. Prices on the whole have remained steady and altogether the week has been quite satisfactory.

CLASSIFIED ADVERTISEMENTS

EDUCATIONAL

THE INSTITUTION OF CHEMICAL ENGINEERS

30TH (1954) ASSOCIATE MEMBERSHIP EXAMINATION

APPLICATION forms (returnable 1st June, 1954) and particulars of the 30th Associate Membership Examination, may be obtained from the Secretary, **INSTITUTION OF CHEMICAL ENGINEERS, 56, VICTORIA STREET, LONDON, S.W.1.**

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.

EXPERIMENTAL OFFICERS AND ASSISTANT EXPERIMENTAL OFFICERS in various Government Departments. The Civil Service Commissioners invite applications for pensionable posts. Applications may be accepted up to 31 December, 1954, but forms should be returned as soon as possible as an earlier closing date may be announced either for the competition as a whole or in one or more subjects. Interview Boards will sit at frequent intervals.

The posts are divided between following main groups and subjects :—(*a*) Mathematical and Physical Sciences; (*b*) Chemistry and Metallurgy; (*c*) Biological Sciences; (*d*) Engineering subjects; and (*e*) Miscellaneous (including e.g., Geology, Library and Technical Information Services).

AGE LIMITS.—For Experimental Officers, at least 26 and under 31 on 31 December, 1954; for Assistant Experimental Officers at least 18 and under 28 on 31 December, 1954. Extension for regular service in H.M. Forces.

Candidates must have at least one of a number of specified qualifications. Examples are: Higher School Certificate, General Certificate of Education, Scottish Leaving Certificate, Scottish Universities Preliminary Examination, Northern Ireland Senior Certificate (all in appropriate subjects and at appropriate levels), Higher National Certificate, University Degree. Candidates taking their examinations in 1954 may be admitted. Candidates without such qualifications may be admitted exceptionally on evidence of suitable experience. In general a higher standard of qualification will be looked for in the older candidates than in the younger ones.

SALARY (London) :—

Experimental Officer—£720-£890 (men); £625-£760 (women).

Assistant Experimental Officer—£290-£645 (men); £290-£545 (women).

Starting pay according to age, up to 26. At 18, £290; at 26, £520 (men), £490 (women). Somewhat lower outside London. Promotion prospects.

Further particulars and application forms from **CIVIL SERVICE COMMISSION, SCIENTIFIC BRANCH, 30, OLD BURLINGTON STREET, LONDON, W.1,** quoting No. S94-95/54.
451/140/4/54/JS.

SITUATIONS VACANT

A **CHEMICAL PLANT ASSISTANT** is required by **LAPORTE CHEMICALS, LIMITED, LUTON.** Duties will include practical work for the Development Engineering Staff prior to the installation of specialised plant. Chemical training to General Certificate Standard is desirable. Pension Fund. Canteen and sports facilities available. Apply to **WORKS MANAGER.**

APPLICATIONS are invited from **CHEMISTS** for a progressive position in a large industrial Research Laboratory in the South of England, to study problems connected with the manufacture and use of detergents. Applicants should have a good degree or equivalent experience, preferably in the detergent and textile fields. The initial salary will be commensurate with qualifications and experience. The Company operates a Pension Scheme. Apply **BOX No. C.A. 3312, THE CHEMICAL AGE, 154, FLEET STREET, LONDON, E.C.4.**

HER MAJESTY'S COLONIAL SERVICE

A VACANCY exists for a **GOVERNMENT CHEMIST** in **ZANZIBAR.**

QUALIFICATIONS. Degree in Agricultural Chemistry; knowledge of soils and soil analysis.

DUTIES. General chemistry of agricultural products; small amount of forensic work; analysis and survey of soil, routine analysis of coconut oil, mangrove bark.

APPOINTMENT. On contract for two tours (24-36 months each tour), with basic salary according to qualifications and experience in the scale £585-£1,320 per annum, plus cost-of-living allowance of between £190 and £350 per annum according to salary. Gratuity of 13½ per cent of basic salary, payable on satisfactory completion of contract. Outfit allowance, £30. Free passages; quarters at rental of 10 per cent of basic salary; leave of 5 days per month of resident service; income tax at low local rates.

Apply, in writing, to the **DIRECTOR OF RECRUITMENT, COLONIAL OFFICE, GREAT SMITH STREET, LONDON, S.W.1,** giving briefly, age, qualifications and experience. Mention the reference number CDE.97/10/01.

CHEMICAL ENGINEER required by prominent Company in Westminster district. Qualifications required are: Age about 30; B.Sc. or equivalent; good knowledge Physics, Mathematics and Chemistry desirable; practical works experience of assistance; understanding of general office procedure and technical sales an advantage. The position offers excellent opportunities to a man having these qualifications coupled with a keen business outlook. Write, stating fullest possible particulars, including age, qualifications and salary required, to **BOX No. C.A. 3306, THE CHEMICAL AGE, 154, FLEET STREET, LONDON, E.C.4.**

YOUNG QUALIFIED CHEMIST required to assist in development work involving Applied Physio-Chemical Problems with special reference to the use of plastic materials. West London area. Superannuation and other welfare schemes. Good conditions in well-equipped laboratory. Write, stating full particulars of qualifications and previous experience, also salary required, to **BOX No. C.A. 3313, THE CHEMICAL AGE, 154, FLEET STREET, LONDON, E.C.4.**

FOR SALE

A 2-TON **MOBILE CRANE** of the very latest high-speed type now available for demonstration. It costs only £1,450 and travels at 12 m.p.h. Diesel fuel consumption cost barely 9d. per hour. With a 1½ cubic yard hydraulic grab it is the simplest, cheapest and most efficient way of handling loose materials in bulk. The ideal machine for loading and unloading railway trucks and road vehicles.
WILLIAM R. SELWOOD, LTD., CHANDLER'S FORD HANTS.
'Phone 2275.

CHARCOAL, ANIMAL AND VEGETABLE horticultural, burning, filtering, disinfecting, medicinal, insulating; also lumps ground and granulated; established 1830; contractors to H.M. Government.—THOS. HILL-JONES, LTD., "INVICTA" WORKS, BOW COMMON LANE, LONDON, E. TELEGRAMS: "HILL-JONES, BOCHURCH LONDON." TELEPHONE 3285 EAST.

ECONOMIC BOILERS, 10 ft. Danks. 12,000 lb. evap. 250 lb. pressure. Two Brand New 14 ft. by 8 ft. by 150 lb. w.p. **IMMEDIATE DELIVERY.** 400 other Boilers in stock.
Whessoe Riveted Steel **MIXING TANK,** 13 ft. diam. by 15 ft. deep, 9-16 in. plate, cone base.
TWO 35 ft. long by 9 ft. diam. Lead-lined **TANKS.**
ONE Stainless **CONICAL HOPPER,** 7 ft. 3 in. diam., overall depth 7 ft. 6 in.
SIX Stainless Steel **JACKETED PANS,** 60 galls.
TWO Broadbent **WATER-DRIVEN CENTRIFUGES,** 30 in. diam., 12 in. deep, 1,150 r.p.m.
SIX Aluminium **CONDENSERS,** 14 ft. long by 2 ft. 6 in. diam. 386 Tubes, ⅞ in. o.d.
FORTY Riveted **RECEIVERS,** 8 ft. 6 in. long, 5 ft. 6 in. diam., 75 lb. w.p. Numerous other sizes.
Solid Drawn **STEEL PIPES,** 6 in., 8 in., 10 in., 12 in., 14 in., thousands of feet in stock, plain and flanged.
CAST-IRON PIPES. 400 yds. 8 in. **NEW.** Also most other sizes, up to 24 in. bore.
VALVES in Stainless, Gunmetal, Enamel Lined.
Free Catalogue. "Watkins Machinery Record," available.
FRED WATKINS (BOILERS), LTD., COLEFORD, GLOS.

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7 BRAND NEW Jacketed **STERILIZING VESSELS**—7 ft. long by 3 ft. diam., complete with fittings.
2—18 in. **KEK PLATE MILLS,** complete with feeders, delivery bins, motors and entablature.
9—Worssam **ROTARY PRESSES.**
POWDER DRESSING OR SIFTING MACHINES.
1—Johnson **FILTER PRESS**—47 plates, 32 in. sq.
1—Johnson **FILTER PRESS**—30 plates, 25 in. sq.
Wood **FILTER PRESS**—69 plates, 2 ft. 8 in. sq.
24 in., 30 in. and 36 in. **HYDRO EXTRACTORS.**
Heavy Cake **CRUSHING MILL**—2-pair high, by Nicholson.
"U"-shaped Horizontal Jacketed **MIXER**—7 ft. long, 3 ft. wide, 3 ft. 3 in. deep, belt and gear driven.
3—5-roll **REFINERS** by Baker Perkins.
1—No. 1A Water-cooled **CIRCULATOR MILL.**
2—Excellent Nickel-lined Jacketed **TILTING PANS.**
5—Excellent Porcelain **DISC MILLS.**
1—Very Fine **GARDNER SIFTER** and **MIXER,** trough 5 ft. 9 in. by 24 in. by 28 in. deep, with wood-built hopper, elevator, A.C. motor and starter.
2—**GARDNER** 'G' size **SIFTERS AND MIXERS.**
2—**GARDNER** 'H' size steam jacketed **MIXERS.**
6—**JOHNSON FILTER PRESSES** 30 chamber 24 in. square.
RICHARD SIZER, LIMITED, ENGINEERS, HULL.
Telephone: 31743.

NEW STEEL DRUMS all sizes and types, immediate delivery from Continental production. Write or phone **STEEL DRUMS LIMITED, 118, BURDON LANE, SUTTON, SURREY** Vigilant 4886.

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SACK AND BAG MERCHANTS AND MANUFACTURERS. New and reconditioned for Home and Export. (Use **JUTEX** for sack repairing). **ALTRINCHAM JUTE LTD., WRIGHT STREET, BROADHEATH, ALTRINCHAM, CHESHIRE.**

STAINLESS STEEL STEAM JACKETED ENCLOSED VACUUM PANS, Hemispherical. 3 ft. 8 in. at top by 1 ft. 10 in. deep at centre with 1½ in. bore bottom centre outlet. Bolted-on domed cover, fitted with two 6 in. sight glasses, 1 in. and 1½ in. bore flanged branches and thermometer pockets. Polished internally and suitable for 28 in. vacuum. Mild steel jacket. Working pressure 30 lb. p.s.i. Mounted in mild steel angle stand. Unused.
STAINLESS STEEL PLATE HEAT EXCHANGER by **A.P.V. CO., LTD.** Type HH. 76 plates 43 in. by 16 in., total projected area 346 sq. ft. Hydraulically operated opening and closing gear.
STAINLESS STEEL CRYSTAL DRIER by **MITCHELL,** 3 ft. 6 in. diam. by 1 ft. 6 in. deep. **STEAM JACKETED** flat bottom with two S.S. paddles underdriven through bevel gearing from direct-coupled 1 h.p. 400/3/50 geared motor. Jacket working pressure, 15 lb per square inch.
M.S. SPIRIT EXTRACTION PLANT, comprising 3 ft. diam. by 5 ft. deep extractor with dished bottom jacketed for 5 lb. per square inch working pressure, condenser, separator, storage tank.
KESTNER HORIZONTAL TUBULAR EVAPORATOR, having six turns copper tube 1½ in. bore by 6 ft. long, complete with copper reception pot.
STEAM JACKETED COPPER STILLS, 150 gallons capacity. Fitted swan-neck, sight and light glasses, etc., and complete with copper coil condenser. Jacket working pressure 40 lb. per square inch.
STEAM JACKETED COPPER BOILING PAN, 100 gallons capacity. Bolted-on cast-iron jacket suitable for 40 lb. per square inch working pressure.
DOUGH MIXER, having "U" trough 1 ft. 5 in. by 1 ft. 7 in. wide at top by 2 ft. deep. Sheet brass trough, cast-iron ends, G.M. agitator. Belt driven and arranged for hand tilting.
M.S. HORIZONTAL "U" TROUGH MIXER, 3 ft. by 1 ft. 9 in. by 2 ft. deep. Fin-type agitating gear belt driven through helical gearing from fast and loose pulleys. Arranged for hand tilting.
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for use in the
SAMPLING
and
TESTING OF WOOD PULP

A FOLDING MARKER GAUGE, giving a commercial and practical application to a calculated mathematical interpretation of the procedure and rules laid down in Appendix I of the Rules Booklet issued by the Paper Makers' Association, and The British Wood Pulp Association, for the sampling and testing of consignments of pulp.

Patentee:
W. S. WALLEY, M.Sc., A.R.I.C.,
PRINCIPAL OF SINDALL & BACON, ANALYTICAL, CONSULTING AND RESEARCH CHEMISTS, 42a, BUCKINGHAM PALACE ROAD, LONDON, S.W.1.
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