Chemical Age

Petrochemical Conference at Fawley (page 635)

VOL. 77 No. 1970

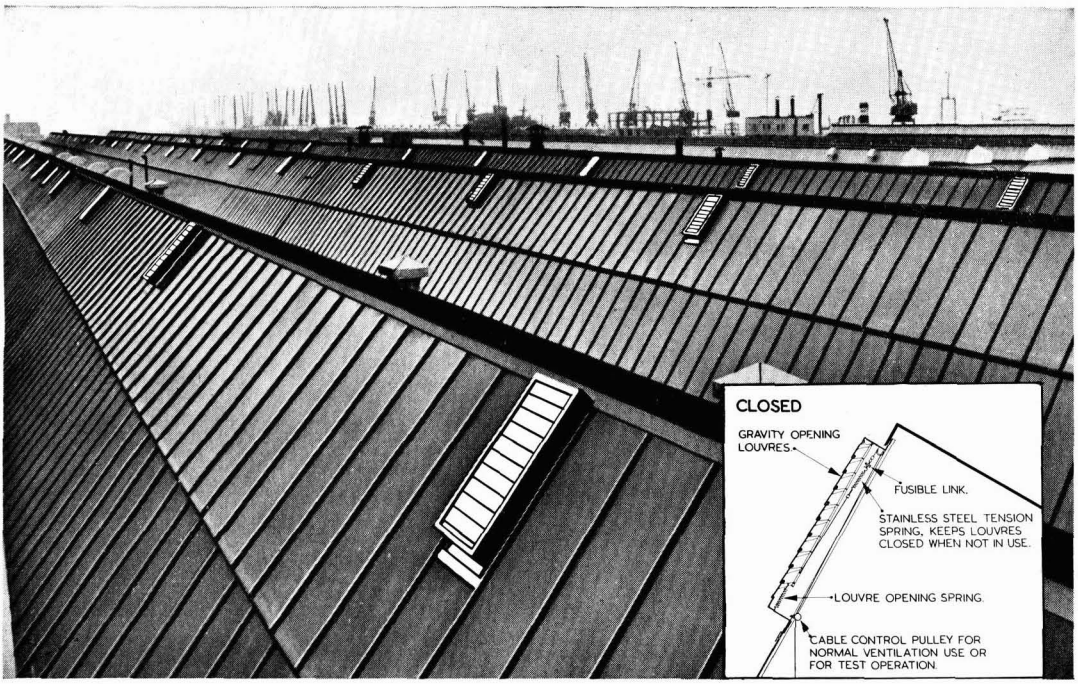
13 April 1957

INDEX TO ADVERTISERS

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

[*continued on page 624*

VENTILATION *AND* FIRE PROTECTION!



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at AC-Delco, Division of General Motors Ltd., Southampton.

A study of industrial fires in Great Britain and in America has shown that the primary cause for the spread of fire is the super-heated air, smoke and explosive gases trapped under the roof. They build up in heat and intensity from the fire below and cause flash fires. Furthermore, the smoke rapidly extends downwards, entirely filling the premises and preventing the work of the fire fighters.

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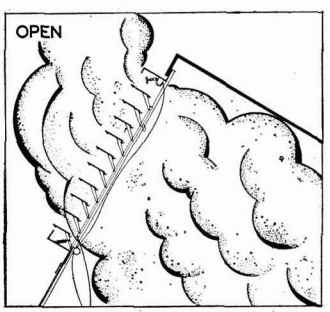
Write to Dept. for paper " Some Aspects of Fire Prevention in Industrial Buildings " by M. J. Reaney, which deals fully with this matter.



The insets illustrate the action of the ventilator as a Heat and Smoke Exhaust. In the event of fire, the fusible link fuses, providing Automatic Escape for Super-Heated Air and Smoke.

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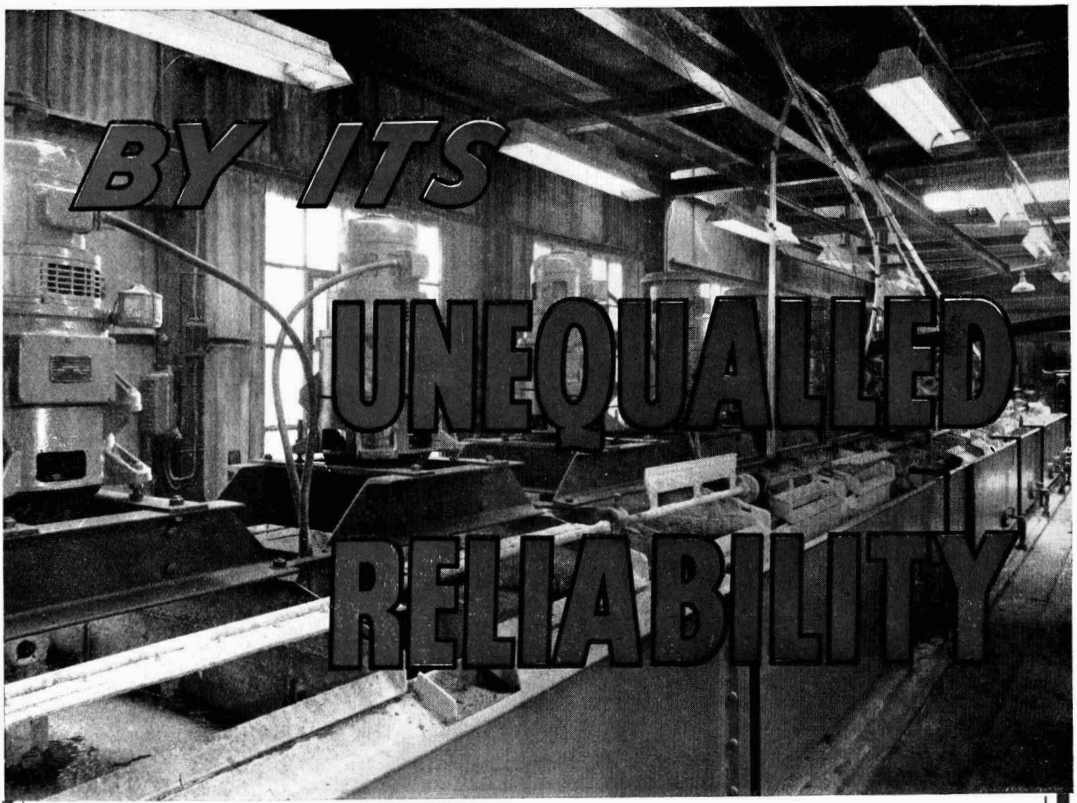

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VOL. 77 No. 1970
13 APRIL 1957

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IN THIS ISSUE

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CHEMICAL AGE

BOUVERIE HOUSE · 154 FLEET STREET · LONDON · EC4

HIGHER WAGE COSTS

UNSKILLED work people in the heavy chemical industry are now to receive an extra 2¼d-an-hour (1⅝d for women). This increase in payment was announced at a meeting of the Joint Industrial Council for the industry on 4 April and has been back-dated to 31 March.

For men the increase represents 8s 3d on the basic week, or about five and one-third per cent. Previously the unions had rejected a 2d-an-hour offer. The new basic rates will now be £8 3s 2d (men) and £5 15s 0½d (women) for the standard week. Cost of this agreement to the companies in the Association of Chemical and Allied Employers will total about £1½ million a year.

CHEMICAL AGE last week quoted the Ministry of Labour figures for average weekly earnings in the chemical industry in 1956 (p. 600). Of nine industrial groups, chemical workers' average weekly earnings of £10 8s 5d were the lowest rate. However, adult workers in the chemical industry fare better, average weekly earnings being £12 0s 8d, which brings them about fifth behind other industrial groups such as engineering, vehicles and shipbuilding industries. With regard to the number of hours worked in the industry, it is suggested that the average hours are: adult male workers, 48 hours; adult female workers, 42 hours; and all workers 47 hours.

Last week's agreement mentioned above does not affect some 10,000 maintenance craftsmen most closely associated with the engineering trades in the chemical industry, nor does the settlement affect 80,000 employees of Imperial Chemical Industries Ltd. This company and the appropriate trade unions (mainly engineering) agreed on Monday a wage increase of 2¾d. an hour for 20,000 maintenance craftsmen with lower amounts for lesser skilled workers. This increase will be back-dated to 1 April.

On Tuesday ICI Ltd. and the trade unions concerned agreed a wage increase for 60,000 unskilled labourers of 2¼d-an-hour for adult men and 2d-an-hour for adult women. These increases will again be back-dated to 1 April. There will also be proportionate increases for juveniles.

The total number of workers employed in the chemical and allied trades at December 1955 was 524,000. In December 1956 it had risen to 526,800. This total is made up of four main groups as follows:

	Dec. 1955	Dec. 1956
Chemicals and dyes	299,200	301,500
Pharmaceuticals etc.	111,700	110,200
Mineral oil refining greases etc.	71,800	73,700
Paints and varnishes	41,300	41,400

Within the industry less than half the workers are organised in trade unions affiliated to the TUC. This state of affairs is believed by the National Executive Council to be due to restrictions placed on unions because of the Bridlington Agreement. The Chemical Workers' Union which represents all workers—technical, operative and auxiliary—in its annual report (June 1956) stated that if as a Union it were freed from these limitations, its membership would double in a very short period of time.

These increases will add considerably to the industry's labour costs at a time when most other costs are also spiralling. They follow the pattern of other increases negotiated recently in other industrial sectors. These rises are, of course, inevitable in an inflationary period and can be borne provided they are accompanied by increase in productivity. In this respect, the chemical industry has a better record than many others, but it must not be forgotten that the productivity pace is set by a few firms and that many have yet to make the capital investment that is a pre-requisite of greater industrial efficiency.

Little can be done until plant and equipment are modernised or replaced. And for many smaller firms the cost puts modernisation out of consideration. Unfortunately for them and the country as a whole the Budget has done nothing to help stimulate such vital investment. It is to be regretted that the Chancellor did not seize the opportunity of producing a Budget that would give industry a positive incentive to invest in new equipment. Such a policy would not only enable manufacturers to meet rising labour costs by greater productive efficiency, it would also have placed them in a more competitive position vis-a-vis their overseas contemporaries.

A MIXED BAG

AS FAR AS the chemical and allied industries are concerned, the 1957 Budget presents a mixed bag. First, there will be general disappointment that nothing has been done to relieve the high level of company taxation and to stimulate investment. On the other hand, the relief for companies with overseas connections will be welcomed.

Certainly, the Chancellor is to be commended on the incentive aspects of his budget. Incentives not only to aspiring executives, but also a very real incentive to further education in the case of children over the age of 16. The benefits of the increased allowance for children still at school will not be felt for some time, but the measure will help parents maintain students at technical colleges and universities.

The Government's proposals to reduce the call-up progressively, to be announced later this month, will most probably include exemption for undergraduates studying science and technology, and taken with the Budget proposal, that should help to alleviate the disturbing shortage of graduates for industry.

TETRAM, NEW BRITISH $-EARNER

A NEW organo-phosphorus insecticide, produced by Plant Protection Ltd., seems certain to earn dollars as well as bring better control of red spider and mite or scale insects within the easy reach of growers. Chemically the active ingredient is 0,0-diethyl-S-(beta diethylamino) ethyl phosphorothiolate hydrogen oxalate, but in the UK and US the general trade name will be Tetram; in other countries, Metramac, ICI Amiton, and Inferno will be the names used for commercial formulations containing 75 per cent of the chemical.

The research story behind this new miticide or acaricide is impressive. It began in the later 1940s when it became apparent that the use of DDT, through killing off useful insects that preyed on red spider, was leading to increased red spider attacks on fruit, cotton etc. Parathion as an additional spray seemed the answer to red spider but experience showed that it had its limitations, mainly that of being insufficiently specific. At the ICI agricultural research station, Jealott's Hill, basic research in the organo-phosphorus compound field was aimed at finding a more specific poison for red spider. Investigations by Dr. R. Ghosh during 1949-52 led to R 6199, one of the esters of an organo-phosphorus acid, combining chemical stability with specific toxicity for red spider.

Trials in the field in Essex and Suffolk (1952-4) showed that this new chemical was more lethal to red spider and more persistent than parathion. Further development work was passed on to Plant Protection Ltd. In the UK 20 different apple orchards were sprayed; a team of three went to Texas in 1956 and 260 acres of cotton on 20 different sites and 150 acres of citrus fruits were sprayed. In all, field trials in 15 countries preceded this year's official announcement of Tetram. An interesting sidelight has been the glasshouse growth of 3,000 citrus plants in this country, with the establishment of a colony of citrus scale insects, possibly the first time this has been done outside citrus growing climates.

Only two to two and a half ounces of Tetram per acre are required. Its persistence is such that only one spraying per season is required. Yet it is specific to mites and scale pests, but relatively unharmful to the useful predatory insects. As with other organo-phosphorus pesticides, handling precautions are required because of toxicity to humans. However, the residues on fruit after spraying at the right time are too small to represent any hazard to health, and official permission to sell Tetram in all major countries is expected during 1957. This has already been granted in Holland, and since the recent public announcement of Tetram official approval for its use in the UK has been given. Temporary approval covering its 1957 use on at least 10,000 acres of cotton has been granted in the US, but this is expected to be widened before the cotton season begins to allow use on the whole cotton acreage of about 17½ million acres.

FIBRE REINFORCED POLYTHENE

DESPITE the unsuitability of polythene for hot water service and its marginal strength, polythene pipe is becoming increasingly popular, by virtue of its low cost and easy handling.

Under consideration, however, have been the possibilities of greatly expanding the use of this pipe by alterations in the physical properties of the material.

Investigations in the US although still in the early stages of development, have shown that relatively small additions of synthetic fibres allow marked alterations in polythene performance. A 10 per cent concentration of polyester fibre (Terylene or Dacron) in polythene is stated to increase the time to failure in standard stress-cracking tests a hundredfold. Polythene pipe reinforced with only five per cent of nylon fibre has shown only barely detectable cracking in four times the length of exposure under severe stress required to cause complete failure of commercial unreinforced pipe.

Fifteen per cent of polyester fibre (Dacron) has been found to reduce the tendency of polythene to creep under stress to one-tenth that of the unreinforced material. Of considerable interest is the observation that the effect of fibre reinforcement is even more apparent at higher temperatures. (Normally because of its characteristic low softening point, polythene cannot be used at temperatures over 140° F.)

Much work remains to be done but these preliminary investigations have shown that synthetic fibre reinforcement can make polythene pipe usable for domestic hot water service and could greatly expand the use of plastic pipe.

INDEX TO VOLUME 75

THE index to volume 75 of CHEMICAL AGE has now been published and is available on request from the editor at Bouverie House, 154 Fleet Street, London EC4.

£35 MILLION TO BE SPENT ON PETROCHEMICALS AT FAWLEY

Plans of Esso, Monsanto and ISR

PETROCHEMICAL developments involving an immediate capital investment in excess of £35 million are planned at Fawley by the Esso Petroleum Co., Monsanto Chemicals and the International Synthetic Rubber Co.

This was revealed at a symposium organised at Fawley Oil Refinery by the Fawley section of the Institute of Petroleum and the Southern sections of the Institution of the Rubber Industry and the Plastics Institute. Speakers were Mr. J. A. L. Spiers, responsible for chemical design at the refinery, Mr. K. C. Bryant, research chemist of Monsanto and Mr. K. G. Burridge, who is to be works manager for ISR.

Esso Petroleum propose new plant costing £22 million part of which is to produce butadiene and ethylene as a by-product to their gasoline production. Monsanto Chemicals are building an £8,500,000 plant on a site at Cadland adjoining the refinery, to produce polythene and other petrochemicals. ISR are building a £5 million plant at a neighbouring site to process butadiene to manufacture GRS rubber.

Mr. Spiers said the refinery's butadiene and ethylene plants were scheduled to go into production on 1 July 1958. It was proposed to make ethylene by the 'steam cracking' process. That process had been chosen because valuable by-products could be obtained and because it was one which had largely been developed by Esso's associated American research company and was being used by affiliated companies in the US.

Secret Catalyst

Butadiene was to be obtained at Fawley by a dehydrogenation process developed by Esso. Mr. Spiers added that a secret catalyst would be used in that process.

Mr. Bryant dealt in his lecture principally with the production of polythene, which he said was to be the first plastics for which Monsanto were installing plant.

At Fawley they would be operating the high-pressure process for its manufacture, a process which had enormous flexibility and from which a very high range of molecular weights could be obtained.

The polythene they proposed to make initially would be of the conventional type. What the situation might actually be in two years' time he could not forecast because almost every month a new polythene seemed to be coming out.

Commenting on the applications of polythene, Mr. Bryant said the conservative nature of the building industry probably meant that it would be a very long time before polythene piping came into general use, but it had recently been accepted by the Metropolitan Water Board.

Mr. Burridge said the ISR factory was being designed for the production of synthetic rubber at the rate of 50,000 tons a year by copolymerisation of butadiene and styrene. The type of synthetic rubber would be GRS rubber—the name given to it as a general process by the American Government when war-time production was begun in the States. There were, however, today a number of varieties and, Mr. Burridge added, 'I am hoping that ISR will confuse the situation a bit more.'

There could be many special types according to use, but the objective in production at the Hythe factory was a solid material which in the main would be used by the UK tyre industry.

Commercial production of GRS dated back to the days before the war and took place firstly in Germany. In the early part of the war production was started in the US. Today world production was about a million tons a year and that of natural rubber about 1,900,000 tons.

Whereas GRS production began because of war-time conditions, present production was due to the world demand for rubber. Natural rubber production had not risen appreciably in the last few years and the demand had been met by the increase in GRS production.

Butadiene and styrene would be supplied to the factory in liquid form and the system of manufacture to be used was emulsion polymerisation.

The GRS that was produced during the war did not have sufficiently good physical qualities to compare with natural rubber, but in the post-war years big advances were made and the properties of the new material—cold GRS—were considerably better. GRS, in fact, had certain advantageous properties in rubber manufacture, particularly in abrasion resistance. That made it particularly applicable in use for passenger car tyres, whereas natural rubber was used predominantly in commercial vehicle tyres. Physically, GRS was not so suitable for large tyres but had advantage in terms of tread for passenger car tyres, where abrasion resistance had a growing significance because of greater car speeds and particularly in cornering.

Direct Reading Fluorimeter for Routine Analysis

A DIRECT READING fluorimeter, said to be well suited for routine analytical work, was the subject of a paper given by Mr. L. Brealey and Mr. R. E. Ross (Boots Pure Drug Co. Ltd.) at a recent meeting of the Society for Analytical Chemistry, organised by the physical methods group. Dr. J. H. Hammence, SAC president, presided at the meeting, subject of which was 'Fluorimetry.'

It was stated that overall stability of the system is such that the mains voltage can vary between 200 and 250 volts without causing more than ±0.5 per cent variation on the instrument testing.

No fluorescing comparison solution is required for operation and sample handling is reduced to a minimum. Either run-through or ordinary cuvettes can be used, the former being the method of choice for routine assay where a reasonable volume of solution is available.

Pollution Charges Dismissed

Magistrates at Leek, Staffs, last week dismissed river pollution charges made against Sir Thomas and Arthur Wardle Ltd., manufacturers of dyestuffs and chemicals, Macclesfield Road, Leek, by the Trent River Board. Evidence relating to the analysis of samples, excluded from a previous hearing, was considered. After a four-hour sitting, the magistrates dismissed the cases, saying there was a reasonable element of doubt.

SAC Biological Methods Group

The summer meeting of the Biological Methods Group of the Society for Analytical Chemistry will be held on Thursday 23 May 1957. This meeting will take the form of a visit to the Wellcome Research Laboratories, Langley Court, Beckenham, Kent. Demonstrations will be arranged throughout the day.

Design of Aqueous Homogeneous Reactor

THE HISTORY of the homogeneous aqueous reactor was discussed in a paper presented at a meeting of the Institution of Chemical Engineers on 2 April. The authors, Dr. R. Hurst and D. Newby, defined the point to which development has now been reached and described the factors still to be studied before we could build a power reactor of this type.

Main points were that we needed to know more about the mechanism of corrosion in the presence of radiation in order to develop a suitable material for the core vessel. Such a vessel must be neutron-transparent as well as corrosion resistant. Zirconium or a zirconium alloy appeared to be one possibility.

We should also like more experience of handling the fission products formed in the solution and more knowledge of their eventual disposition within the reactor.

Behaviour of Ruthenium : AERE Paper at Geneva

IN A PAPER presented at a recent Geneva conference, J. M. Fletcher and F. S. Martin of the UK Atomic Energy Research Establishment discussed the chemistry of ruthenium. They stated that in the chemical processing of reactor fuels and in the treatment of fission products it was not unusual to find that ruthenium behaved in an exceptional manner. Whereas most fission products could usually be made to follow one definite course in chemical treatment, fission product ruthenium was apt to follow several courses.

Isolation and properties of some of the co-ordination complexes of nitrosylruthenium, formed in nitric and nitrous acid solution, were described in relation to the fate of fission product ruthenium and to the chemistry of other forms of ruthenium and other metals.

DISTILLATES

★ A LEADING US chemical personality—Mr. Henry du Pont, vice-president of E.I. du Pont de Nemours and Co.—made a flying visit to Londonderry last week to inspect the Maydown site on which his company is to erect a synthetic rubber factory. Accompanied by Lord Glentoran, Minister of Commerce, Mr. du Pont said it was certain that building operations would be started this year.

Alembic understands that work will probably start in September and that the new plant is estimated to cost £7 million. Mr. du Pont will return to Londonderry during the construction of what is du Pont's only European project.

★ SCOTLAND'S tallest chimney—the 300 ft. stack at the Rutherglen Road, Glasgow, works of British Chrome and Chemicals Ltd.—was demolished recently in the interests of clean air. It is to be replaced by a battery of electric fans. A 55-lb. charge of gelignite, embedded in the 27 ft. diameter base, brought the 25,000 ton chimney down along the works railway line.

★ WHEN THE new *Mayflower* repeats the Pilgrim Fathers' crossing to America, its cargo will include a replica of a 17th century spice chest carried on the original ship. This chest, made of 1¼ in. oak, bound with hand hammered brass, will contain a representative selection of the chemicals made by a Darlington firm.

An inscription inside the lid reads: 'This chest containing high quality chemicals made by craftsmen of Darlington in the County of Durham, England, was consigned by Darlington Chemicals Ltd. of that town to Darlington Chemicals Inc. of Philadelphia, Pennsylvania, in the United States of America and carried by the sailing vessel *Mayflower* in the month of April of the year of Our Lord one thousand nine hundred and fifty-seven'.

The spice boxes in the chest will hold the following Darlington chemicals: light magnesium carbonate powder, technical quality; light magnesium carbonate powder, USP quality; light magnesium oxide powder, technical quality; light magnesium oxide, USP quality; light magnesium oxide, granulated; magnesium hydroxide powder, technical quality; magnesium hydroxide powder, NF quality.

The *Mayflower*, a replica of what experts believe to have been the Pilgrim Fathers' original ship, sails from Plymouth to Cape Cod, Mass., under the command of one of the most experienced masters of sailing ships—Commander Alan Villiers. The crew, dressed in 17th century costume, will live on the traditional provisions of seafarers of the period, including salt pork.

One of the few departures from tradition will be the supply to the ship's medical officer of the 20th century antibiotic, Terramycin, donated by Pfizers.

★ LIQUIDATION of the IG Farben Chemical Trust is likely to be postponed for years to come if shareholders do not ratify the agreement concluded recently between the board of liquidators and the Jewish Claims Conference to indemnify former slave workers at IG Farben factories. Some shareholders have stated that the West German federal authorities and not the company should provide the compensation. The liquidators have pointed out, however, that negotiations with the Federal Government on this issue would almost certainly prove fruitless and could lead to a long period of stalemate.

★ ONE OF THE factors that has hampered post-war development in the UK chemical industry has been lack of adequate housing facilities. Many sites, ideal in every other respect, have had to be rejected because of local housing problems. Faced with a serious shortage of skilled labour on Tees-side, ICI's Wilton council plans to import the workers required for development plans. This, however, would call for nearly 500 houses a year.

Last week, Saltburn and Marske Urban Council's health and housing committe heard details of an ICI offer of a £20 a year subsidy for each house built by a local authority and allocated to ICI key workers. The object of the offer is not to create tied houses and if a key worker who had been allocated a house left the firm, the subsidy would continue to be paid for a fixed period.

There were no 'strings' on how the subsidy should be used, although ICI hoped it might have some reflection in rents charged. The committee considered the offer at a later meeting and rejected it.

E. G. Fairburn, chairman and managing director of the Darlington group of companies (right) and D. Nelson, commercial manager, inspect the 'Mayflower' chest

★ ALEMBIC is flattered by the attention this column has received from readers. One of the first comments on this feature comes from a correspondent who sends 'best wishes for the success of your entertaining column'. He says he would like to sign himself 'Regular Reader', but adds, 'as you have only just appeared for the first time, I shall have to wait a year or two for that privilege'. So he pens the signature 'Vox Non Populi'.

'VNP' makes an interesting suggestion in his letter. He says 'Will Alembic or his editor run a competition for the best headline of the week? I have in mind the abstruse and sometimes almost poetic language of the chemical industry which is perfectly clear to the highly intelligent readers of CHEMICAL AGE, but double-Dutch to the public at large. For example, in your issue of 6 April, I would award the palm to "flocculant for uranium concentrate"'.

Alembic's choice for the heading most likely to make the layman reach for his aspirins would be a subsidiary headline in page 597 of the same issue 'Cis-trans-Ratio of 1,4-Polybutadienes'.

★ PERSEVERANCE, a necessary attribute of the man who would be his own boss, last week had its reward. Mr. Richard Fairfax Naylor, an industrial chemist, and one of last year's unsuccessful finalists in the *News Chronicle* 'Be Your Own Boss' contest, this year won the top prize of £3,500. Mr. Naylor is in charge of the plastics and chemical laboratory of the General Electric Company's applied electronics laboratory at Coventry.

Two years ago with a friend, Mr. Edgar Marlow, Mr. Naylor started a part-time precious metal-plating business. He now plans to operate on a full-time basis, extending the scope of his operations. He joined the GEC laboratory as a postgraduate apprentice seven years ago.

One of the judges for the final round of the contest was Sir Miles Thomas, chairman of Monsanto Chemicals.

Alembic

TRADE WASTE SYMPOSIUM

Practical and Legal Aspects of Disposal Considered at Birmingham

At the symposium of Trade Wastes arranged by the Midland Branch, Institute of Sewage Purification, and held at the University of Birmingham, on 9 April, the following papers were presented: 'Problems concerned with the acceptance of trade effluents into public sewers,' M. A. Kershaw; 'Obligations of local authorities and traders under the Rivers Pollution Prevention Acts,' M. Lovett; 'Treatment of some industrial organic wastes,' D. H. Sharp; 'Acid wastes and their neutralisation," S. H. Jenkins and C. H. Hewitt; 'Treatment of plating wastes and cyanides,' A. E. J. Pettet; and 'Gas works effluents and their effect on sewage treatment,' W. T. Lockett.

Alderman A. Paddon Smith, J.P., chairman of the Birmingham Tame and Rea District Drainage Board, opened the symposium. Chairman of the symposium was Mr. Arthur Key, senior chemical inspector, Ministry of Housing and Local Government.

Effluents in Sewers

Mr. M. A. Kershaw's paper on 'Problems concerned with the acceptance of trade effluents into public sewers' covered a very wide field. An historical background was given covering the national development of trade effluent treatment. The problem today was considered, as also pre-treatment of wastes and inspection and control of trade effluents.

In 'Obligations of Local Authorities and traders under the Rivers Pollution Prevention Acts,' Mr. M. Lovett dealt with legislation. He gave a résumé of the main features of the Acts as they affect local authorities and traders.

Descriptions of effluent treatment processes employed at a latex, a rayon, a textile dyeing and finishing, a pharmaceuticals and a pesticides factory were considered in Mr. D. H. Sharp's paper. It was reported that in all five factories discharge was made into rivers, although in two cases (i.e. the latex and rayon factories) it was expected that the effluents would shortly be discharged into sewage systems.

In each case, some form of pre-treatment was necessary before the effluents were susceptible to biological treatment. Pre-treatment processes described included:—(i) sedimentation; (ii) coagulation; (iii) chemical dosage; and (iv) adsorption on to activated charcoal.

In the pesticides factory effluent, adsorption treatment utilising activated charcoal is found to be necessary as a pre-treatment. Biological treatment after admixture with sewage is then effective.

It is to be noted that in each of the three treatment processes in which discharge occurs into a river, the river receives considerable aeration either immediately after or immediately before the point of entry of the effluent. This is considered to be an important point. Also it appears from examination of these five cases, that the best place to treat an effluent is at the source, i.e., in the processes themselves.

'Acid wastes: their source, composition, effect on sewage treatment and their neutralisation' were dealt with in considerable detail by Mr. S. H. Jenkins and C. H. Hewitt. Types of discharges discussed included those containing iron, copper and chromium, as well as waste acid free from metallic salts. Composition of some of those wastes and their effect on the composition of sewage at the point of discharge and when they reached the sewage works were given. The authors suggested that treatment of the wastes at the factory did not present any technical difficulty although it might not be easy to apply in old and congested premises. If much deposited material was produced, arrangements should be made for its sedimentation and removal.

It is apparent that in large modern plants that separation of solids from liquids by filter pressing or by filtration through rotary vacuum filters is becoming more common. At one factory calcium sulphate, obtained from neutralisation of large volumes of dilute sulphuric acid with lime, is pressed to a cake which is sufficiently dry to be tipped. According to the authors this method is still limited to neutralisation plants having little land available for sludge drying. Prevention of waste and in some cases, as with iron pickle liquor, recovery and re-use of the constituents was possible and the ideal solution.

Plating Wastes

'Treatment of plating wastes and cyanides' was examined by Mr. A. E. J. Pettet. He reported that waste washing waters containing chromic acid or chromates were usually treated by reduction with either ferrous sulphate or sulphur dioxide, followed by precipitation of the reduced chromium by addition of alkali.

If highly efficient treatment was required, batch treatment was necessary. Spent chromic acid anodising solutions could be regenerated by using ion-exchange resins. Chlorination in strongly alkaline solution, preferably in a batch process would destroy cyanides in the form of an alkali salt or the complexes of zinc, cadmium, and copper.

A process which could be used in continuous-flow plant was the partial removal of cyanide by treatment with ferrous sulphate and an alkali. Oxidation with permanganate was also in use for removal of cyanide, while in the US acidification was used to liberate hydrogen cyanide, which was blown off to the atmosphere. Since cyanides were amenable to biological treatment, Mr. Pettet suggested that that might form a basis of a further method of dealing with cyanide wastes.

Source, character and composition of gas works effluents of high polluting value, such as lime-distilled spent liquor and effluent from liquor concentration plants were described by Mr. W. T. Lockett, in 'Gas works effluents and their effect on sewage treatment.' The author suggested that it was likely in the future that effluents of different properties, arising from developments in the practice of pre-treatment of ammoniacal liquor and/or in the practice of gas manufacture designed to reduce the impurity content and particularly the toxic impurities of gas effluents might be forthcoming.

Because of the objections raised to the discharge of crude ammoniacal liquors to public sewers, the extended use of the liquor concentration process had been favoured by sewage disposal authorities. As there were difficulties regarding the treatment of large volumes of gas liquors at sewage works, an extensive programme of research was being carried out at different centres throughout the UK. Work undertaken at Leeds and Stivichall, it was suggested might well lead to noteworthy advances. At Leeds, identification and estimation of constituents of gas liquor was being investigated. Work at Coventry had reference to large-scale experiments on treatment of spent gas liquor in percolating filters under carefully controlled conditions.

These symposium papers are published in full in a booklet obtainable from the joint secretaries, the Institute of Sewage Purification, 10 Cromwell Place, South Kensington, London SW7, price 10s, post free.

Conference on Hydrazine and Water Treatment

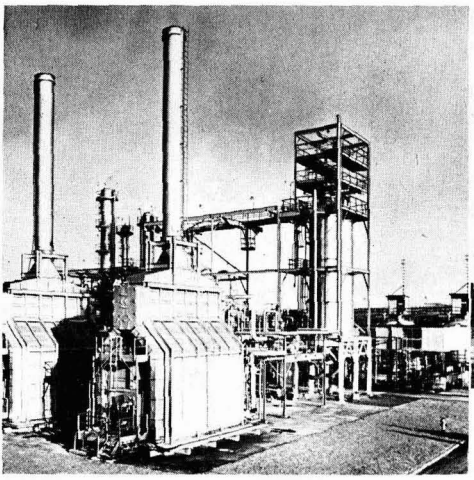
Because of the importance of the treatment of boiler feed water and the prevention of corrosion, Whiffen and Sons Ltd., Fison House, 95 Wigmore Street, London W1, are organising, an international conference on 'Hydrazine and water treatment' at the Royal Bath Hotel, Bournemouth on 15, 16 and 17 May, 1957.

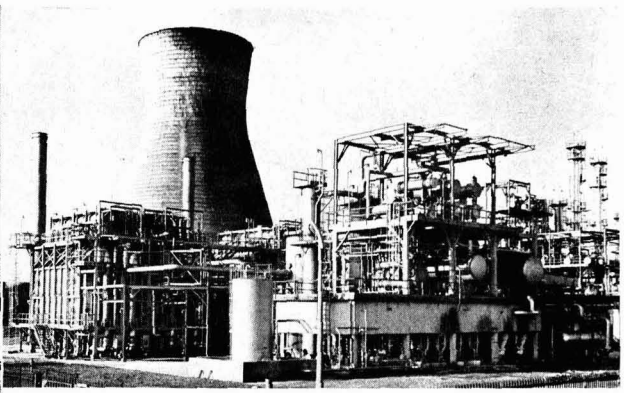
Scientists, industrial engineers and chemists from many parts of the world having a common interest—the treatment of industrial water, particularly as it applies to steam-raising and power stations—will attend the conference.

Drawback of Import Duty

The Board of Trade is considering an application for drawback of duty, under Section 9 of the Finance Act, 1932, for imported grease and tallow used in the manufacture of stearine fatty acids, oleine fatty acids and cloth oils and wool oils containing not less than 70 per cent by weight of oleine fatty acids, for export.

Any representations should be sent in writing to the Board of Trade, tariff division, Horse Guards Avenue, London SW1 not later than 24 April 1957.





British Hydrocarbon at Grangemouth

NOW in operation at Grangemouth are these new plants of British Hydrocarbon Chemicals Ltd., for ethylene and ethanol production. The output from the plants has doubled the existing capacity for these basic chemicals.

The decision to construct these plants was announced in June 1955 as part of the £8,000,000 expansion programme at Grangemouth.

Above left is the No. 2 plant for ethanol, an industrial alcohol used in the production of a range of chemicals, including dyestuffs, synthetic textiles, plastics paints etc. Above, is the No. 2 ethylene plant for the production of ethylene gas, an important raw material for organic chemical manufacture.

British Hydrocarbon Chemicals are jointly owned by the British Petroleum Co. Ltd., and The Distillers Co. Ltd.

UK's Share of Chemical Exports down 1 per cent

ACCORDING to a report on export trends in recent years, prepared by the Board of Trade, UK exports of chemicals rose considerably less rapidly than world exports and her share fell from 16.9 to 15.9 per cent during the period 1954-56.

The figures and conclusions of this report are based on returns for the first nine months of 1956 compared with figures for the corresponding periods of 1955 and 1954.

Among reasons for the decline in the UK's share were the rapid fall in exports of fertilisers and the fact that while her exports of plastics materials increased substantially, her competitors' exports of these materials increased even more.

The fall in fertiliser exports is attributed to the increases in the rate of subsidy on nitrogenous and phosphatic fertilisers in the 1955 and 1956 farm price reviews.

Japan and the US increased their exports by the greatest proportions, while a slightly above average increase was recorded by Germany.

Chemical Aspects of Dyeing Synthetic Fibres

DISCUSSING the chemical aspects of dyeing and finishing man-made fibres at the Bolton meeting of the Manchester Section, Royal Institute of Chemistry, recently Mr. F. V. Davis (James Hardcastle and Co. Ltd., Bolton) said that in the case of nylon fabrics, the best fastness of colour was obtained by the use of pre-metallised dyes. Although these were deficient in the bright blues and greens, a German company had recently introduced a reddish-blue which gave good results. Disperse dyes at high temperatures could be used for the dyeing of Terylene. In order to aid the penetration of the dyes, a carrier which possessed the properties of a swelling agent could be used. So far the ideal swelling agent had not been discovered. Some swelling agents, such as methyl salicylate (oil of wintergreen) retained their colours.

Dr. Koppers Describes Gasification Process at Institute of Fuel

WORK CARRIED OUT by Dr. H. H. Koppers' company under the direction of F. Totzek which led to a new process for synthesising gas from any kind of solid, liquid and gaseous fuels — the Koppers-Totzek gasification process—was described by Dr. H. H. Koppers himself in a paper presented to the Institute of Fuel on 10 April at the Institution of Civil Engineers, London SW1.

Dr. Koppers stressed that carbon as a cheap means for the reduction of water and ores, had great industrial importance. Because varying and, often unsuitable, properties of natural fuels made their technical application difficult, a simple method of recovering carbon in a uniform and useful state has been sought. To a certain degree this requirement has been fulfilled when solid fuels are carbonised by simple heating in the absence of air. This process, however, largely depends on the properties of the raw material.

Carbon monoxide, said Dr. Koppers, was the key in chemical synthesis, since it could be easily handled and by reacting with steam by its own power, it formed useful raw products such as hydrogen for converting nitrogen to ammonia and hyrdocarbons of all kinds. This simple carbon compound, however, could be immediately obtained from most of the natural carbon-containing matters by gasification

The Koppers-Totzek gasification process had became internationally known as several plants employing this system have been operating successfully for some years.

Main subject matter of Dr. Koppers' papers was the principle and development of the process, together with the practical realisation and applicability of the process and some experience gained in operating the plants.

Petroleum Industry Used to Demonstrate Applied Science

SOME 250 science teachers (220 men, 30 women) attended the holiday course from 1 to 4 April at University College, London, to discuss the application and development of science in broad terms, using the petroleum industry to illustrate this theme.

Realising the need to establish a closer relationship between science in industry and science in schools, Shell Petroleum Co. approached a number of schoo's all over the country with the suggestion that a short course on the sciences as applied in the petroleum industry, might be of value to teachers.

The programme included lectures on geology, geophysics, chemical engineering, chemistry and refining, new chemical products and agriculture, and automatic controls; they were given by a number of eminent scientists, including Sir Robert Robinson, O.M., Sir Edward Bullard, and Sir William Ogg.

TOXIC HAZARDS IN INDUSTRY—8

Chemical Carcinogens

By Peter Cooper, F.P.S.

MALIGNANT tumours are characterised by their power of rapid and uncontrolled growth. They differ from the regenerating tissue of a wound or the rapidly-dividing cells of an embryo in the essentially wild and reckless way in which they grow. Normal tissue, once it has come to the end of its vital development, once again returns to a slow process of growth; cancerous tissue makes no ordered response to the needs of the tissue in which it develops, and persists as a disorderly mass of cells.

The exact mechanism of carcinogenesis is still unknown, but it seems to be more complex than a mere cell-irritation with presumably the destruction of over-stimulation of some essential part of the cell structure. Not only do certain chemicals induce cancers, but the same compounds can also inhibit their growth once they are formed.

Unlike the production of cancers, which requires a very long latent period in man and, in proportion to its life-span, a similarly long latent period in experimental animals, their destruction by the same chemical agents is relatively very rapid. Also, some chemical carcinogens are aided in their activity by other non-carcinogenic compounds called co-carcinogens. For example, croton oil alone causes tissue hyperplasia (that is, proliferation) but not malignant growths, and 9,10-dimethyl-1,2-benzanthracene is a slow carcinogen. The application of croton oil to the skin before the carcinogen reduces the latent period before malignancy occurs. Its application after the carcinogen determines the time of appearance of the growth, which is then not simply related to the time of the original carcinogenic treatment. It appears, therefore, that carcinogens may act primarily by sensitising certain predisposed cells to the irritant action of other compounds not themselves carcinogenic. Such a conception helps to throw light on the mystery of the latent period characteristic of all chemical carcinogens.

Not Exempted

Compounds that are normal constituents of body cells are not exempted from the list of carcinogens. For example, cholesterol is a carcinogen, though only a mild one, for the mouse. It is possible that a derangement of normal metabolic processes may contribute to carcinogenesis. The steroid hormones and bile acids have structural resemblances to some of the known polycyclic carcinogenic hydrocarbons. All the most powerful known carcinogens are based on the phenanthrene structure, and it has been suggested that the high molecular reactivity in the region of the 9:10 bond of that compound may be connected in some manner with cancer production. The use of androgens as anti-tumour agents in certain cancers of women, and of oestrogens in certain cancers of the male, is normal clinical practice, and there have inevitably been suspicions, though apparently not well-founded ones, that therapy with these agents may carry a risk of provoking tumours as well as retarding them.

One of the complications in predicting the possible carcinogenic properties of an industrial compound is that its metabolism in the human body may not be known for some time. Carcinogens have essentially a local activity against tissues. When they are produced in the body by the metabolic breakdown of an otherwise innocent compound, their effects occur at points along the track of their excretion. Thus, beta-naphthylamine absorbed into the body appears in the urine as the carcinogenic compound 2-amino-1-naphthol, which may produce malignant papillomas of the bladder in predisposed persons.

Early Cases

The earliest industrial cancers of the skin arose from handling coal-tar or mineral oil derived from shale. Scrotal epithelioma in mule-spinners was traced to the introduction as a spindle-lubricant of Scottish shale-oil, and had a latent period of about thirty-five years. Epitheliomatous ulcers also arose from handling pitch, tar and bitumen and were commonest in chimney-sweeps, tar-distillery workers and briquet makers. However, they only occurred in certain areas where the source and heat-treatment of the crude products conferred carcinogenicity. Paraffin eptheliomas, from handling oil in petroleum refineries, have been comparatively rare. They have been preceded by wart-formation.

Gas works tar and pitch have been more heavily incriminated as carcinogenic materials than coke-oven pitch, and petroleum cracking does not appear to produce markedly carcinogenic products. Coal-tar produced in horizontal retorts seems particularly carcinogenic. A working temperature of 700°C and upwards confers a high activity on the tar, the main causative factor being 3,4-benzpyrene. Although the tumours usually induced by this and chemically related hydrocarbons are skin epitheliomas, injection of the compounds beneath the skin produces in certain conditions sarcomas.

Animal experiments with active hydrocarbons have shown that individuals show over-resistance and over-susceptibility to them, and that the development of any sort of immunity is doubtful. High vitality of the affected cells, such as goes with good nutrition and health, at first protects against their injury, but once the tumour has arisen, seems to increase its rate of growth.

Among the potent hydrocarbons investigated are 1,2,5,6-dibenzanthracene and 20-methylcholanthrene; methylation seems to increase carcinogenicity, for methylcholanthrene is one of the most rapidly carcinogenic substances known. The phenanthrene nucleus is not essential to carcinogens, for benzacridine, triphenylbenzene and tetraphenylmethane are carcinogenic, at least to rats and mice. Considerable protection against these and similar compounds is given by skin-applications of wool-fat, and the removal of fat from the skin by organic solvents increases the liability to tumours. The degree of protection or of increased risk depends upon the potency of the particular compound handled. Removal from work is not effective, since, once the cell damage has been done it tends to progress irrespective of further exposure.

Epithelial cancers also arise from handling arsenical compounds, in particular sheep-dips. Prolonged exposure seems necessary and recorded cases have involved handling the compounds for twenty years or more. The earliest signs are darkening of the skin and the appearance of warts; these grow in size, ulcerate and become malignant. The growth is painless and does not metastasise until a later stage, so that surgical removal may be effective. Inhalation of arsenic fumes from smelting works may provoke growths in the nasal cavities. Cancer of the nose has been associated with nickel carbonyl production, but the root cause has not been established.

Cancer of the lung has been attributed to 3,4-benzpyrene in the smoke of burning tobacco and in the exhaust fumes of diesel-engines. The size of the smoke particles on which this carcinogen is absorbed probably determine the effect of it on lung tissue. Chromates inhaled in droplets over periods of twenty years or more may give rise to lung cancer. Only the monochromates seem to be incriminated, dichromates, chromic acid and chromium salts being comparatively inactive. Nasal irritation and septal perforation, common wherever chromate sprays are met, appear to have no relationship to lung cancer caused by the same agent. Chromate tumours have a tendency to metastasise early.

Industrial Dusts

Inhalation of some industrial dusts is suspected of playing a part in pulmonary carcinogenesis. Asbestosis is closely associated in some persons with primary carcinoma, though the irritation alone is insufficient to account for the tumour. Metal grinders have a higher incidence of pulmonary cancer than others. Asphalt dust may well contribute its effect, for many asphalts contains polycyclic carcinogens.

Aromatic amines and their derived dyestuffs offer by far the greatest variety of potentially noxious compounds. The ingestion or inhalation of them initiates metabolic conversion of some of them to

carcinogenic excretion products. Beta-naphthylamine has been shown to yield urinary 2-amino-naphthol, which is carcinogenic in dogs and apparently causes parallel effects in humans. Long-standing irritation of the bladder by this substance produces papillomas which later become malignant; the presence of blood in the urine marks this development. Periodical cystoscopic examinations of workers exposed to this compound have been advocated, so that surgical intervention can be made early.

Benzidine and related diamines are suspect. Bendizine will induce tumours of the liver and intestine in rats. 4-Amino-diphenyl and 3,2'-dimethyl-4-amino-diphenyl, particularly the last, are potent tumour-inducters in rats, and are presumably dangerous to man. They are metabolised to o-hydroxyamines, which are the prime agents causing bladder cancers. Again, as in the case of the hydrocarbons, methylation has a potent effect in conferring increased carcinogenicity. Since the metabolities, in rats, appear in the bile, there is some chance that these compounds may cause liver and intestinal tumours.

Ortho-methylation or N,N-dimethylation of the amines incourages metabolic hydroxylation in the ortho-position relative to the amino-group, and so ensures added carcinogenic properties. The aminoazo dyes which can be methylated in vivo and bound to liver protein are likely to be carcinogenic. Dimethylaminoazobenzine ("butter yellow"), at one time used to colour foodstuffs, causes proliferation of bile-ducts and liver parenchyma in experimental animals, and eventually produces complex tumours.

Alpha-napathylamine is not a proven carcinogen but the presence of the beta-isomer in commercial samples is suspected to have been contributory to bladder cancers. The beta-compound may often be avoided by using sulphonated beta-naphthol in syntheses instead. Aniline is not clearly carcinogenic, but it is metabolised to phenylhydroxylamine, which is a bladder irritant even in high dilution. Aniline may therefore contribute towards the toxic picture, particularly since it may be contaminated with more undesirable compounds in technical grades. Scarlet-red is certainly a cell-proliferant, and was at one time used in medicine to promote speedy tissue granulation; it cannot, therefore, escape suspicion as a potential carcinogen.

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Conference on Radio-isotopes in Research

AN INTERNATIONAL CONFERENCE on radio-isotopes in scientific research has been convened by Unesco and will be held in Paris from 9 to 20 September.

It is expected that more than 1,000 scientists from all over the world will attend. Participants will include those nominated by Governments; representatives of the United Nations or its specialised agencies and of international scientific organisations, and persons participating in an individual capacity, or sent by scientific or industrial bodies.

Radioisotopes are now being widely used in industrial research, medicine, agriculture, biology, physiology and oceanography. Main purpose of the conference is the exposition and discussion of new ideas or methods for utilising radioisotopes in scientific research. Plenary meetings of the developments will be devoted to new developments in measuring techniques and significant developments in the production of radioisotopes. The remainder of the work of the conference will take place in two main sections, dealing with the physical and biological sciences.

Radiological Protection Course

The fourth short course in radiological protection will be held at the Atomic Energy Research Establishment, Harwell from 29 April to 3 May inclusive. The course is designed to give practical advice of direct use to people engaged in handling radioactive materials. Enquiries should be addressed to the Isotope School, AERE, Harwell, Nr. Didcot.

Dangers of Commercial Trichlorethylene

IN THE International Labour Office's publication *Occupational Safety and Health*, January-March 1957, mention is made in an abstract of the danger of allowing commercial trichlorethylene to come in contact with caustic soda. Trichlorethylene contaminated with stabilisers of the alkylamine type which act as catalysts in the presence of caustic soda decomposes to chloracetylene, a compound which ignites and may explode on contact with air.

A case instanced in the report is that of a pilot plant used for the manufacture of a pharmaceutical chemical. In order to avoid the use of a highly inflammable solvent as extraction agent, trichlorethylene was tried. In the extraction process 2 gallons of the solvent were mixed with a residue made strongly alkaline with caustic soda. The emulsion which formed, immediately began to decompose and for a period of five hours gave off gases from the surface that ignited spontaneously.

Natural Gas Drilling in Yorkshire

Imperial Chemical Industries Ltd. and British Petroleum Exploration Co. Ltd. have commenced drilling for natural gas near Robin Hood's Bay, Whitby, Yorks. A borehole sunk to a depth of 4,000 ft. by Fisons Ltd. in search of potash some years ago, is being deepened. The limestone formations, where the natural gas may be present, lie some hundreds of feet below the potash beds.

Three years ago, ICI discovered natural gas at a depth of 4,800 ft. at Grosmont, near Whitby.

Sturge Expand Calofil Production Facilities

CERTAIN production facilities at their Lifford Chemical Works, Birmingham, are being extended by John and E. Sturge Ltd., to increase by 300 per cent their output of Calofil, a special grade of precipitated calcium carbonate used widely as a filler for polyesters.

Calofil is a white, low oil absorption, non-abrasive chemical which is claimed to be the only specially manufactured inert filler for reinforced plastics produced in this country. It is claimed to effect marked economies in the amount of resin used, to reduce shrinkage and to improve the surface finish.

The new plant is planned to be in operation by 1 June.

International Cybernetic Association Formed

AT THE FIRST International Cybernetic Congress held at Namur, France, in June of last year, it was decided to form an International Cybernetic Association. This was set up at Namur on 6 January this year. It already has more than 1,000 members (300 are industrial companies), representing 26 countries.

Object of the Association is to ensure permanent liaison and organisation between researchers, and to promote the development of cybernetics and its technical applications.

The Administrative Council of the Association is as follows: President: M. George R. Boulanger (Belgium), Professor of the Polytechnic Faculty of Mons and at the University of Brussels. Members: M. M. René Close (Belgium), lawyer at Namur; Louis Couffignal (France), Inspector General of Public Instruction, director of the Laboratory of Mechanical Calculus of the Blaise Pascal Institute, Paris; John Diebold (US) management consultant, New York; W. Grey Walter (UK), director of the Physiology Department of Burden Neurological Institute, Bristol. Administrator: M. Josse Lemaire (Belgium), director of the Economic, Social and Cultural Office of Namur Province, Namur.

All inquiries should be addressed to the permanent secrétariat of the Association, 13 rue Basse-Marcelle, Namur.

Titanium Oxide Prices Up

Laporte Titanium Ltd. announce that basic selling prices for their standard range of titanium oxide pigments were increased on 1 April by the following amounts:

Runa R. H. and Runa R. G., £12 per ton; Tiona G, Tiona W. D., and Tiona S, £14 per ton; Tiona 80, £14 per ton; Tiona 50, £12 per ton; Tiona 25 £10 per ton; Tocarba 25, £10 per ton.

AEA Award Pipework Contract

A contract for the installation of pipework at the atomic plant at Springfields, near Preston, has been awarded to Mitchell Engineering Ltd. by the Atomic Energy Authority.

Overseas News

SOME US CHEMICAL PRICES RISE: MORE INCREASES EXPECTED

IN THE April issue of *Baird-facts* digest it is suggested that price and supply-demand of ethanol in the US will be stable until the latter part of the year when a price increase is expected.

A recent rise of $0.01/lb. in the price of polyester resin by one company is expected to become industry-wide in the near future. There has been persistent talk also that a price rise in sodium phosphate will occur shortly. The price of phthalic anhydride is steady and demand is stated to be improving.

It is suggested that there is now surplus capacity for sulphuric acid. Prices have not been increased since 1953 but as production and shipping costs are now higher a price increase is expected this year.

US chemical industry increased sales by about 9 per cent over 1956 figures in the first quarter of this year, according to this April issue of *Baird-facts*. Price increases for many chemicals account for much of the rise and, in recent weeks, it is stated there have been signs of a renewed climb in chemical prices. For some chemicals, such as sulphur, only the pressure of severe competition (Mexico, in this case) is considered to be preventing increases.

Chemicals which increased in price are: salicylic acid, melamine urea resins, barium carbonate, barium chloride (anhydrous) tetraethyl lead, sulphur (mono- and di-) chlorides, urea, xylol, carbon tetrachloride, perchloroethylene, trichloroethylene, methyl and methylene chlorides, p-phenetidine and phenothiazine NF. Reductions in price have been announced for trimethylamine, aniline, lithium hydroxide and piperazine.

It is suggested in this digest that US imports of high priced products (dye and dye intermediates, medicinals, plastics and some synthetic fibres) will increase as foreign capacity expands.

Du Pont of Canada

Last year Du Pont Co. of Canada spent about $11 million on construction. Among the new plants brought into production was the Freon fluorinated hydrocarbons and refrigerant and propellent plant at Maitland, Ont. Total sales were valued at $66,600,000 ($65,460,000).

Venezuela Petrochemical Plant Planned

Establishment of a state-owned petrochemical plant is planned for Venezuela. This will involve a total investment of 1,000 million bolivares and will be carried out in three stages. The first stage includes basic units for the manufacture of explosives and solvents, together with the completion of factories for producing caustic soda, chlorine and fertilisers. The second stage, scheduled for completion by the end of 1958, involves the completion of the explosives factory and factories producing insecticides, fungicides and weed-killers, together with an oil refinery and a network of pipelines. The third stage includes synthetic rubber and plastics plant and is expected to be completed by the end of 1960.

Pakistan Plans to Lift Fertiliser Subsidy

While the subsidy on fertilisers is being continued at present it is understood that it is the aim of the Government of Pakistan to remove it. It is not thought, however, that this will occur until the two fertiliser factories which the Pakistan Industrial Development Corporation is to set up, come into full production.

The Pakistan Minister of Finance, referring to the Government's plan to set up a fertiliser factory in each wing of Pakistan, has said that the capacity of each of these factories will be 200,000 tons per annum; they will produce urea and ammonium nitrate.

New Refinery Planned for British Columbia

Plans for the construction of a multi-million-dollar refinery at Port Moody, near Vancouver, British Columbia, have been announced by the British-American Oil Co. It is understood that the refinery will have a daily capacity of 20,000 barrels, and will serve the growing Vancouver and Pacific Coast markets with a complete range of petroleum products.

The refinery will be completely integrated. Main installations will include catalytic cracking, catalytic reforming and alkylation units, topping and vacuum facilities. The contract for building the refinery has been awarded to Canadian Kellogg Co. Preliminary construction is already under way and it is hoped the refinery will be completed by late next year.

Fluid Bed Reactors Installed at Battelle

A pair of four-foot-diameter fluid bed reactors suitable for ore roasting on a tonnage basis has been installed at the pilot plant laboratory of Battelle Institute, Columbus, Ohio, US. The two reactors can roast ores in one or two stages in either oxidising or reducing atmospheres and they accept either solid or slurry feed. The units are believed to be the largest roasters of their kind available for research on behalf of industry and government.

The roasters will be used in flexible pilot plant-scale experimentation preparatory to the actual design of full scale ore treatment plants. They will thus complement present Battelle fluid bed reactors used in bench-scale and small-scale laboratory research. The reactors were built by Battelle and equipped with instruments for measuring and controlling such important variables as temperature, pressure, gas flow, and gas composition.

According to Mr. F. M. Stephens, head of Battelle's extractive metallurgy group, reactors such as these are assuming increased importance in ore treatment as the need for using lower grade ores and more chemically complex ores accelerates the trend from physical to chemical ore treatment. Roasting, which, for instance, can convert a sulphide ore to an oxide or sulphate, makes the ore more amenable to leaching procedures. Fluid bed reactors, which provide close control of both temperature and atmosphere, yield a uniform end product.

Italy to Prospect for Uranium

Societa' Ricerche Impianti Nucleari (SORIN), floated jointly by Fiat and Societa' Montecatini for the purposes of prospecting for uranium and exploiting it industrially, has decided to increase its original capital of 100 million lire to 2 milliard lire This step is a preliminary to the intensification of prospecting in promising districts of Italy.

Goodrich's New Plant for Antioxidants

Organic chemicals such as antioxidants are to be produced by B.F. Goodrich Chemical Co., US, a division of B.F. Goodrich Co., at a $5 million chemical plant to be set up near Henry, Illinois, US.

Spanish Aluminium Oxide Deposits

New deposits of aluminium oxide are reported in Lower Aragon near the villages of Belmonte and La Carollera. It is claimed that the mineral extracted contains 48 per cent alumina.

Rumanian/Italian Agreement

Quotas have been announced for the goods to be exchanged by Italy and Rumania under a new protocol to the existing trade agreement. Yearly quotas in millions of lire are: Rumanian exports, butyl alcohol 30; miscellaneous chemical products 100. Italian exports, tanning extracts 100; citric and tartaric acids 10; titanium dioxide 40; sodium cyanide 25; furfuraldehyde 60; organic and inorganic chemicals 150; sulphur 200; organic and inorganic colouring materials 200; mercury 40; barytes 20.

Record Sales by Olin Mathieson

Consolidated net sales of Olin Mathieson Corporation in the US and Canada increased by 6.5 per cent in 1956 to a record high of $596,673,005. Sales in 1955 totalled $560,480,335. Net income of the firm increased from $44,558,102 in

1955 to $44,791,071 in 1956. These results do not include sales of $48,519,075 from operations in foreign countries other than Canada. Earnings of $1,484,868 from foreign operations were retained abroad and are not included in the 1956 figures.

Capital expenditure on new plant and equipment totalled approximately $49,000,000 during 1956. These funds were expended to complete a new cellophane plant at Olin, Ind.; to double chlorine and caustic soda capacity at the McIntosh, Ala. plant; and to build new explosives facilities near Marion, Illinois; new aluminium fabricating facilities at Omal, Ohio, and new pilot plants and expanded research facilities for nuclear and high energy fuels operations.

Shell of Canada to Produce Epoxy Resins

A $1 million epoxy resins plant is to be built by Shell Oil Company of Canada alongside its Montreal chemical plant. Construction is to be begun at once. It is intended that it will produce enough resins to supply Canada's present and anticipated future demands.

Engineers from the Shell Co. have designed the plant which will be made by Refinery Engineering of Toronto, and will be completed within a year.

Rise in West German Chemical Exports

Exports of West German chemical products last year were worth about £325 million, or 15 per cent more than the previous year. This is stated by the Chemical Industry Federation, Frankfurt. The biggest increase was in pharmaceuticals, with a rise of 25 per cent to £29 million.

Dow Chemical Announce Styrene Price Cuts

Prices of high specification styrene, which is used in the production of polystyrene and styrene copolymers, will be reduced by Dow Chemical Co., US, as from 1 July.

Potentialities of Rhenium

Research now being carried out at the University of Tennessee, Knoxville, Tenn, US, on the rare metal rhenium, indicates that the metal may be of importance in industry. Rhenium, first manufactured in a pure form by the Tennessee chemists, has already been proved very hard and dense and second only to tungsten in ability to withstand high temperatures. Research is now being directed to its corrosion resistant properties.

According to Prof. M. J. Joncich who is directing the research, even though rhenium melts at a slightly lower temperature than tungsten, it is stronger than that metal at very high temperatures and it can be made harder than any other metal.

At the present time, however, the main obstacle to commercial use of rhenium is the lack of a convenient source and its cost. In its purest form rhenium sells at about $3.80 to $4.00 per gram, which makes it more costly than gold.

Rhenium usually occurs in certain copper ores in concentrations of only a few parts per million. Pure rhenium was first extracted by the Tennessee chemists in 1945 from the flue dust of copper-producing plants.

US to Stage International Symposium on Gas Chromatography

The analysis instrumentation committee of the Instrument Society of America is to hold its first three-day international symposium on gas chromatography at the Kellogg Centre for Continuing Education, East Lansing, Michigan, from 28 to 30 August. The symposium is to be directed toward discussion of theoretical and practical advances in the field of gas chromatography as it applies to both laboratory analysis and industrial process control.

Contributed papers relating to specific major or minor advances in gas chromatography are now being solicited by the programme chairman, Mr. Vincent J. Coates, Perkin-Elmer Corporation, Norwalk, Connecticut.

Du Pont Announce First of New Selective Solvents

A new solvent, so selective it cleans sound film without damage to the magnetic sound track yet safer and more efficient than solvents now commonly used, has been developed by the Du Pont Company. Known as Freon TF, it is the first of a series of selective solvents soon to be announced by the company.

Since it is chemically inert and virtually non-toxic, Freon TF can be used safely under normal ventilating conditions and without fear of explosion or fire from electricity.

Goodrich Close Synthetic Rubber Plants

Synthetic rubber plants of Goodrich-Gulf Chemicals at Port Neches, Texas, has been closed and the 400 hourly-paid workers paid off as a result of a strike now in its second week. The plant has an annual capacity of 100,000 tons.

Danish Gas Works Still in Difficulties

Further to our report that A. P. Moller's pyrolytic gas works at Amager (CHEMICAL AGE, 23 March, 572) was now in operation, it is learned that technical difficulties have occurred again and operations have stopped once more.

Japan's Chemical Export Target

According to an announcement by the Trade Ministry, Tokyo, Japan has set herself an export target of 150 million dollars' worth of chemicals for the financial year 1957/58. This compares with a target of 120 million dollars' worth in 1956/57 although actual exports were only 101 million dollars in that year.

Reasons advanced for the failure to reach last year's target are that fertiliser shipments (which accounted for nearly half of the total chemical exports) had to be restrained due to increased domestic demand. Also Communist China did not buy as heavily as was expected.

Other main chemicals exported are dyestuffs, medicines, soda and plastics. These are exported principally to South-East Asia, Nationalist China, South Korea, Communist China and South America.

US Sodium Silicofluoride Plant Now ot Stream

A new sodium silicofluoride plant, built at a cost of more than $750,000 is now in full production, state the Olin Mathieson Chemical Corporation, New York. Adjoining the high analysis Ammo-Phos fertiliser plant of the company's plant food division, the new unit recovers fluorides from phosphoric acid manufactured at this location.

Sodium silicofluoride is used principally for the fluoridation of municipal water supplies, as a laundry scouring agent, as an ingredient of insecticides, and in the manufacture of elemental aluminium and ceramic glazes.

Ammonia Plant for Puerto Rico

From San Juan, Puerto Rico, have come reports of an ammonia plant at Guanica which is now on stream. The plant has been set up by Gonzalez Chemical Industries, a new Puerto Rican company with heavy US private financing. Estimated production of the plant is 40,000 tons of anhydrous ammonia annually. There is also to be a sulphuric acid unit at Guanica which is expected to turn out 115,000 tons of sulphuric acid annually, its main end product being 130,000 tons annually of ammonium sulphate.

Italian Co-operation with Japanese Chemical Industry

It is reported that a large Italian chemical concern has signed an agreement with the Japanese Mitsubishi Kasei whereby Italian technicians will co-operate in organising in Japan the production of synthetic urea and ammonia. The same Italian firm is expected to sign soon a similar agreement with the Japanese firm Edogawa concerning the production of synthetic metonol.

Agency Inquiry

Carst and Walker (Pty.) Ltd., PO Box 5500, Johannesburg, are anxious to obtain the representation of UK firms manufacturing: Phenothiazine — drench grade; pentaerythritol; and maleic anhydride. Manufacturers should write direct to Carst and Walker.

Bayer Raises Dividend

Bayer chemical combine of Düsseldorf, Germany is raising its dividend from nine to 10 per cent. The company is also planning to raise its capital from DM 550 million to DM 750 million.

CHEMICAL PIONEERS

5 Macintosh

The fifth article in this series on the pioneers of the chemical industry deals with Charles Macintosh. The author, Dr. D. W. F. Hardie, the well-known historian of the Industrial Revolution and of the chemical industry, describes Macintosh here as 'the greatest of the early pioneers.'

IN JEST, W. H. Wollaston referred to his friend Charles Macintosh as 'the great chemist,' because of the scale of his operations. In a more serious sense, however, Macintosh's achievements fully justified the appelation; indeed, it is not too much to say that, not only in his manufacturing activities, but in his consciousness of the nature and potentiality of chemical industry, he was the greatest of the early pioneers.

Charles Macintosh was born in Glasgow on 29 December 1766. His father, George Macintosh, a Highlander who had migrated to the city in his youth, was then a successful mass-producer of shoes for the American colonial market. While his son Charles was still a boy, destruction of the market for shoes, resulting from the revolt of the American Colonies, led George Macintosh to embark upon the manufacture of cudbear, a natural dyestuff derived from lichens by digestion with lime and ammonia. Later, with David Dale, he introduced the continental method of Turkey red dyeing into this country. In both these near-chemical activities Macintosh senior was entirely successful.

Interest in Technology

Charles Macintosh was thus from his earliest years in an environment likely to arouse his interest in technology, and it was for a career as an industrialist that George Macintosh carefully prepared his son. Charles received his first schooling in Glasgow and subsequently transferred to a private academy at Catterick Bridge in Yorkshire. Returning to Glasgow, he studied chemistry at the University under William Irvine, a chemist interested in the industrial application of his science; later, he proceeded to Edinburgh, where for a time he sat under the great Joseph Black.

While attending Irvine's classes, Macintosh was also being initiated into commercial procedure in the counting-house of his father's friend, John Glassford, then the most important financier in the city. Young Macintosh, in 1786, began, in association with Dr. William Couper, a Glasgow medical man, to manufacture sal ammoniac on a small scale from soot. The sal ammoniac produced was in part sold to local metal industries and in part used as a source of the ammonia required at his father's cudbear works, where it had hitherto been obtained from urine.

His father's interest in dye-making caused Charles Macintosh at this time to investigate the possibility of producing from the plant dog's mercury a blue colouring matter to replace indigo. In 1786 he made the first of his five extended visits to the Continent; there, besides continuing his search for a new source of blue dye, he attempted to find markets for Prestonpans vitriol, learned the French language, and became acquainted with several aspects of continental chemical manufacture, in particular the making of sugar of lead.

Charles Macintosh, F.R.S.

After his return to Glasgow Macintosh introduced the Dutch process for lead acetate there, and soon he was exporting a superior product to Holland. In 1789 he began manufacture of acetate of lime as a cheaper mordant than the lead salt. As a consequence of the American Revolution the former monopolistic exploitation of the colonial market had given place to a trade in imported cotton and investment in its manufacture in the Clyde region. With the growth of this cotton manufacture arose an increased demand for mordants. With his friends, James Knox, John Finlay, John Wilson, and Charles Stirling the calico-printer, Charles Macintosh, in 1797, began manufacture of alum from shale waste at Hurlet, near Paisley. The rise of cotton manufacture had the effect of increasing the difficulties of the bleachers, whose greens could not readily cope with the greatly increased output of the mills. As we have seen, (CHEMICAL AGE, 16 March, 468) Macintosh was associated with Charles Tennant in the introduction of chlorine bleaching at St. Rollox, where he made his most important chemical invention—bleaching powder.

In 1805, Macintosh and his alum-manufacturing partners extended operations to a new works at Campsie in Stirlingshire. Here Macintosh proceeded to produce, in addition to alum, most of the principal chemicals in demand at that phase of the Chemical Revolution. Using kelp as raw material, he produced refined soda ash for the bleacheries and extracted the potassium chloride required for his alum. From byproduct iron sulphate from shale he made Prussian blue and pure potassium prussiate (ferrocyanide), of which latter commodity he was for many years the only manufacturer in Britain. He invented, also, at this period, a process for applying Prussian blue in calico printing by forming the pigment *in situ* on the fabric.

George Macintosh died in 1807, and Charles Macintosh took over the manufacture of cudbear at the Dunchattan factory in Glasgow. The first gasworks in Glasgow began operations in 1819, and Macintosh used its byproduct tar as a source of ammonia for cudbear-making. In distilling the tar he obtained 'coal oil' (naphtha). He began to experiment with the application of naphtha solutions of rubber to various fabrics, and was thus led, in 1823, to invent his two-layer textile, 'impervious to water and air'—the fabric of the 'mackintosh,' the invention which has given his misspelt name to our language.

It is impossible here to do more than indicate the diversity of Charles Macintosh's inventive genius. To the East India Co. he proposed the casting of nitre in the form of hexagonal ingots to save shipping space and to replace wasteful iron ballast, and he suggested that lime juice should be imported in concentrated form to inhibit its fermentation in transit. The use of metallic poisons to prevent fouling of the hulls of ships, forger-proof banknotes, the Twaddell hydrometer, and the use of carburetted coal gas for converting iron into steel were among his minor inventions.

Charles Macintosh died on 25 July 1843. His lifetime thus extended into the period when the rising chemical industry was dominated by the large-scale manufacture of sulphuric acid and LeBlanc soda. While, as his writings show, he was fully aware of the significance of these developments, declining health caused him to live a country life and to turn his interest to agriculture, which he also approached in scientific fashion. Macintosh's intellectual horizons were wider than those of most of his chemical industrial contemporaries. A Fellow of the Royal Society, he had contacts with many of the eminent scientific men of his time; abroad, he had made friendships with such men as Gay Lussac, Vaquelin, and Thénard.

Argentine Graduates Visit Shell and ICI

A PARTY of 22 Argentine chemistry graduates of the University of Buenos Aires under the leadership of Dr. Gini Lacorte are now in Great Britain where they are visiting industrial plants laboratories and experimental stations of Shell and Imperial Chemical Industries. Their stay is scheduled to last for 10 days. The tour has extended to the Continent, where Italy, France and Switzerland have been visited. After leaving England, the party will spend a few days in Holland and will visit the Amsterdam laboratories of the Royal Dutch/Shell Group. Dr. Lacorte is professor of industrial chemistry at the University of Buenos Aires and director of the chemical industry division of the Argentine Ministry of Industry.

Chemist's Bookshelf

US ROLE IN PETROCHEMICALS

THE CHEMISTRY OF PETROCHEMICALS. By *Melvin J. Astle.* Reinhold Publishing Corp. Inc., New York. Chapman and Hall Ltd., London. 1956. Pp. 267. 52s.

Apart from its widespread applications as a fuel, petroleum must now be regarded as a very important chemical intermediate, surpassing coal tar in importance. Professor Astle estimates that by 1965 one-half of the chemicals being produced will be supplied by the petrochemical industry. The phenomenal rate of progress of this industry is obvious when it is considered that in 1920 the amount of chemicals made from petroleum was scarcely significant. Much of the impetus in this development has arisen because the demand for organic chemicals for use in the production of various new synthetic rubbers, plastics and textile fibres could not be met from existing sources of supply.

The petrochemical industry is very largely based upon natural supplies of petroleum, but it is also possible, using the Fischer-Tropsch process, to produce 'synthetic' petroleum from carbon monoxide and hydrogen. This latter mixture can be used either as a fuel or for the production of chemicals. In his opening account of the synthesis of paraffin hydrocarbons the author deals with recent developments in the Fischer-Tropsch process, which he considers to provide an excellent source of organic chemicals. Some of the main reactions (oxidation, halogenation and nitration) undergone by paraffin hydrocarbons are reviewed and the important results obtained by the cracking and dehydrogenation of these compounds are considered.

Important Olefins

Olefins which result from this process are of considerable commercial importance and their reactions are extensively described; these include polymerisation and alkylation. Later in the book there is also a chapter on the oxides of olefins. The most important diolefin, butadiene, which is used in the production of synthetic rubbers, is usually obtained by the catalytic dehydrogenation of n-butylenes. The latter are themselves obtained by the cracking of high molecular weight hydrocarbons or by the dehydrogenation of n-butane.

The author includes an account of the chemistry of acetylene, which is probably not commonly regarded as a petrochemical, although it can be produced from paraffin hydrocarbons. Acetylene is, however, of increasing value as a chemical intermediate, and the vinyl compounds produced from it are of great importance in the preparation of various plastics and synthetic textile fibres.

Cycloparaffins or naphthenes, and aromatic hydrocarbons are also dealt with. Until recently coal tar was the only source of the latter, but the pressure of demand made production from petroleum necessary, and about 90 per cent of xylene and 70 per cent of toluene are now obtained from the latter source. The petrochemical industry is also responsible for the production of substantial quantities of simple organic compounds, such as alcohols, ethers, aldehydes, ketones, acids, esters, amines and nitriles. The account of the preparation and properties of these compounds illustrates the hold that the petrochemical industry has established in the manufacture of these products.

The US has taken a leading part in the development of the petrochemical industry and it is therefore appropriate that an account of the chemistry of petrochemicals should be written by an American. It is difficult, however, to avoid the conclusion that Great Britain has lagged sadly behind in this field, and if Professor Astle's interesting account is capable of stimulating greater interest in this country in the use of petroleum as a chemical intermediate it will have served a valuable function.

G. S. EGERTON

A German Reader

ANORGANISCHE CHEMIE, By *W. Klemm.* Sammlung Goschen Vol. 37. 9th edition. Verlag Walter de Gruyter and Co., Berlin. 1956. Pp. 184. Figs. 18. DM 2.40.

This little paper-bound book is a general elementary introduction to inorganic chemistry, the standard being about general certificate level. Thus, about two pages are devoted to the periodic system, eleven to the nitrogen group of elements and seven to the alkali metals. The treatment is, on the whole, refreshing. There is a rational approach, and the book is primarily concerned with inorganic chemistry and not with industrial chemistry, so that there are none of the complex and somewhat incomprehensible diagrams of intricate machinery which the average schoolboy cannot resist reproducing with varying degrees of inaccuracy.

Most of the elements are mentioned, a paragraph or two being devoted to practically all of the less familiar ones. There is reference to modern concepts such as the hydrogen bond, though naturally these are not treated in detail.

The language is simple and clear. Consequently, although the book will have no appeal in this country as a basis for the study of chemistry, it would provide a first-rate means of brushing up the average chemist's knowledge of German chemical usage.

C.L.W.

Co-ordination Chemistry Reviewed

THE CHEMISTRY OF THE CO-ORDINATION COMPOUNDS. Edited by *J. C. Bailar, Jr.* American Chemical Society Monograph No. 131. Reinhold Publishing Co., New York. Chapman and Hall Ltd., London. 1956. Pp. x + 834. 148s.

This ACS monograph represents the most up-to-date and thorough survey available at the present moment of the chemistry of co-ordination compounds. The subject matter represents the accumulation of evidence and opinions of 24 experts within selected fields of reference. There has been a certain amount of duplication, but not sufficient to be seriously criticised. The book starts with a preliminary survey of the whole field and subsequently surveys modern theories. A special chapter is devoted to chelation and another to the formation of large rings. Considerable attention is focused on the stereochemistry of co-ordination compounds. The stabilisation of valency states receives special attention. Among other subjects, organic molecular compounds, metal carbonyls and nitrosyls, olefin complexes and the polyacids are revised and discussed. The closing sections of the book are concerned with more practical applications of co-ordination compounds e.g., physical methods in co-ordination chemistry, co-ordination compounds in analytical chemistry, electrodeposition and water softening, co-ordination compounds in the dyestuffs industry, and their importance in natural products.

All the most important aspects of the chemistry of these substances are covered in this work and it opens up the way to the relevant literature by citing over 5,000 references. Co-ordination compounds are of prime importance in many branches of chemistry, metallurgy, biochemistry, medicine, botany etc., and the many workers in these fields will undoubtedly find much that is helpful and stimulating in this treatise.

Each user of the book will see it through different eyes, and because of this there are likely to be several conflicting opinions expressed by different reviewers. From the point of view of the analytical chemist, this book is very welcome indeed. The treatment of the theory of heterocyclic ring formation and the stabilisation of unusual valency states is excellent and the account given of the electron-pair bond and its relation to the structure of co-ordination compounds will be appreciated by many who are less familiar with modern theories.

The review of the application of physical methods to co-ordination compounds is all too brief and it is to be hoped that this aspect may receive greater attention if a further edition is contemplated. The treatment of co-ordination compounds in analytical chemistry is somewhat stereotyped in view of the many books in existence on the application of organic reagents to inorganic analysis. A different approach which is less qualitative and more concerned with the physicochemical interpretation of the subject matter would have been more in keeping with the specialist nature of the book. On

the other hand, for the non-specialist in analytical chemistry, this particular chaper is an excellent account of the application of chelation and co-ordination to this most vital branch of chemistry.

From a student's point of view, and indeed from the younger research worker's viewpoint, the book is prohibitively expensive, but it is a work which must be regarded as being absolutely essential for the bookshelf of chemical libraries and research laboratories concerned with co-ordination compounds. T. S. WEST

Importance of Clean Air Recognised

AIR POLLUTION HANDBOOK. Edited by *P. L. Magill, F. R. Holden,* and *C. Ackley.* McGraw-Hill Publishing Co. Ltd., London. 1956. Pp. xi + 698. 112s. 6d.

Of recent years there has been a welcome if belated recognition in administrative as well as technical circles of the importance of clean air culminating in this country with the so-called 'Clean Air' Bill. Much remains to be done both by legislation and by propaganda but among the first essentials is a proper understanding of the problem and its scientific analysis and correction. It is most timely therefore that the latest McGraw-Hill handbook should be devoted to the subject of air pollution.

This book is divided into 14 sections, each of which stands on its own but at the same time may be regarded as being part of a broader division. It comprises the statement of the problem in sections 1 and 2 from the point of view of the householder to that of the industrialist, the science of air pollution in sections 3 to 6, the effects of air pollution in sections 7 to 9, and the methods and techniques of overcoming or ameliorating pollution in sections 10 to 14.

31 Contributors

The subject matter has been contributed by 31 leading people in the various fields covered, and is well arranged and indexed.

Naturally, the emphasis throughout is on US conditions, practice and legislation. Nevertheless the subject matter is generally applicable in this country and the usefulness of this book should not be thought to be materially diminished because of its American origin. Of particular value is the collection within one volume of important field and laboratory data from a remarkable variety of sources. The references at the end of each chapter are very extensive and remarkably up-to-date.

In short this is well up to the high standard that have gained for other handbooks published by this company the familiarity of being called the technical man's 'bible.' It is well produced and printed and has clear illustrations. The only complaint that this reviewer has is the use of the decimal system for numbering diagrams and pages which appears in this particular book to have even less to commend it than usual and which made the finding of the number of pages depend upon a long (and probably incorrect) addition. D.C.F.

Chemist's Bookshelf

TRANSITION ELEMENT CHEMISTRY

TREATISE OF INORGANIC CHEMISTRY, Vol. II. By *H. Remy.* Translated by *J. Anderson.* Edited by *J. Kleinberg.* Elsevier Publishing Company, Amsterdam. Cleaver-Hume Press Ltd., London. 1956. Pp. xxviii + 800. 105s.

The first volume of this work has already been reviewed in this journal (CHEMICAL AGE, 16 June 1956, p. 1335) and the general remarks about the presentation and the high quality of the translation apply equally to this volume. Like Vol. 1, the book is printed on paper of such high density that the volume turns the scales at nearly 3½ lb. In addition, the very high glaze makes the book rather trying to read owing to the dazzle from reflected light.

The topics dealt with are primarily the transition elements, related subjects such as the general properties of metals, and radioactivity, and a number of independent topics such as geochemistry, and reactions in non-aqueous solvents and in the solid state.

Considering how the subject of inorganic chemistry is changing at the present time, this volume seems reasonably up-to-date, but there are curious omissions in the bibliographies at the end of each chapter. Thus on p. 86 *Hartstoffe und Hartmetalle* by Kieffer and Schwarzkopf is mentioned, but English-speaking readers would have been interested to know that an American translation is available. Useful reviews or books on zirconium, titanium, chromium, tungsten and manganese, which have appeared over the period from 1946 to 1955, have received no mention. Shand on *Rocks for Chemists* might have been noted among suggestions for further reading.

Similar minor omissions, nonetheless striking, occur in the text, of which only a couple of contrasting examples may be instanced—lack of reference to the Caron process under nickel, coupled with no indication that the Orford process is now obsolescent; and some mention of the curious complexes formed between some metals and cyclopentadiene.

There does not appear to be any uniformity in the mode of presenting references in the text. These are indeed rather sparsely given, and those which are included are often limited to the author's name (with no initial) and the year, leaving the reader with the prospect of trying to trace them in *Chemical Abstracts* or elsewhere.

Nevertheless, this volume, like the first, contains a mass of useful information, and should find a valued place on the shelves of any chemical reference library. The sections on radioactivity and the transuranic elements are particularly attractive. The high price will, unfortunately, prevent the work from having any strong appeal (as a purchase) for the individual CECIL L. WILSON

Two CIBA Foundation Symposia

CIBA FOUNDATION SYMPOSIUM ON IONISING RADIATION AND CELL METABOLISM. Edited by *G. E. W. Wolstenholme* and *C. M. O'Connor.* J. and A. Churchill Ltd., London. 1956. Pp. 308. 45s.

A great many studies have been made on the alterations in gross cellular structure following the exposure of animals and plants to ionising radiation. There is available much information of the cytological and genetical effects. To date, the nature of biochemical changes following radiation remain a mystery. In the present Symposium some 18 papers were presented on the effect of ionising radiations on a number of metabolic activities, such as energy-producing systems, protein synthesis, nucleic acid synthesis and the metabolism of desoxyribosenucleic acid. One cannot say that radiation, directly or indirectly, damages an enzyme but it is felt that the possibility cannot be ruled out that enzymic damage is important in radiation damage.

The Symposium has served to bring together a great deal of information which was widely scattered in the literature. However, the basic problem in the field still exists, namely, that comparatively small doses of radiation produce marked biological changes, although rather large doses are required to produce observable chemical ranges. K. R. REES.

CIBA FOUNDATION SYMPOSIUM ON CHEMISTRY AND BIOLOGY OF PURINES. Edited by *G. E. W. Wolstenholme* and *C. M. O'Conner.* J. and A. Churchill Ltd., London. 1957. Pp. 327. 48s.

After a gap of half a century from 1945 onwards, there has been a renewed interest in the purines. Nucleosides and nucleotides have been the main group investigated in this country, whereas in the US workers have been interested in the simple purines and their analogues. One reason for the renewed expansion in this field has arisen from the discovery of vitamin B_{12} and its purine-containing analogues and of puromycin.

The discovery of trypanocidal and anti-tumour activity in puromycin may lead to the development of new chemotherapeutic agents depending on their purine structure. In the biochemical field there has been great progress in the enzymology of the synthesis of purines and the actual pathway of synthesis is now well established.

Reports in this Symposium bring together the current knowledge in this field in the clinical, biochemical and pharmaceutical sides. The Symposium is in no way a textbook on the purines but is an up-to-date report for the worker who has some previous knowledge of this field.—K. R. REES.

Chemist's Bookshelf

CHEMICAL PLANT PRACTICE

CHEMICAL ENGINEERING OPERATIONS. By *F. Rumford*. 2nd edition. Constable and Co. Ltd., London. 1957. Pp. 387. 32s 6d.

This book, now in its 2nd edition, appears to have had the measure of success it deserves. Its purpose is to provide an introduction to those processes which are peculiar to chemical plant practice, and its contents include reference to: chemical works pumping, heat transfer, distillation, gas absorption, extraction and adsorption, evaporation, drying, mixing, crystallisation, filtration, centrifuges, gas cleaning, size reduction, screening, classification and sedimentation, solid separation, weight and flow measurements, and automatic control.

The chapters on distillation and automatic control are supposed to have been rewritten, but few signs of this task can be detected. The treatment of the subject matter throughout is simple and concise, with emphasis on the practical aspects and only a brief introduction to the basic theories. Many worked examples are given.

Having digested the contents of this book, a student should be ready to tackle the more specialised publications on the subject. Unfortunately, the way has not been paved smoothly because the author has seen fit on numerous occasions to introduce his own system of nomenclature. For instance, λ is used for the activity coefficient in place of the more commonly used symbol γ. The overall gas transfer coefficient, long since denoted by K_G, now appears as K_A, the symbol K_G being used to denote the gas *film* coefficient.

There are already far too many 'recognised' symbols in use without the invention of new ones. A number of misprints were noted, e.g. p_2V^2 on page 76 should be ρ_2V^2, while the spellings 'impeller' and 'impellor' are scattered indiscriminately through the chapter on pumping. Nevertheless, the book can be recommended to those who desire an introductory text to the subject of chemical engineering. It makes a change these days to read a down-to-earth British approach to the subject, and no-one could grumble at the price. J. W. MULLIN

Unit Operations for Students

UNIT OPERATIONS OF CHEMICAL ENGINEERING. By *W. L. McCabe* and *J. C. Smith*. McGraw-Hill Publishing Co. Pp. viii + 945. 1957. 79s.

'Yet another book on unit operations—the mixture as before' is one's first reaction on seeing a new text on chemical engineering. What a remarkable commentary on the growth of the subject this is when one recalls that little more than ten years ago there were not more than two respectable text books on the subject. Of these one was the now classic Badger and McCabe, still the standby and 'swot' book of many a student.

In this, the most recent of the five or six texts to appear in the last few years, McCabe has a new co-author but this book is likely to become just as popular and widely used as the *Elements of Chemical Engineering* has been. If it does, it will be deservedly so for it would be quite unfair to dismiss this as just another book on chemical engineering. True, it has the usual list of subject headings but there are some subtle but important differences.

After an introductory chapter largely concerned with the basic principles of material and energy balance the reader is introduced to fluid mechanics, the treatment of which is notable for its early and clear exposition of elementary boundary layer theory. Throughout this chapter the emphasis on fundamental principles is strictly maintained, and the case of flow around solid spheres is followed logically by a treatment of flow through porous beds. In contrast, the next chapter which deals with the transportation of fluids is pre-eminently practical and has literally hundreds of drawings of various types of pipe fittings, valves, pumps, fans and blowers.

The next chapters are entitled size reduction, handling of solids, mixing and mechanical separations, the last containing an excellent introduction to filtration. Then follows a lengthy section on heat transfer which includes a useful introduction to the general problem of unsteady state heat transfer in solids and liquids. Again there are excellent descriptions of equipment which is also noteworthy in the next chapter, on evaporation.

The rest of the book (rather more than one third) is taken up with chapters on mass transfer processes. The essential unity of these is emphasised by an introductory chapter outlining types of processes, the idea of countercurrent flow and basic principles of phase equilibria, operating diagrams and diffusion. The treatment of the individual mass transfer operations follows along conventional lines under chapter headings of Absorption, Distillation, Leaching and Extraction, Crystallisation, Air-water-contact Operations and Drying. The treatment is always thorough, and up-to date design methods are presented.

At the end of the book there are 20 appendixes containing some useful tables of data, a humidity chart and a comprehensive index.

In their preface the authors state that they have deliberately retained the traditional approach of separate treatment for each unit operation. This appears on the surface to be the case but throughout the theoretical parts of the text it is clear that the traditional approach has been influenced by the strong present-day trend towards a more fundamental outlook which emphasises the few basic principles which underlie the study of unit operations. This approach advocated in recent British texts, notably that of T. K. Ross, has advocates in the US as is evidenced by the recent Department of Scientific and Industrial Research report on chemical engineering education in that country.

In conclusion, this book on unit operations may not be the most advanced text yet published but it is more than adequate for the second year honours or pass degree student and is written with such a clear and lucid style that it must commend itself not only to all students but equally to teachers who can depend upon it to relieve them of much of the drudgery and waste of time involved in descriptive lectures. The book is produced in the usual excellent manner and high quality finish associated with this series of texts. D.C.F.

Colorimetric Methods

COLORIMETRIC ANALYSIS. Vol. 1. 2nd Edition. By *H. L. Allport* and *J. W. Keyser*. Chapman and Hall Ltd., London. 1957. Pp. 424. 50s.

In view of the ease of application and the very small quantities that can be measured, colorimetric methods have been particularly useful in clinical and biochemical analysis. In this volume the authors describe the analysis of some hundred substances such as metabolic intermediates, trace elements, amino acids, hormones and some drugs present in a range of biological material. Under the section on each substance there is some discussion in which the possibilities and limitations of the various tests are assessed. This is a collection of methods already available in the literature but the authors have reduced these methods to a form which permits the worker to apply the techniques directly.

Discussion of theoretical considerations and of colour-measuring instruments have been omitted from this edition. There is an additional appendix describing the principles and relevant references to the analysis of some 35 other compounds. There has been no attempt at classification in this edition other than to list the compounds alphabetically. This book should prove to be a first-rate addition to biochemical and clinical pathologist laboratories.

K. R. REES.

Organic Structure

INTRODUCTION TO STRUCTURE IN ORGANIC CHEMISTRY. By *C. K. Ingold*. G. Bell and Sons Ltd., London. 1956. Pp. vii +200. 20s.

This volume is a reprint of the first four chapters of Professor Ingold's *Structure and Mechanism in Organic Chemistry* (G. Bell and Sons Ltd., 1953), a treatise which has already found a place as one of the classics of organic chemistry. The reprinted chapters deal with the general principles of molecular structure from the organic chemist's point of view, and in the larger volume they logically precede 11 others which are concerned with the mechanism of organic

reactions. The publication of the four opening chapters as a separate volume is amply justified by the fact that Professor Ingold's fundamental discussion of organic structures provides a general introduction to the theory of chemical structure, which is suitable for students of physical chemistry as well as for organic chemists.

The four chapters in this volume (valency and molecular structure, interactions between and within molecules, physical properties of molecules, the aromatic nucleus) are all masterpieces of incisive thinking, and they will be read and re-read with pleasure and profit by chemists of all ages. The first year students for whom this reprint is intended may find the breadth of Professor Ingold's treatment a little terrifying, but they will also find an intellectual beauty which is lacking in more elementary texts on chemical structure.

PETER SCHWARZ.

SLTC Symposium at Cambridge

THE CHEMISTRY OF THE VEGETABLE TANNINS: A SYMPOSIUM. Society of Leather Trades' Chemists, Croydon. 1956. Pp. 160.

This volume is a collection of 12 papers on the chemistry of the vegetable tannins given at Cambridge last year, under the aegis of the Society of Leather Trades' Chemists, who arranged the symposium.

In his opening remarks, Professor Haworth referred to tannin chemistry as having become, since Fischer's pioneer work, one of the 'untidy corners of organic chemistry,' and it is true that there have been few monographs on the tannins, most of the original work on them appearing in scattered journals throughout the world. In view of their commercial importance to the leather industry and the part they play in many foodstuffs and drinks, it is gratifying to receive a volume which establishes the fact that this particular corner is quickly being tidied up, and the SLTC is to be congratulated on bringing together so many workers in this field.

Methods of Analysis

There was no intention on the part of the organisers to allow any time to be devoted to tanning as such, and although four of the papers emanated from organisations connected with the leather industry, all are devoted to the chemistry of the tannins themselves, or their precursors in the plant. The contributions emphasise that their structure is far more complicated than was realised even 20 years ago, and although considerable progress is being made in the identification of specific nuclei and components, largely due to the development of methods of analysis such as paper chromatography, room remains for considerable speculation on many aspects of their bio-synthesis and structure. The merit of this publication is that it provides a first-rate summary of knowledge to date (with an extensive bibliography), and a detailed survey of the latest work in this fascinating field. J. P. DANBY

Chemist's Bookshelf

POLLUTION PROBLEMS DISCUSSED

ASPECTS OF RIVER POLLUTION. By *Louis Klein*. Butterworth Scientific Publications. 1957. Pp. xii + 621. 84s.

The modest title of this book gives no indication of the wealth of information it contains, much of which is not readily available elsewhere. How many of us have intended to compile a notebook of useful information, under carefully chosen headings and with a comprehensive index for future reference: how few of us have ever done so! We need have no more regrets. Dr. Klein has not only done it for us, he has done it a good deal more thoroughly than we should have done, and probably from a wider reading.

Valuable as such a compilation would be, it is here incidental to a full and lucid exposition of fundamental principles, with illustrations and interpretations of stream phenomena based on the author's own long observations and experience with the Manchester Rivers Department, the old Lancashire Rivers Board, and the present Mersey River Board. Here then, invaluable as it will prove for that purpose, is no mere textbook, but an indispensable work of reference which will stimulate further thought and be of permanent service to all who have pollution problems to solve, whether they be chemists, biologists, engineers, industrialists or administrators. Moreover it should prove extremely attractive reading, even to the non-specialist.

As Dr. Klein would be the first to declare, the value of the book is greatly enhanced by the authoritative chapter on 'Fish and river pollution' by Dr. J. R. Erichsen Jones, and by that on 'Biological aspects of river pollution' by Mr. H. A. Hawkes. These chapters are no mere addenda, but form an integral part of the book.

Dr. Klein's own contributions include chapters on the causes, nature, effects, and legal aspects of pollution, and on its detection, assessment and abatement. The work is abundantly documented, with an index covering almost 1,500 separate entries, in addition to comprehensive bibliographical references at the end of each chapter. A random check on both these failed to reveal any inaccuracies. At first sight the price might appear to be a little high, but a few minutes' acquaintance with the book will convince the reader that here indeed is value for money.

Unfortunately the paramount importance to the whole community of the need to conserve its water resources is not yet adequately recognised. The publication of Dr. Klein's book is most opportune and in writing it he has done signal service in a vital cause. M. LOVETT

Chromatography of Racemates

FORSCHUNGSBERICHTE DES WIRTSCHAFTS- UND VERKEHRSMINISTERIUMS NORDRHEIN-WESTFALEN. No. 270. Die Trennung von Racematen auf Chromatographischem Wege. By *H. Krebs*. Westdeutscher Verlag, Cologne. 1956. Pp. 49. DM 12.95.

The resolution of racemates of optically active compounds is not only of considerable academic interest, but is also of importance in industry, especially in the field of pharmaceuticals. One method of resolution which has recently aroused considerable interest involves chromatography of the racemate on an optically active adsorbent; the simplicity of this technique suggests that it may become valuable on an industrial scale. This booklet describes research, recently carried out in the University of Bonn, which throws light on some of the possibilities of the above method of resolution.

The author and his collaborators have shown that many octahedral complexes of metals can be conveniently resolved by chromatography on ordinary potato starch. They have also extended this technique to a number of purely organic compounds, and their results confirm previous studies which indicate that successful resolution generally depends on the presence of three active groups which become simultaneously attached to the adsorbent.

However, it was found that resolution can sometimes be achieved even in the absence of 'three point attachment', provided that the asymmetric carbon atom carries large, rigid substituents as well as a polar group. This is clearly of considerable interest, because it suggests that racemates which resist resolution by chromatography may often become resolvable after the introduction of bulky substituents.

The booklet also contains a brief, critical survey of other methods of resolution. J.C.P.S.

Not So Sceptical Chymists

ALCHEMY. By *E. J. Holmyard*. Penguin Books Ltd., Harmondsworth, Middlesex. 1957. Pp. 281. 3s 6d.

The history of alchemy is traced from its beginnings in China and Egypt to its final demolition by the publication of Boyle's *The Sceptical Chymist* in 1661.

Alchemy, says Dr. Holmyard, is both an exoteric and an esoteric subject. Outwardly it is merely an attempt to transmute base metals into gold and to discover the elixir of youth. Eventually, however, it became a system of thought in which alchemical terms were regarded as symbols of religious beliefs.

Dr. Holmyard is well known as an author and as an historian.

J.P.S.J.

BALFOUR GROUP PLAN NEW RESEARCH AND DEVELOPMENT LABORATORIES AT LEVEN

NEW RESEARCH and development laboratories are planned by the Balfour group of companies, specialists in the design, development and manufacture of chemical plant, on a 25-acre site at Leven, Fife. The site is adjacent to the existing works of the parent company, Henry Balfour and Co. Ltd.

It is anticipated that the future expansion of the seven companies in the group will take place on this site.

The initial building will be specially designed and laid out to co-ordinate current development projects and to allow for the housing of equipment from several existing laboratories within the group.

Qualified chemists and chemical engineers, already operating in existing laboratories, will be engaged in research, and this staff will be augmented to take care of the greater range of work which it is anticipated will be undertaken.

The main bay will contain a range of pilot plant and equipment for the processing of materials from which design data can be obtained in the fields of evaporation, drying, distillation, extraction absorption, size reduction, heat transfer, fluid flow, dust recovery, filtration, carbonisation, electrolysis, dispersion, mixing, agitation and general chemical reactions.

Attention will be paid to materials of construction, and separate laboratories for corrosion, mechanical testing, chemical analysis, physical chemistry, metallurgy and radiographic examination are being installed.

In addition to 35,000 sq. ft. of laboratory and pilot plant space there will be conference rooms, library facilities, drawing office and design departments and a separate building for inflammable solvents, noxious gases and ionising radiations.

A scheme has been launched for the training of technical personnel in chemical engineering, mechanical engineering and chemical subjects. A five to six years' student apprenticeship plan is envisaged, which will enable suitably qualified young men and women to reach full professional status, and, at the same time, obtain valuable practical training in industry, especially in the design and operation of a wide range of scientific process equipment.

Obituary

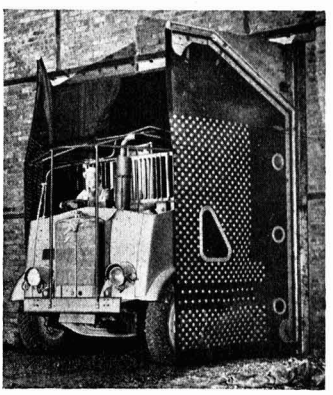
MR. H. T. PINNOCK, a well-known figure in the paint and chemical industries, died recently in the Royal Hospital, Gloucester.

He was associated with the former South Staffordshire Mond Gas Co. and its subsidiary companies for over half a century. About 30 years ago, after years of research in the Mond Laboratories at Dudley Port, Tipton, Staffs, Mr. Pinnock was responsible for the introduction to the market of a range of Monsol germicides, Tectal cordage and wood preservatives and Melanoid bituminous paints, manufactured and marketed by Melanoid Ltd., Dudley Port, Tipton, Mr. Pinnock was technical manager of that company until his retirement in July 1948, since when he acted as part-time consultant to the company.

MR. BASIL R. JACKSON, who retired as chairman of the British Petroleum Co., at the end of January this year, died on 29 March, aged 65. Mr. Jackson became chairman of BP in April last year but had to give up the post owing to ill health. He joined the Anglo-Persian Oil Co.—as BP was then called—in 1921. He was appointed a director in 1948, managing director in 1949 and became deputy chairman in 1950.

The death has occurred at his home, 6 Lethington Road, Whitecraigs, of MR. KENNEDY CAMPBELL, M.I.CHEM.E., a director of the British Dyewood Co. Ltd., Glasgow. Joining the company in 1898, he succeeded his father as works manager and was for many years a member of the board. He is succeeded in the business by his eldest son, Mr. John Campbell, a director of the company.

Steel-studded Door For Anhydrite Mines



These special steel-studded rubber swing doors have been installed to control air movement in the Billingham anhydrite mines of ICI Ltd. Made by Mancuna Engineering Ltd., Manchester, the doors measure 13 ft. 8 in. wide by 13 ft.

Terylene at Textiles Fair

Terylene on land, sea and air was the theme of the Terylene stand of Imperial Chemicals Industries' fibres division at the Second National Industrial Textiles Fair, Royal Albert Hall, 1 to 5 April.

The use of Terylene laminates was illustrated by a pipe bend and open tank made by Mendip (Chemical Engineering) Ltd. High resistance to abrasion, vibration and acids is claimed for these laminates.

New BS Covers Vulcanised Rubber Tests

METHODS of testing vulcanised rubber are the subject of a British Standard (B.S. 903 Parts A4 and A9:1957).

Groups with prefix letter 'A' detail methods of testing the physical properties of rubber. Parts A4 and A9 replace Part 17 and Part 24 respectively of the 1950 edition.

Part A4 specifies two test methods: compression stress at a specified strain, and strain at a specified compression stress.

Principal new feature in Part A9 is the inclusion of a method of testing under conditions of constant torque, using the Du Pont abrasion machine. Layout has been aligned with that of other parts, and metric equivalents have been included. Methods specified are: Method A, Du Pont method; Method B, Du Pont constant torque method; Method C, Akron method; Method D, Dunlop method.

Normal method of using the Du Pont machine, as laid down in Method A of B.S. 903, Part A9 is now being considered for adoption internationally by the International Organisation for Standardisation.

Copies of these new parts of B.S. 903 may be obtained from BSI Sales Branch, 2 Park Street, London W1. Part A4, 3s and A9, 5s.

Two New BS for Measuring Smoke Density

Available from the British Standards Institution, 2 Park Street, London W1, are two new standards covering the measurement of smoke density. The first, BS 2811 is for more elaborate smoke density indicators and recorders, the use of which should help larger firms to reduce smoke emission and cut fuel costs by ensuring efficient combustion. The second, BS 2741, contains suggestions for simple smoke viewers designed to supplement the information given by the photoelectric devices specified in BS 2740 and BS 2811.

Synthetic Detergent Toilet Soap

Eventual introduction on the UK market of Unilever's first synthetic detergent toilet bar, Dove, is envisaged, stated Lord Heyworth, chairman of Unilever Ltd. Dove is already on sale in the US. However, it is expensive—at present it costs twice as much as high quality natural soap.

New Equipment Showrooms

Opening of new permanent showrooms at their Spenser Street, London SW1 address, will be marked by Measuring and Scientific Equipment Ltd. by a special comprehensive display of MSE centrifuges, microtomes, homogenisers and other laboratory equipment. Excluding week-ends, the exhibition will be open from 1 to 31 May.

ICI Build Training Centre

Work has started on the construction of a training centre at the Wilton, north Yorkshire, works of Imperial Chemical Industries Ltd.

People in the NEWS

● DR. D. C. FRESHWATER, Ph.D., A.M.I. Chem.E., has been appointed head of the new department of chemical engineering at Loughborough College and will take up his new post at the beginning of May. Dr. Freshwater, who is at present a lecturer in chemical engineering at Birmingham University, is a member of the education committee and board of examiners of the Institution of Chemical Engineers, and a member of the Chemical Engineering Group Committee of the SCI.

● MR. GRAHAM F. TOWERS has accepted the invitation of the chairman of the British Petroleum Co. Ltd. to become chairman of the board of BP (Canada) Ltd., which is entering the petroleum products market in Eastern Canada and is planning the construction of a refinery in the Montreal area. Mr. Towers is a former governor of the Bank of Canada.

● MR. J. O. HITCHCOCK, a director of the Mond Nickel Co. Ltd., has been elected a director of Henry Wiggin and Co. Ltd.

● MR. J. V. KLEIN, joint managing director, Compoflex Co. Ltd., is flying to Brussels on Sunday 7 April on a two-week continental tour. He will visit the company's agents in Belgium, Holland and France to discuss the present and future sales of flexible tubes and hoses. He will also visit the agents of Rollo Hardy and Co. Ltd., the recently acquired Compoflex subsidiary, to discuss the future marketing of rigid tubing.

● MR. R. S. ABRAMS has been appointed manager of production and engineering for the silicones division, Union Carbide and Carbon Corporation of the US.

● MR. A. L. KING, until recently general manager, administration, has been appointed general manager, sales, of Shell-Mex and B.P. following the retirement of MR. A. M. MACKINTOSH, who has taken over co-ordinating duties within the Shell-Mex and B.P. Group.

● Oxford University proposes to confer the honorary degree of D.Sc. on SIR CHRISTOPHER HINTON, managing director of the industrial group of the Atomic Energy Authority. Sir Christopher was chief engineer of the alkali division of ICI Ltd. at Northwich from 1931 to 1940.

● PROFESSOR H. W. MELVILLE, Ph.D., D.Sc., F.R.S., F.R.I.C., secretary, Department of Scientific and Industrial Research since September 1956 and formerly professor of chemistry at Aberdeen University, is to be awarded the honorary degree of Doctor of Laws by Aberdeen University.

● MAJOR T. W. ADAMS, who has relinquished the office of managing director of the Monckton Coke and Chemical Co. Ltd., of Royston, near Barnsley, after 45 years' association with the company, still retains a seat on the board.

MR. J. GALLAGHER has been appointed general manager.

● MR. WILLIAM P. ORR has been appointed assistant general manager of the plastics division, Celanese Corporation of America. MR. BURTON E. CASH, former assistant plant manager of the Celanese Houston plant, succeeds Mr. Orr as plant manager.

● MR. H. DRIVER has been appointed alternate to MR. MARSHALL E. YOUNG on the board of Monsanto Chemicals Ltd. Mr. Driver will continue in his office as secretary of the company and head of the legal department.

Mr. Driver, who joined Monsanto in 1946 as assistant secretary, was appointed secretary and head of the legal department in the same year. A solicitor of the Supreme Court of Judicature, he was deputy town clerk of Oldham before joining the company.

● MR. A. J. M. HENSHAW, director of W. C. Holmes and Co. Ltd., chemical engineers, Huddersfield, has been appointed general sales manager. Previously he was contracts manager. MR. W. SYKES will now take over responsibility for the contracts, erection and buying departments in addition to his present duties as works director and director in charge of the gas cleaning division. Working under Mr. Sykes as managers of the cleaning division and contracts department respectively are DR. W. T. COSBY and MR. E. TAYLOR.

● DR. E. R. S. MEREWETHER, C.B., C.B.E., HM Senior Medical Inspector of Factories, retires on 31 August next. He will be succeeded by DR. SIBYL HORNER, M.B., B.S., D.P.H., D.I.H. Dr. Horner has been a medical inspector of factories for 32 years including nine years as a deputy senior medical inspector. She is the first woman to hold the posts of deputy and senior medical inspector.

● MR. JOHN BOULTON, M.Sc.(TECH.), F.R.I.C., F.T.I., was elected president-elect of the Society of Dyers and Colourists at the society's annual general meeting on 29 March. Mr. Boulton, a member of council of the Textile Institute and the institute's honorary secretary, is head of the research laboratory, Coultaulds Ltd., Droylsden, Manchester.

● MR. MATTHEW HOWIE, textile buyer for the North British Rubber Co. Ltd., Castle Mills, Edinburgh, has retired after being with the company for 43 years. He first joined the rubber staff as a chemist, and after some time in the laboratories became a buyer of chemical materials. In 1953 he was made textile buyer.

● MR. C. L. OLD, principal of the Wolverhampton College of Technology, has been appointed education officer for the Vickers group of companies. It is expected that he will take up his appointment from 1 September.

● DR. F. A. TATFORD, chief purchasing officer of the UK Atomic Energy Authority, will succeed MR. R. A. BROWNING as director of contracts when he retires in the near future. Dr. Tatford's office will be at 1 Richmond Terrace, Whitehall, London SW1.

● MR. D. M. H. JAMBLIN has been appointed a director of A. Boake, Roberts and Co. (Holdings) Ltd.

● MR. SYDNEY L. TURNER, M.A., B.Sc., A.R.I.C., for several years a senior technical representative for A. Gallenkamp Ltd., has recently been appointed an executive director of the company.

Sydney L. Turner

● DR. DESMOND M. C. REILLY, F.R.I.C., has been appointed manager of technical information for the Food Machinery and Chemical Corporation's recently formed organic chemicals division. He will be responsible for the preparation of technical literature on organic chemicals, plastics, plasticisers and pharmaceutical intermediates. He will be located at the division's New York headquarters. Dr. Reilly received his Ph.D. in chemistry from the National University of Ireland in 1945. He worked in research at Howard Smith Paper Mills, Cornwall, Canada, and at the Midwest Research Institute, Kansas City, before joining FMC in New York in 1953.

● MR. K. G. SINCLAIR, the new chairman of Griffin and George Ltd., laboratory furnishers and makers of scientific apparatus, Alperton, comes to the company after a highly successful business career in Ceylon, from which he has only recently retired. When he retired, Mr. Sinclair was a director of several well-known companies connected with the tea industry and was chairman of the board of control of the Tea Research Institute of Ceylon.

In addition, he is an underwriting member of Lloyd's.

Commercial News

Manchester Oil Refinery Peg Payment on Higher Profit

Group profits of Manchester Oil Refinery (Holdings) Ltd., after tax, for 1956 amounted to £115,000 (£89,000). Final dividend of 8½ per cent (same), making 12½ per cent (same) is proposed on ordinary. Carry forward is £94,000 (£67,000).

Ayrton Saunders and Co.

Dividend for 1956 declared by Ayrton Saunders and Co., is 10 per cent, the same as 1955. Consolidated trading profit etc., was £86,278 (£93,470) and net profit £54,785 (£60,636) before tax of £20,907 (£22,292). £15,000 (£10,000) has been put to general reserve and £27,574 (£27,053) has been brought forward. Current assets are £670,882 (£669,227) and reserves and surplus £312,574 (£297,053). A 100 per cent scrip issue proposal will be submitted at the annual meeting in Liverpool on 26 April.

William Blythe and Co.

Group profit of William Blythe and Co., for 1956 after all charges including tax, is £163,028 (£152,699). Taxation was £170,169 (£194,140 as adjusted). Interim paid was £15,187 (same). Final dividend was 20 per cent (25 per cent), as announced.

Evans Medical Supplies

Preliminary figures of the Evans Medical group for 1956 show a net profit, after tax and all charges, of £117,796 (£122,964). Final dividend of 5d. per 5s. unit (same) is proposed on ordinary. An interim of 1½d. per 5s. unit on increased capital has been paid. Carry forward is £89,184 (£86,655).

Glaxo Laboratories

Increased profits and turnover are announced by Glaxo Laboratories Ltd. in the six months ended 31 December last compared with second half of 1955, excluding South American subsidiaries. Turnover rose 21 per cent in value and trading profits totalled £1,601,000 (£1,313,000). Net profit amounted to £805,000 (£725,000) of which £79,000 (£715,000) was attributable to parent company.

Turner and Newall

Turner and Newall are planning to become a holding company operating solely through subsidiaries, at home and overseas. Business operated by six home branches on behalf of the parent and such assets will be taken over, as from 1 April, by the subsidiaries. Consideration for the transfer will be satisfied by the issue to the parent of shares in the subsidiaries.

The business of purchasing, shipping and selling asbestos fibre, at present carried out by the parent, will be transferred to Raw Asbestos Distributors, a non-operating subsidiary, for a cash consideration.

For this year only the half-year's preference and ordinary interim dividends will be paid approximately three weeks earlier than usual to facilitate the work necessitated by the reorganisation.

Unilever Group

The Unilever Ltd. and Unilever NV groups report that expenditure on fixed assets increased from £28 m. in 1955 to £37 m. in 1956. It is anticipated that the 1957 outlay will be still higher. Resources are expected adequately to cover financial requirements.

Profits retained in 1956 totalled £35.3 m. and cash resources—cash and short-term investment less short-term borrowing—were increased by £15.5 m. to £47.7 m. New projects totalling £37 m. were approved in 1956.

Combined turnover rose by 10.3 per cent to a new record of £1,671 m. The increase in combined revenue from trading despite rising costs in attributed by the directors to the additional turnover. Profits after tax but before loan interest were equivalent to 10.2 per cent on capital employed, against 9.8 per cent. Unilever Ltd.'s ordinary dividend, as known, is 17½ per cent (15¾ per cent) and NV's 15½ per cent (14 per cent).

NEW COMPANIES

AMMONIACAL LIQUOR FERTILISERS LTD. Capital £10,000 in £1 shares. Directors: Ronald Chappell, and Allan Chappell, both directors of Fred Chappell Ltd. Secretary: R. Sykes. Registered office: 51 Station Road, Batley, Yorkshire.

CATOMANCE LTD. Capital £120,000 in £1 shares. To acquire the business of Catomance Ltd. (incorporated in 1936) and to acquire any patents relating to waterproofing, stainproofing and rotproofing paper, leather, woven textile material and other fabrics, etc. Directors: E. B. Higgins, Thomas M. Abrahams, Arthur W. Waller, George Proctor, Donald I. Campbell and Gordon W. Whiston. Secretary: R. Redfern. Registered office: 94 Bridge Road East, Welwyn Garden City.

TRAFFORD AGENCIES LTD. Capital £100. Searchers for, developers, producers, transporters, refiners, manufacturers of and dealers in solid, liquid and gaseous hydrocarbons and other minerals, etc. Solicitors: Simpson, Curtis and Co., Leeds 1.

LONDON GAZETTE

Voluntary Winding-up

(A resolution for the voluntary winding up of a company does not necessarily imply liabilities. Frequently it is for purposes of internal reconstruction and notice is purely formal.)

CATOMANCE LTD., chemical manufacturers. Registered office: 94 Bridge Road East, Welwyn Garden City, Herts. E. B. Higgins, 'Punchetts', Tewin Wood, Herts, appointed liquidator, 29 March.

NEW ACID CO. LTD., manufacturers of chemical products, registered office: Chatterley, Tunstall, Staffordshire. R. Phillips, 10 Chancery Lane, Alsager, Cheshire, appointed liquidator 1 April 1957.

MORTGAGES & CHARGES

BRITISH OXYGEN CO. LTD. London SW 1 March, £10,000,000 deb. stock secured by a Trust Deed dated 12 February 1957; general charge.

HINCKLEY DYE WORKS LTD. 13 March, £4,000 mortgage, to W. C. Taylor, Oadby; charged on property at Ashby Road and Netherley Road, Hinckley.

Market Reports

STEADY DEMAND IN MOST SECTORS

LONDON There has been a steady call for supplies in most sections of the industrial chemicals market and the movement, in the aggregate, including contract deliveries and new business, has been satisfactory. The textile and plastics industries are reported to be taking good quantities while the seasonal demand for fertilisers continues substantial. There has been little change from recent levels in the overall price position and most quotations are firm. Titanium pigment prices were raised by Laporte Titanium as from 1 April. The position of the coal-tar products is unchanged with creosote oil, carbolic acid and cresylic acid finding a ready outlet. The light distillates remain in moderate request.

MANCHESTER Most descriptions of industrial chemicals, including bleaching, dyeing and finishing products, are meeting with a continued steady demand on the Manchester market. Leading consumers are mostly well bought for forward delivery, but fresh inquiries on both home and shipping accounts have again been on a fair scale. As regards prices, there is no indication of easiness in any section of the market, the undertone being firm throughout the range. Among the fertilisers, sulphate of ammonia, superphosphates, and the compounds are in steady demand, and there is a good call for most of the light and heavy tar products.

GLASGOW Although the Scottish heavy chemical market has again been quieter during the past week, the latter part did show some signs of improvement. The industrial unrest, as could be expected, was having its effect, but with the resumption of work an improved position will no doubt result. Against this, continued activity can be reported in regard to fertilisers, and the demand has been good, both in regard to current and forward deliveries. Prices generally have shown little or no change.

NEW PATENTS

By permission of the Controller, HM Stationery Office, the following extracts are reproduced from the 'Official Journal (Patents),' which is available from the Patent Office (Sale Branch), 25 Southampton Buildings, Chancery Lane, London WC2, price 2s 6d including postage; annual subscription £6 6d.

Specifications filed in connection with the acceptances in the following list will be open to public inspection on the dates shown. Opposition to the grant of a patent on any of the applications listed may be lodged by filing patents form 12 at any time within the prescribed period.

AMENDED SPECIFICATIONS

On sale 15 May or as soon as possible thereafter.

Petroleum resins I. Esso Research and Engineering Co. **737 231**

ACCEPTANCES

Open to public inspection on 22 May.

Preparation for combating pests. Ciba Ltd. **775 085**

Lubricating oil compositions. American Cyanamid Co. **775 466**

Corrosion-proof high pressure lubricants. Newby, H. (Chemische Werke Hüls AG). **775 089**

Production of tricyclodecene. Ruhrchemie AG. **775 298**

Disazo-dyestuffs insoluble in water. Farbwerke Hoechst AG. [Addition to 774 676.] **775 355**

Condensation products of isobutylene and formaldehyde. British Petroleum Co. Ltd. **775 357**

Production of alkoxyalkenes. Distillers Co. Ltd. **775 358**

Methods and apparatus for drying oils by evaporation of water and for determining the solubility of water in oils. National Research Development Corp. **775 097**

Polyoxygenated cyclic compounds. Pfizer, C., and Co. Inc. **775 360**

Sequestering agents for preventing rubber deterioration. Geigy Co. Ltd. **775 361**

Aminophenoxyalkanes. Wellcome Foundation Ltd. **775 478**

Divinyl ethers of dihydric alcohols. Deutsche Solvay-Werke Ges. **775 102**

Method of and apparatus for roasting fine grained sulphidic ores. Metallges AG. **775 362**

Distilling liquid mixtures. Naamlooze Vennootschap de Bataafsche Petroleum Maatschappij. **775 273**

Soap compositions. Unilever Ltd. [Addition to 745 367.] **775 364**

Method of and composition for reducing foaming in water evaporating and steam generating plant. Geigy Co. Ltd. **775 483**

Therapeutic compounds formed from modified saccharides. Lasdon Foundation Inc. **775 485**

Method and apparatus for preserving liquid explosive nitric esters from explosion. Du Pont de Nemours, E. I., and Co. **775 368**

Production of viscose. Courtaulds Ltd. **775 369**

Fluorescent materials. Siemens Bros and Co. Ltd. **775 188**

Pyrimidine derivatives. Soc. des Usines Chimiques Rhone-Poulenc. **775 370**

Recovery of cyclodiene monomers. Esso Research and Engineering Co. **775 113**

Method of and means for coating plastic materials. Brock, H. W. **775 371**

Phosphate-containing fertilisers. Soc. Industrielle d'Acide Phosphorique et d'Engrais, SIAPE. **775 114**

Tetracycline by fermentation. American Cyanamid Co. **775 115**

Monoazo dyestuffs. Ciba Ltd. **775 308**

Treatment of cyanoethylated cotton. Institute of Textile Technology. **775 118**

Thermoplastic laminate. Union Carbide and Carbon Corp. **775 373**

Filter fabrics. United States Rubber Co. **775 310**

Explosive composition. Hyslop, A. **775 311**

Recovery of mineral values. Imperial Chemical Industries Ltd. **775 119**

Hydroxy-carboxylic acid and polyesters therefrom. Imperial Chemical Industries Ltd. [Cognate application 24710.] **775 122**

Lactone, and polyesters therefrom. Imperial Chemical Industries Ltd. [Cognate application 22445/55.] [Divided out of 775 122.] **775 495**

Aromatic hydroxyaldehydes. Farbenfabriken Bayer AG. **775 312**

Aminoalkyl ethers. Parke, Davis and Co. **775 376**

Pelleting carbon black and apparatus therefor. Phillips Petroleum Co. **775 378**

Coating vitreous surfaces with powdered luminescent materials. British Thomson-Houston Co. Ltd. [Addition to 669 392.] **775 202**

Polyamide solutions. British Nylon Spinners Ltd. **775 382**

Process for the dimerisation of olefins or olefinic mixtures. Ziegler, K. [Addition to 742 642.] **775 384**

Chromium-containing azo dyestuffs. Geigy, J. R., AG. **775 385**

Polyglycol terephthalates and isophthalates. Goodyear Tire and Rubber Co. **775 316**

Improving properties of asphalt and similar bituminous products. Aktiebolaget Nynaes-Petroleum. **775 502**

Tetracycline by fermentation. Lepetit Soc. Per Azioni. **775 139**

Hard metal alloys. Metro-Cutanit Ltd. **775 318**

Purification of water. Adamson, R. B. **775 143**

Monoazo dyestuffs of the benzine-azo-pyrazolone series and their chromium-complex compounds. Sandoz Ltd. [Addition to 753 550.] **775 216**

Metallised polyazo dyestuffs. Sandoz Ltd. [Addition to 760 705.] **775 320**

Sterilisers for liquids. Philips Electrical Industries Ltd. **775 222**

Pumping system for conveying material of semi-liquid plastic, loose or paste-like consistence. Sveda, V. **775 324**

Phenolic methylol-phosphorus polymers. Albright and Wilson Ltd. **775 325**

Epoxidised fatty acid diacetoglycerides. Ault, W. C., and Feuge, R. O. **775 326**

Granulation of fertilisers. Chemical Construction Corp. **775 515**

Metal bodies containing boron nitride. Carborundum Co. **775 516**

Process to demineralise or to concentrate saline solutions by congealing said solutions. Trepaud, G. **775 328**

Pipeline of non-weldable synthetic plastic and a process for the manufacture thereof. Rhoenix-Rheinrohr AG. **775 233**

Catalysts. Rohm and Haas Ges. **775 401**

Cobalt-containing monoazo dyestuffs containing no sulphonic acid groups. Badische Anilin- and Soda-Fabrik AG. **775 163**

Reaction of gaseous hydrocarbons with oxygen. Badische Anilin- and Soda-Fabrik AG. **775 334**

Dialkyl and trialkyl tin derivatives of S-acyl thiomatic acids and processes for producing such derivatives. Soc. Anon. des Manufactures des Glaces et Produits Chimiques de St.-Gobain, Chauny and Cirey. **775 242**

Bis (cyanopentenoxy) alkanes. Rohm and Haas Co. **775 404**

Phenothiazine derivatives. Sandoz Ltd. **775 279**

Colouring of textiles. Celanese Corp. of America. **775 406**

Hydroxyalkyl ethers of phenolformaldehyde resins. Abbey, A. (Dow Chemical Co.). **775 459**

Drying oil fatty acid esters of polyalcohols. Abbey, A. (Dow Chemical Co.). **775 460**

Resinous coating compositions. Abbey, A. (Dow Chemical Co.). **775 461**

Polymerisation of unsaturated organic compounds in aqueous suspension. Badische Anilin- and Soda-Fabrik AG. **775 409**

Polyester resins. General Electric Co. **775 081**

Steroid compounds. Upjohn Co. **775 411**

Method and means for extracting an adsorbable solute from a suspension of finely divided solids in a solution. Commonwealth Scientific and Industrial Research Organisation. **775 415**

Processes and apparatus for the separation of liquid drops from a stream of gas or vapour by means of a cyclone. Naamlooze Vennootschap de Bataafsche Petroleum Maatschappij. **775 259**

Organic boric esters. Borax Consolidated Ltd. **775 418**

Phenothiazine derivatives. Sandoz Ltd. **775 280**

Treatment of rubber latex. United States Rubber Co. **775 536**

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Visits by London Section RIC

Summer programme of the London section, Royal Institute of Chemistry includes 13 visits, a golf tournament at Wimbledon Park Golf Club on 1 May and a tennis competition at King's College Athletic Ground, Mitcham, on 13 July. Full details are available from Mr. H. Holness, honorary assistant secretary of the London section, at the SW Essex College of Technology, Forest Road, London E17.

Wills

MR. ABRAHAM TAYLOR, late managing director of the Lancashire Paper Tube Co., and a former director of Ligma Chemical Manufacturing Co., Rochdale, who died on 21 January, age 80, left £72,698 net.

British Association Publishes Advance Details of Dublin Annual Meeting

'TECHNOLOGY AND WORLD ADVANCEMENT' is the title chosen by Professor P. M. S. Blackett, F.R.S., president of the British Association, for his presidential address to be delivered in the library of the Royal Dublin Society on the evening of Wednesday, 4 September. Professor T. S. Wheeler, head of the department of chemistry, University College, Dublin, is chairman, and Mr. G. F. Mitchell, registrar of Trinity College, Dublin, is vice-chairman of the local committee organising the 119th annual meeting of the British Association.

This year, the scientific programme is to have an agricultural slant, which it is hoped will prove of particular interest in Ireland. President of the agricultural section is Sir James Turner, president of the National Farmers' Union. A major exhibition of agricultural equipment and methods will be held in the Great Hall of University College, Dublin. In addition, a number of the papers will be on specifically Irish topics.

The preliminary programme, now available from the secretary of the British Association, Burlington House, Piccadilly, London W1, contains the titles of addresses by the presidents of the 13 sections. Among section presidents are Professor J. Z. Young, F.R.S., well known for his Reith lectures on 'Doubt and certainty in science'; Dr. J. W. Cook, F.R.S., vice-chancellor of Exeter University; Sir David Anderson, principal of the Glasgow Royal Technical College; and Sir Lindor Brown, Jodrell Professor of Physiology at University College, London and a secretary of the Royal Society.

One of two evening discourses in the library of the Royal Dublin Society will be given on 6 September by Dr. H. J. Bhabha, F.R.S., secretary to the Government of India Department of Atomic Research and director of the Tata Institute of Fundamental Research in Bombay. The other will be given by Professor S. P. O'Riordain, a distinguished Irish archæologist.

As in the past two years, there will be a major programme of scientific films; daily screenings will be given in the Aula Maxima, Newman House, St. Stephen's Green.

FOR YOUR DIARY

TUESDAY 16 APRIL

I.Chem.E. and Inst. of Petroleum—Manchester: Engineers' Club, Albert Square, 6.30 p.m. 'Forty years on—if the oil wells run dry' by Professor E. S. Sellers.

SC, RIC, SCI and Inst. of Petroleum—Manchester: Chemistry Lecture Theatre, University, 9.30 a.m. Symposium: 'Recent trends in medicinal chemistry'; 'Drugs affecting mental state' introduced by Dr. H. C. Carrington: 'Biological methods' by Dr. A. Spinks; 'Biochemical observations in 5-hydroxytryptamine and cognate drugs' by Professor H. McIlwain and R. B. Rodnight; 'Chemotherapy of cancer' introduced by Professor F. Bergel; 'Side effects of some tumour-inhibitory drugs' by Dr. A. L. Walpole and Dr. H. Jackson.

WEDNESDAY 17 APRIL

SCI (Microbiology Group)—London: 14 Belgrave Square SW1, 6 p.m. Annual general meeting, 6.15 p.m. 'Applications of genetics in industrial microbiology' by Professor G. Pontecorvo.

THURSDAY 18 APRIL

RIC—Luton: Town Hall, George Street, 8 p.m. 'Extraction of germanium and gallium' by A. R. Powell.

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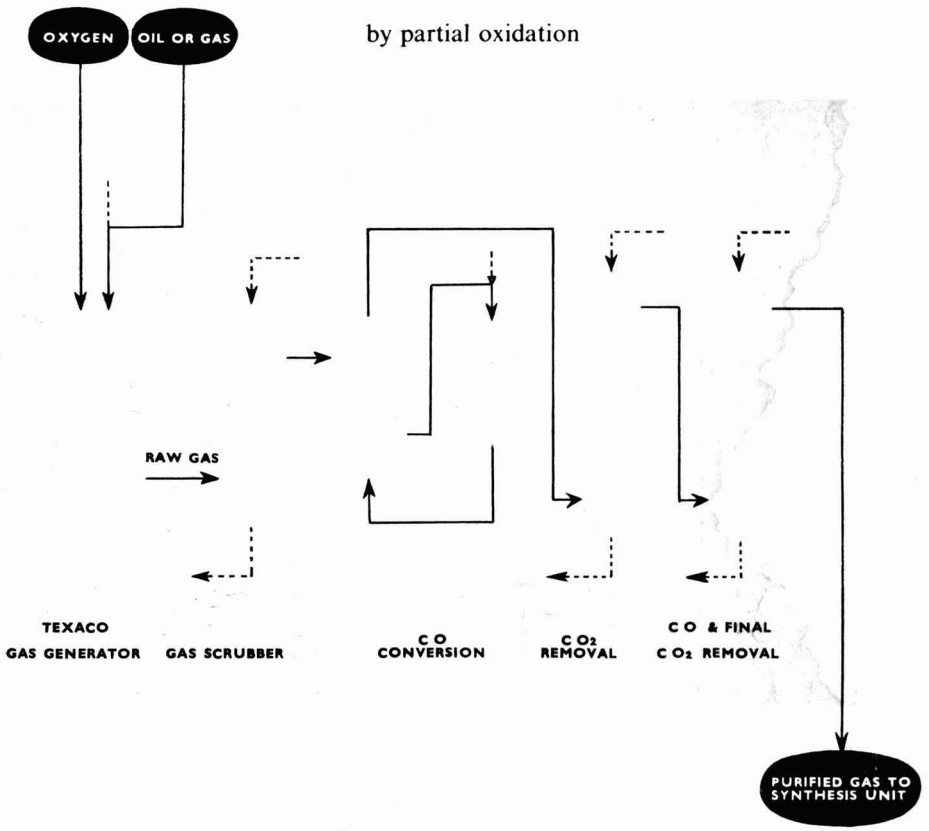

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