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VOL. LXXV

8 SEPTEMBER 1956

No. 1939

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Chemistry at Sheffield

T ITS 118th annual meeting, which ended at Sheffield on Wednesday, the British Association for the Advancement of Science demonstrated its ability to move with the times. On the first day of the meeting the council considered a general statement of policy on the functions of the Association. This gave an indication of the trend of the preliminary discussions of the committee set up under the chairmanship of Sir Ben Lockspeiser 'to consider the function of the British Association in the present day world.'

If, said the statement, the overriding purposes of the Association are conceived to be discussion, integration and dissemination, then it is obviously desirable that somewhat more 'conscious' planning of its meetings should be undertaken. The annual meeting lasted for one week a year only, and the Association was aware that other forms of service were necessary to give continuity to its efforts. It believed, for example, that there was a need for the publication of a suitably planned and presented nonspecialist scientific journal; for the holding of special one-day meetings on specific subjects to offer industrialists and others an opportunity to discuss their problems on a platform common to themselves and to the country's leading scientists and administrators.

A new steelmaking process, called Gyclosteel, was described by Sir Charles Goodeve, in his presidential address to the Chemistry section on 'Steelmaking Since Bessemer.' Steelmaking, he said, still depended on the production of the ircn-carbon alloy, pig iron, which was not only off the direct route from ore to steel, but was costly to make. Steelmakers for many generations had longed to develop a cheap steelmaking process for converting ore directly to low carbon steel. Several existed but they had severe limitations.

The speed of Bessemer's process depended on the dispersion of bubbles of air by reversing the system and dispersing small drops of liquid ore in a hot reducing gas. The new process was being developed by the British Iron & Steel Research Association but it was still in its very early stages and nothing like as advanced as Bessemer's process was 100 years ago. Formidable technical obstacles stood in its way but, said Sir Charles, a method of making steel from powdered ore and coal was extremely attractive, especially as it avoided the sinter plant and coke ovens and widened the range of fuels that could be used. He added, 'It is unlikely to replace the blast furnace, at least for many years, but if logic can be converted into practice it will take a place among pneumatic steelmaking processes."

An evening discourse on the growth of biochemistry was given on 31 August by Professor F. G. Young, Sir William Dunn Professor of Biochemistry, Cambridge University. After defining and comparing biochemistry with organic chemistry, the lecturer traced the early beginnings of biochemistry from the end of the 17th century. The chasm separating inorganic from organic chemistry was bridged, said Professor Young, when Wohler discovered in 1828 that heating ammonium cyanate transformed it into urea (a substance occurring in urine). He added that Wohler then wrote to Berzelius: 'I can make urine without calling on my kidneys....'

Growth of organic chemistry in the 19th century was traced, and the development of ideas about enzymes and digestion was reviewed. Finally, Professor Young discussed the modern era of biochemistry in the 20th century ushered in by Sir Frederick Gowland Hopkins who deduced the existence of vitamins.

Several exhibitions and excursions were held during the meeting and scientific films were shown daily. 'Metals at High Temperatures' was the theme of an exhibition organised by the Department of Metallurgy at Sheffield University. It included displays contributed by a number of Sheffield steel companies which specialise in the production of steel, titanium and other alloys for use at elevated temperatures. High temperature materials were shown in rolled, forged and cast form, and there was a representative selection of components for such typical industrial applications as gas and steam turbines and oil refineries.

Scientific glassware was displayed and demonstrated by a number of manufacturers in the Department of Chemistry at the University. The following firms took part: Beatson, Clark & Co. Ltd.; Camlab (Glass) Ltd.; H. J. Elliott Ltd.; W. G. Flaig & Sons Ltd.; A. Gallenkamp & Co. Ltd.; James A. Jobling & Co. Ltd.; Loughborough Glass Co. Ltd.; John Moncrieff Ltd.; Plowden & Thompson Ltd.; Quickfit & Quartz Ltd.; The Thermal Syndicate Ltd.; Wood Brothers Glass Co. Ltd.; and G. H. Zeal Ltd.

Another exhibition in the Department of Chemistry showed the wide range of manufacturing processes and products of the British glass industry. The display included raw materials and hand and automatic methods of production.

An exhibition of working experiments and demonstrations by pupils from schools in Sheffield and its district was held in the city Grammar School during the meeting.

In the city Library an exhibition showed how scientific and technical information is provided for industry by the

Library's science and commerce department.

A special programme of steel films was screened in the central Library on 5 September, the last day of the meeting, as a tribute to the memory of Sir Henry Bessemer. The six films selected all dealt with aspects of the steel industry including, of course, the Bessemer converter.

During the meeting members of the Chemistry section visited Firth-Vickers Stainless Steels Ltd., The Staveley Iron & Chemical Co. Ltd., The United Steel Companies Ltd. (Swinden laboratories), United Coke & Chemicals Co. Ltd., The British Iron & Steel Research Association, University Department of Glass Technology & the British Glass Industry Research Association at Sheffield University, Safety in Mines Research Establishment (Buxton), The Park Gate Iron & Steel Co. Ltd., Walker & Hall Ltd., Beatson, Clark & Co. Ltd., ICI Ltd. (Huddersfield), The Sheffield Smelting Co. Ltd., and Batchelors Peas Ltd.

About 130 members attended the Chemistry section dinner at the Cutlers' Hall on Friday 31 August, when Sir Charles Goodeve, the section president, was in the chair.

The New President

PROFESSOR P. M. S. Blackett, F.R.S., professor of physics, Imperial College of Science & Technology, since 1953, has been elected president of the British Association for the Advancement of Science for 1957. He will be installed in January 1957 and will preside at the Association's meeting in Dublin, which will take place from 4 to 11 September 1957. Born in 1897, Professor Blackett was educated at the Royal Naval Colleges, Osborne and Dartmouth, and at Magdalene College, Cambridge. He was professor of physics at Birkbeck College from 1933-37, and at Manchester University from 1937-53. He directed naval operational research at the Admiralty during World War II and was especially concerned with the anti-U-boat campaign. In 1933 he was elected F.R.S. and in 1940 he received the Royal Society's Royal Medal. Professor Blackett was awarded the Nobel Prize for Physics in 1948 for his improvement of the Wilson cloud-chamber method, and for the resulting discoveries in the field of nuclear physics and cosmic rays.

8 September 1956

New Growth Chemical

ON 30 August, the Eli Lilly Co., Indianapolis, US, announced that it is distributing to scientists for agricultural experiments a chemical substance, gibberellic acid, which has been found to stimulate growth in such crops as wheat, oats, corn and tobacco, as well as vegetables, flowers, shrubs and trees.

It is stated that gibberellic acid can 'break dormancy in specific plants, stimulate germination in certain seeds, reverse dwarfism and induce flowering in biennials in the year in which they would not ordinarily flower. Growth up to five times as fast as normal is claimed.

The acid has been applied successfully in four ways—spraying, 'feeding' through roots, injecting into stems and rubbing on to stems in paste form.

A spokesman of the company said that a great deal of careful research still must be carried out before the full extent of the usefulness of gibberellic acid is known. Unfortunately, there have been difficulties in producing enough of the chemical to supply even research requirements. However, Eli Lilly Co. have finally produced enough to distribute to interested scientists at agricultural colleges and other institutions to obtain more information about it.

It is understood that gibberellic acid is obtained from gibberellin, a constituent of bakanae fungus which is pathogenic on rice. Three gibberellins are known, gibberellins A, B and C. The isolation of the giberellins was reported by Yabuta *et al.*, in the *Journal of the Agricultural Chemical Society* of Japan, 1950, **16**, 1157 abstracted in *Chemical Abstracts*, 1950, **44**, 10814).

Glycerine Prices Reduced

Due to a favourable change in raw material prices, Glycerine Ltd. have been able to make an additional reduction of £47 10s per ton in the prices of chemically pure Glycerine BP, and industrial glycerine. A new price list is available and is being posted.

Pullin Group Showrooms

New London showrooms of the Pullin Group are to be opened on 10 September at Electric House, New Cavendish Street, W1. The building, of six storeys, is of reinforced concrete construction, faced with sea-green slab panels and steel glazing inserts. Polished Lagos mahogany side panels are on the ground floor frontage.

Obituary

MR. CHRISTOPHER BACON (50), chief chemist of John Summers & Sons Ltd., Hawarden Bridge steelworks, was found dead on 27 August in the grounds of his home near Chester. A saw and ladder were beside the body, and several branches of a tree above were cut.

A chemist employed by ICI Ltd. at the Ardeer (Scotland) factory was killed in an explosion on 29 August. He was MR. JOHN WILLIAMSON (32), a native of Northwich, Cheshire. The explosion occurred in a section of the factory where a sensitive explosive compound was being prepared. The work was being supervised by Mr. Williamson, and there were four process workers also in the building. One was severely injured; the others escaped with minor injuries and shock. No damage was done to property. Mr. Williamson graduated B.Sc. at St. Andrews University. He had been at the Ardeer plant for five years. He is survived by Mrs. Williamson and two daughters.

Titanium Facilities Expanded

FACILITIES for the manufacture of titanium tetrachloride are being further expanded by by the Stauffer Chemical Co. at its Niagara Falls works, and should double the plant's capacity for this titanium compound. An expansion doubling the company's facilities in 1955 is just being completed. The new expansion project, scheduled for completion in 1957, will quadruple Stauffer's capacity of a vear ago. Stauffer Chemical Co. have produced titanium tetrachloride and other metal chlorides, such as aluminium and silicon chlorides for nearly 40 years. It is only recently that demand for titanium tetrachloride has increased.

Originally the main use of this titanium compound was as the basic material for the production of military 'smoke screens' and commercial skywriting 'smokes'. Now it is a main source of titanium metal.

British Pharmaceutical Conference

The 1956 British Pharmaceutical conference is being held in Dublin this week from 3-7 September. Conference chairman is Dr. K. Bullock, Ph.D., M.Sc., F.P.S. His address on 3 September was on 'Biochemical Principles in Pharmacy': Enzymology; chemotherapy; disinfection; dehydration and life processes; cell architecture.

NEWS BRIEFS

Elliott-Swartwout Agreement

Elliott Brothers (London) Ltd. announce that they have concluded a licence and technical agreement with the Swartwout Co. of Cleveland, Ohio, by which they become the manufacturing licensee and sole agents in the British Commonwealth (except Canada) and Europe for the complete Swartwout range of Autronic control and transmission equipment.

Crookes Laboratories

Among the 70 guests present at the annual dinner and dance of The Crookes Laboratories of Park Royal, London NW10, held on 23 August, were members of the staff from Singapore, Scotland and Northern Ireland. The dinner was preceded by a twoday representatives' conference during which the following addresses were given:— 'Oxycodone Pectinate and Antibiotics' by Dr. A. R. H. Hicks and 'Product Development' by Mr. R. Scott Miller. A discussion was held on veterinary matters.

Titanium Oxide Pigments

The first meeting of the 19th session of the London section of the Oil & Colour Chemists' Association will be held on Thursday, 13 September 1956, at 7 p.m. at the Royal Society of Tropical Medicine and Hygiene, Manson House, 26 Portland Place, London W1, the title of the lecture being 'Recent Developments in Titanium Oxide Pigments' by A. D. Hibberd, B.Sc. (British Titan Products Ltd.).

Magnesium Explodes

An explosion on waste ground at Belvedere, Kent, on 31 August, is believed to have been caused by overheating of commodities which led to the ignition of magnesium swarf stored in sacks. Waste rubber was also stored on the site. The explosion damaged a number of prefabricated bungalows and a warehouse building nearby, but no one was injured. Moisture may have led to the overheating and subsequent explosion.

High Speed Photography

On 10 September 1956, the Third International Congress on High Speed Photography opens in London for one week at New Government Offices, Horse Guards Avenue, London SW1. It is stated that about 40 persons from all over the world will be attending the congress. In addition to the ordinary sessions, two popular lectures, on Tuesday and Thursday of the week, are being given, one of which is the photography of nuclear explosions. The other is 'Living by High Speed Photography.' These two lectures will be given at the Physiology Department, The Medical College of St. Bartholomew's Hospital, Charterhouse Square, London.

Telephone Number Change

New telephone number of The Hydronyl Syndicate Ltd., of 14 Gloucester Road, London SW7, is Knightsbridge 6803. The telephone number of the principal of the company has also been changed, to: Knightsbridge 8935.

Industrial Safety Exhibition

Space is offered, free of charge, at the Milan office of Ente Nazionale Provenzione Infortuni (ENPI), Via Marina 5, Milan, for exhibiting any interesting safety equipment from the UK (e.g. devices for guarding machinery, protection of workers from the effects of noxious dusts, protective clothing). UK manufacturers wishing to avail themselves of this offer should communicate with Dr. Diego Andreoni of the ENPI at the above-mentioned address.

Non-Woven Cloth

Another new project to develop methods of production which may revolutionise Britain's textile industry by by-passing spinning and weaving processes, was revealed last week by Mr. A. V. Symons, chairman of the Tootal group. The group are to link with West Point Manufacturing Co. of Georgia, US, for the purpose of manufacturing non-woven fabrics in this country by West Point processes. The Bradford Dyers' Association Ltd. recently announced that it was to produce non-woven fabrics by bonding the fabrics by chemical and physical means.

New BS for PVC

New and revised British Standards for p.v.c. sheeting were due to be published on Wednesday. One—BS 2739:1956, dealing with thick sheeting, is entirely new. The other, BS 1763:1956, dealing with thin sheeting, is a complete revision of the existing BS 1763:1951. The BSI states that the plastics industry considers the standards are likely to be very far reaching in effect and of great importance to users.



DISRAELI once came to the conclusion that the people of this country could be divided into two nations, but since then the waters of reform have passed under innumerable bridges. Thoughts of the same kind nowadays come from the more extreme edges of the Left. However, as recent industrial disputes have emphasised. terms of employment in many factories fall into two sharply divided classes —staff and non-staff. The biggest difference is usually found in the period of notice given for terminating employment. Often, too, there are other differences of privilege.

A Northern pharmaceutical company, has recently outlined a scheme to give 'staff status' to hourly and weekly paid employees. All employees with a minimum of two years' service will become 'established' and will then be entitled to four weeks' notice in the event of termination of employment. On the other hand, such employees will retain their own rights to give the company only one week's notice. There will in fact be three grades of workers at the factory when these plans are introduced-probationary, non-established, and established. The probationary class will be these with up to six months' service.

The simplicity of these plans seems admirable. As with output bonus systems, effectiveness depends upon absence of complexity. How far industry as a whole could introduce similar schemes can hardly be assessed—in chemical or allied industries, the labour/turnover ratio is generally much smaller than, say, in engineering industry, so that small changes in the bill for labour have a relatively low impact upon product costs. There must, however, be many chemical works where schemes of this kind could be usefully considered. Apart from the human value of raising the status of timepaid workers, the emphasis that is placed

upon continuity of service should have favourable consequences. Chemical factories are rarely heavily staffed, and there is a fairly high demand for special skill and experience upon each worker; with this background, frequent resignations and recruitments are undesirable. A stable labour force is probably one of the best assets a chemical works can have. Most of our larger chemical organisations have solved these problems with pension schemes, welfare systems, share allotment arrangements etc. This Northern plan by a company of smaller size seems a commendable one.

India's New Five-Year Plan

CHEMICAL OBJECTIVES are well to the fore in India's second 'Five-Year Plan'. Production of caustic soda is to be stepped up as soon as possible, with simultaneous research on the utilisation of chlorine. The production of a variety chlorine-containing organic comof pounds-such as ethyl chloride, chlorinated solvents etc.-is to be studied. The manufacture of caustic soda by 'caustisation of sodium sulphate' is also among the list of research projects; so is the recovery of sodium carbonate and sodium sulphate from Sambhar lake. Other important schemes within the major plan include manufacture of manganese dioxide for use in dry batteries; direct recovery of sulphur from low-grade gypsum; production of terpene chemicals from Indian turpentine oil; production of tallow substitutes, lubricants and plasticisers from Indian vegetable oils; and research on corrosion of metals with special emphasis upon the effect of climatic conditions in different areas of India

Particular attention seems to have been given to developing production plans for textile industry chemicals—wetting agents, detergents, gums and modified starches, finishing emulsions etc. The 'formula' here would seem to be that research on the manufacture of these chemicals is imperative. Fluorescent or optical bleaching agents, desizing agents, wetting agents made from indigenous vegetable oils, and silica dispersions for spraying cotton before spinning, are all specified for priority of attention. Clearly it is India's intention to become less dependent upon imported supplies for these types of chemical. Pilot-plant manufacturing research on two major rubber industry chemicals — mercaptobenzthiazole and phenyl-methylamine—is also specified.

Handicapped

NEVERTHELESS, the existent chemical industry is still severely handicapped by fuel shortage. It is officially stated that supplies of coal have barely reached 60 per cent of quotas allocated-despite special Government measures to help out certain units. In many cases, fuel supplies have fallen below 60 per cent of the pro-The Indian mised quota. chemical industry is placed in a lower priority class than the pottery industry for obtaining wagons for fuel-it is in class H while primary industries are placed in class D. Shortage of wagons for transport appears to be at present a more serious trouble than shortage of fuel itself. It must be fair comment, therefore, to query whether the ambitious chemical expansions of Indian's Second Five-year Plan can be superimposed upon the fuel and transport difficulties of her Plan. And at the same time the Indian Railway Ministry's expenditure target for the second Five-Year Plan has been changed-for the worse! As the Indian chemical industry is now pointing out with some force, about 80 per cent of future extra transport will be reserved with high priority for steel, iron ore, cement, and coal-yet the new Five-year Plan calls for the doubling of production for almost all basic chemicals.

Planning by priorities does not appear to be putting first things first as effectively as planning theorists claim.

Industrial Safety

ONE OF THE MOST important contributions yet made to the study of industrial safety is the report of the Industrial Safety Sub-Committee of the NJAC. This has been published under the title of Industrial Accident Prevention bv HMSO at 1s 6d. The sub-committee (chairman, Dame Mary Smieton. Ministry of Labour & National Service) was composed of representatives of the British Employers Confederation, the TUC general council and the boards of the nationalised industries.

The sub-committee's terms of reference were to review the problem of accidents at work to workers in factories and other places of industrial employment subject to the Factories Acts and to make recommendations to the NJAC on ways and means of securing greater freedom from accidents. Throughout the discussions the sub-committee wisely recognised that safety and health in industry are closelylinked.

In the course of nine chapters the report deals comprehensively with the following subjects: (1) Problem of Industrial Accidents. (2) Prevention of Accidents: A General Survey. (3) Organisation of Safety in the Works. (4) Em-ployers' and Workers' Organisations and the Promotion of Safety at Work. (5) Research. (6) Information and Advisory (7) Schools, Colleges and Services. Universities and Education in Industrial Safety. (8) Factory Inspectorate. (9)Summary of Conclusions and Recommendations.

Reflection on Efficiency

THE sub-committee's 'General Conclusions' open by stating that industrial accidents can be prevented by positive action, and when they happen they are a reflection on efficiency. Their formidable toll constitutes a challenge to industry, and their prevention is a task which industry must accept unreservedly. Later the report states that legislation (which must be kept abreast of industrial developments) must be observed and enforced, but this is not sufficient. There is need for more vigorous, more extensive, more sustained, and better organised efforts to prevent accidents in industry on the part of managers, supervisors and workers.

No fewer than 59 valuable recommendations for industrial accident prevention are in the report. Of these, the final one deserves special mention. This particularly as it has subsequently been accepted at a meeting of the NJAC. Here it is: A standing national committee, including representatives of Government and industry, should be established to keep under constant review progress in furthering all aspects of industrial safety and, in particular, to consider requirements in the field of research.

British Association at Sheffield



The Earl of Halifax, Chancellor, Sheffield University, confers the degree of Doctor of Science on Sir George Paget Thomson (right) on the occasion of the British Association annual meeting in Sheffield, 29 August to 5 September

A BOUT £10 million worth of antioxidants is used every year in petroleum fuels and lubricants to ensure that they have adequate oxidation stability for the jobs that they have to perform, said Mr. C. N. Thompson, senior research chemist, Shell Research Ltd., in a paper delivered before the Chemistry section of the British Association in Sheffield on 31 August. He added that this amounted to nearly 50,000 tons per annum, over 90 per cent of which was used in lubricants.

There were five main kinds of antioxidant. The type selected for use in a particular product depended on the nature of the oil product itself, and on the conditions of oxidation likely to be met in service, for example, operating temperatures and amount of contact with air and engine or equipment parts made of copper and iron, which were powerful catalysts of oxidation. Very small amounts of antioxidants could, said Mr. Thompson, effectively reduce or completely stop oxidation for long periods, 50-fold improvements in stability being common.

Two or more kinds of antioxidant could

be used together in an oil product to combat the various oxidation influences, continued Mr. Thompson. The amounts needed varied greatly with the severity of service required. The petroleum industry manufactured a great number of oil products, and much care had to be taken to ensure that the best oil product/antioxidant combination was available for each of a wide variety of purposes.

This, said the lecturer, was achieved by making use of the knowledge that had been gained in recent years of antioxidant behaviour. For example, different oil products did not respond equally well when the same antioxidant was added to them, and some could be improved in their oxidationresistance much more than others. The effectiveness of some antioxidants could vary widely according to the conditions under which oxidation was occurring. An antioxidant which was superior under one set of conditions might not be the best in different circumstances, he added.

A colour film illustrated various problems which antioxidants help to solve, and the kind of work involved in studying these in the laboratory and also in actual service.

Studies involving the assessment of antioxidant activity during the service life of an oil product were valuable in indicating oil change periods or the need for better products to withstand the more severe conditions to be expected in the future. Development work based on purely laboratory experiments might, said Mr. Thompson, give a misleading idea of the advantages to be obtained in service, largely because all the relevant factors could not easily be duplicated in the laboratory.

As to future trends, Mr. Thomposn said the jet engine would impose new demands on the oxidation stability of both lubricants and fuels. It was expected, for example, that in supersonic aircraft capable of 1,500 to 2,000 m.p.h. the fuel might have to be used to provide not only the power but also the cooling that would be necessary to overcome the 'thermal' barrier.

Antioxidants in Rubber

CPEAKING on the subject of antioxidants Din the rubber industry, Mr. J. T. Watts, manager, Rubber Service Department, ICI Ltd., told the Chemistry section of the British Association on 31 August that degradation of polymers during their useful service life could be retarded, but not entirely eliminated, by the use of materials falling into the class known as 'antioxidants'. The terminology, he said, was not exact since materials were classified as 'antioxidants' depending on the properties they imparted to rubber mixes, and not on how they behaved alone towards oxygen. Chemically, the important antioxidants were divided into two classes: - amines and their derivatives. and phenols and their derivatives.

The power, as antioxidants, shown by members of each class was approximately the same but essential differences lay in their effectiveness in presence of carbon black and in the degree of staining imparted to vulcanisates on exposure to light.

Efficiency of antioxidants in rubber was estimated from the results of a series of accelerated ageing tests, Mr. Watts continued. Broadly speaking they might be divided into six groups, the importance of each group being emphasised by certain requirements:— oven, oxygen bomb, ultraviolet light exposure, anti-flex cracking, ozone resistance and outdoor exposure, and steam exposure tests. The methods of test were essentially comparative in that the

British Association

performance of rubbers under the prescribed conditions of test were compared with the behaviour of a compound of known service performance tested under the same conditions, preferably at the same time.

Vulcanised rubber was represented by no particular chemical entity or physical mixture but was a material characterised in its behaviour, by the raw rubber used, the method of compounding and the method of curing, said the lecturer. Little was understood, in the chemical sense, about all the changes which had gone into the production of a vulcanised article, so that it west unlikely that the process of degradation could be chemically understood.

A study of model olefines had shown that the oxidation reactions were chain reactions, triggered off by a rare initiating reaction followed by a series of easy reactions changing the components until a rare termination reaction occurred. The use of model systems had not explained the chain scission reaction which was probably linked with cyclic processes.

In the past, said Mr. Watts, materials used as antioxidants had contained impurities now known to cause papilloma. Steps had been taken to eliminate such compounds from use, he concluded.

Titanium Manufacture

DR. JAMES TAYLOR, a director of ICI Ltd., delivering a paper on *The Manufacture of Titanium* before the Chemistry Section of the British Association at Sheffield on 30 August, said that modern developments in several industries had led to the commercial manufacture of some metals which until recently existed only as rare laboratory specimens. In most cases, he added, the production of the metal in the proper form and quality had demanded the working out of new techniques.

Titanium possessed the strength of steel, but was only a little more than half as heavy, Dr. Taylor continued. It showed great resistance to rusting and corrosion and its outstanding resistance to seawater, for example, made it certain that applications utilising this property would be introduced before long.

Although the existence of titanium had been known for over 160 years, it was only

Meeting at Sheffield

during the last 30 years that difficulties in its preparation had been sufficiently overcome for its valuable properties to be realised and exploited. The main difficulties, said Dr. Taylor, arose from the fact that at high temperature titanium reacted rapidly with air and with refractory crucible materials, and as a result the metal was rendered brittle and useless. Smelting methods as used for iron were useless and titanium was obtained from the ore by operations which were more typical of the chemical than of the metal industry.

The oxide ore was first roasted with coke and chlorine, yielding the liquid titanium tetrachloride. This was carefully purified by distillation and was then reacted at a high temperature with molten magnesium metal. From this reaction titanium was obtained in spongy form mixed with magnesium а chloride and magnesium. Usually the impurities were removed from the titanium by distillation at a high temperature and high vacuum, though leaching with dilute acid was also employed. More recently some producers had used the metal sodium in place of magnesium, and aqueous leaching was

then the preferred method of isolating the titanium.

The titanium sponge was crushed and melted into ingots from which sheet, bar and tube etc., was produced. Melting was accomplished by feeding the sponge into a copper crucible where it was powerfully heated by an electric arc to above its melting point of 1660°C. Melting and alloying of the crucible was prevented by cooling it on the outside with water.

Dr. Taylor concluded by saying that titanium was no longer a new, exotic metal, but had taken its place as yet another specialised engineering material. Large ingots were commonplace, and the titanium melting furnace had grown into a highly developed, fully automatic unit with surprisingly high electric efficiency. Most wrought forms of titanium was no longer a new, exotic metal, obtainable in the UK.

Research Expenditure

THERE ARE no up-to-date figures for the amount of money spent on research and development in Great Britain. DSIR has recently been carrying out surveys aimed at estimating the British investment in research and technical development. The surveys are not yet complete but preliminary estimates

At the British Association inaugural meeting and degree ceremony at Sheffield City Hall on 29 August. Left to right: Sir Charles Goodeve (Doctor of Science), Sir George Paget Thomson (Doctor of Science), Sir Raymond Priestley (President of the British Association), Dr. J. M. Whittaker (vice-Chancellor, Sheffield University), and Professor Gerard Young (Junior pro-Chancellor)



8 September 1956



BA Meeting Section 'B' Dinner at Cutlers' Hall Sheffield



at Sheffield

were given in a paper presented to the British Association annual meeting on 4 September by Mr. Ernest Rudd of DSIR Intelligence Division.

Main points in the paper are summarised below. They refer to the financial year April 1955 to March 1956.

Britain spends about £325 million on research and development; £185 million was spent in private industry, mostly by aircraft, electrical engineering and chemical firms. Between them, these three industries spent three-quarters of the total.

The amount of money spent in Government laboratories was £122 million. Payments by Government Departments for research and development work not done in Government laboratories, most of which is reflected in the £185 million spent in private industry, are shown in the following table. DSIR £ million

Grants to research associations 1.5 Grants to students and universities 0.7 Ministry of Supply

Payments to industry and universities 109.2 Admirally Research and development contracts 7.8

Research and development contracts 7.8 Nationalised industries probably spend about £4 million. A further £16 million can reasonably be assumed to have been spent by miscellaneous organisations such as research associations and universities.

In research and development in British industry 130,000 people are engaged. 30,000 of them hold a degree, or equivalent qualification in science or engineering. Only

SECTION 'B' DINNER

Top, Mr. and Mrs. W. G. Ibberson with Lord and Lady Dudley Gordon (right). Lord Dudley Gordon is a past-president of the FBI and of the Institution of Mechanical Engineers; Mr. Ibberson is a past-master Cutler of Hallamshire. Second row, left, Sir Harold Hartley, a past-president, Institution of Chemical Engineers, enjoys a joke with Mr. L. Ll. Rees; right, Lady Dudley Gordon, Mrs. Fonseka, Lady Goodeve and Sir Charles Goodeve. Sir Charles is president of section 'B' (Chemistry). Bottom row, left, Dr. A. H. Lamberton with Dr. John Dewar and Dr. D. C. Martin; right, Mr. A. W. Chapman and Sir Henry Tizard discuss chemistry. Sir Henry (right) is a past-president of the **British Association**

100,000 of them spend all their time on research and development. The rest combine this with other kinds of work. Aircraft firms lead in the proportion of manpower employed on research or development (12 per cent), followed by mineral oil refining (6 per cent), electrical engineering (4 per cent), and the chemical and allied industries (3 per cent).

Latest similar figures available for the US refer to the year 1953, which makes comparison with Great Britain a little difficult. In that year American industry is estimated to have spent £1,320 million, taking the rate of exchange at \$2.8 to the \pounds . The industries with the largest expenditures were the same as in Britain, electrical equipment, aircraft and chemicals, although their order of size is different. In America they spend half the total compared with three-quarters in Britain.

Comparison is easier using manpower figures. These indicate that industry in the US employs about six times as many graduates on research and development as does industry in Britain. The proportion of graduates employed in industry as a whole is much higher than in Britain (0.9 per cent compared with 0.26 per cent of the labour force).

Per head of the population the US spent £12 compared with £7 here at current rates of exchange.

The estimated American expenditure in 1953 was 1.5 per cent of the US's gross national product, compared with Britain's 2.0 per cent in 1955. As the American gross national product in 1953 was $2\frac{1}{2}$ times as much per person as the British in 1955, it follows that American expenditure per head on civil research and development was more than three times that of Britain.

The Prof. had Two

THE British Association annual meeting at Sheffield was not without its lighter touches.

The following paragraph appeared in *The* Star, Sheffield, on 30 August:— 'The tradition that professors are absent-minded, particularly with regard to umbrellas, is long standing, but one professor went from nis residence in Totley Hall to a meeting carrying two umbrellas—one on each arm. When this was pointed out to him he could not remember where the extra umbrella had come from.'



From all Quarters



Swiss Foreign Trade

Imports of coal, heating oil and fertilisers in June rose, but imports of raw chemicals fell. Exports have shown a rise compared with June last year. The rise is attributable to increases in certain products including industrial chemicals.

Luxembourg Fertilisers

Because of high production in the steel industry output of the by-product Thomas slag fertilisers has shown a considerable increase. March production this year was 63,319 tons (55,811 tons in 1955); April, 60,496 tons (49,097 tons in 1955); May, 61,545 tons (53,689 tons in 1955), and June this year 67,000 tons (59,494 tons in June 1955).

Pakistan Natural Gas

Slight gas indications have been encountered at a depth of 4,380 ft. during test drilling operations by Pakistan Petroleum Ltd. at Sylhet in East Pakistan. It is not yet known whether the gas is of commercial importance. The natural gas pipeline extension from the Dhulian oil field in West Pakistan to the power house of Rawalpindi Electric Supply Company has been completed, but the necessary conversion equipment is still awaited.

Mexican Oil & Petroleum

Crude oil production in the first four months of this year totalled 31,405,786 barrels, giving a daily average production of 259,553 barrels. Average daily production in 1955 was 249,537 barrels. The Poza Rica area accounted for 12,241,743 barrels and the Ocotepec-Ordunez zone for 9,127,463 barrels. Petroleum and petroleum products imported into Mexico during the first four months of 1956 were 4,895,427 barrels, worth US \$19,936,373. Petroleum exports during the same period were 9,408,770 barrels.

German Plastics at Wiltz

Wiltz, Luxembourg, has been chosen by the German Mannesmannwerk for the erection of a factory to manufacture plastic tubes and pipes.

Developments in Brazil

Plans for the construction of a refinery at Corumbá in the state of Mato Grosso have been discussed by Congress. The refinery is planned to produce 5,000 barrels a day. A consortium of three large concerns of Swiss chemical manufacturers, Sandoz, Ciba and Geigy, is to build a factory next year at Rezende in the state of Rio de Janeiro. Production is expected to begin in 1959. Lederle Laboratories, US pharmaceutical company, are also to build a factory at Rezende.

Oil Find

Oil deposits at Ozouri, 20 miles from Port Gentil, have been shown by test boring to be commercially exploitable, the Société des Petroles d'AEF (French Equitorial Africa) announces. Production is to start next year at the rate of 100,000 tons a year. Proximity of the deposits to Port Gentil will greatly facilitate the shipment of the oil.

Lonza SA

The annual report for 1955 of Lonza SA, Aeschenvorstadt, 72, Basle, stresses particularly intensified international competition in chemicals. Sales of the company's organic products on the home market were good, though sales prices were under heavy pressure. Exports showed a rise. Demand for nitrogen products for fertilisers and for technical purposes remained at the same level as in 1955. Prices for these products are below the average of Lonza's foreign competitors. New products introduced in the company's Swiss factories have produced an increase in total turnover.

Aluminium Company Formed

A new company, to be called the Olin Revere Metals Corp., has been formed by Olin Mathieson Chemical Corp. and Revere Copper and Brass Inc. Capital of the company is \$231 million and it will produce 180,000 tons of primary aluminium per year. President will be Mr. Walter O'Connell. Ownership of Olin Revere will be on a fiftyfifty basis.

Incident at Chemical Works

Operator Dies from Injuries

SOON after midnight on 15 August, an explosion occurred at Lankro Chemicals Ltd., Eccles, Lancs. (THE CHEMICAL AGE, 25 August). The ester department was involved. It is understood that the explosion took place in the stainless steel liquid return line from the distillation column to a reactor vessel.

The plant consisted of a glass-lined 500gallon steel vessel which had a jacket for heating by steam, and cooling by water. There was a mechanical stirrer, connections for charging liquids, and a manhole for charging solids. The main outlet from the top of the vessel led to a packed glass distillation column through which the vapour passed to glass condensers.

Thorough Overhaul

From the condensers the liquid flowed to a glass liquid-phase separator; heavy liquid (mainly water) sank to the bottom, the light phase was returned to the top of the distillation column to act as reflux. Liquid leaving the bottom of the distillation column returned to the reactor vessel via a stainless steel pipe. There was a bottom outlet which could be used for discharging the vessel.

Thorough overhaul of the plant had been carried out recently, including replacement of the reactor by a new glass-lined vessel. On 13 August the reactor vessel was charged with olein and butanol, and toluene sulphonic acid was added as a catalyst. Heating of the contents was effected under vacuum, this being obtained by use of a steam ejector. Normally the reaction is completed in 12 hours but on this occasion difficulty was experienced with vacuum and the plant was closed down for attention to the problem.

After repair to the ejector the reaction was continued. For other reasons the plant was closed down for a further four hours and was restarted again on 15 August. By midnight the reaction had been completed and a conventional mild bleach had been carried out, followed by drying-off under vacuum.

Shortly after this the plant operator went to the canteen and returned about 20 minutes later. Approximately four minutes afterwards an explosion occurred and completely disrupted a section of the stainless steel return pipe. The butanol was ignited and released from the liquid-liquid phase separator, flowing over the vessel and on to the ground floor. There is evidence that drying-off had been completed and vacuum released before the explosion occurred.

It is stated that other employees working in the building when the explosion occurred saw a 'red flash followed by a wall of flame' near the plant. The plant operator had reached the platform of an external staircase where he collapsed. He was rescued but died in hospital as a result of the explosion.

Alarm was sounded immediately after the explosion and a call made to Eccles fire station. Many employees entered the building with foam machines and fire extinguishers while others ran out a line of hose; the fire at ground floor level was soon dealt with by employees using water from the firm's well-water supply.

There was also fire in the distillation column. Extinguishers were used through the hole at the bottom of the column where the liquid-return line had been disrupted and the fire was subdued. It was not, however, completely extinguished, and exploded. Glass and berl saddles were scattered and caused injuries to a further 11 employees and two members of Lancashire fire brigade. This explosion smothered what fire had remained.

It has not been possible as yet to determine the cause of the initial explosion.

Means of Escape

Principles governing the provision of fire separation, and the requirements for exits is given in *Escape from Fire*, a bulletin published by the Fire Protection Association, London. The bulletin also gives guidance on where detailed advice can be obtained on the legal aspects of fire safety. A series of diagrams illustrates the points made in the text and a number of examples of fires, where lives were lost because of inadequate precautions for escape, drive home the need for proper safety arrangements.



• MR. W. J. PARKER, B.Sc., A.R.I.C., A.M.I.GasE., A.M.Inst.F., has recently joined the staff of Mervyn Instruments of Woking. A graduate of London University, he has extensive experience in research and industrial chemistry. He is specially concerned with physical methods of analysis and control. Keenly interested in polarography and a founder member and present chairman of the Polarographic Society, Mr. Parker will be responsible for the sales of the Mervyn range of infra-red spectrometric and polarographic equipment.

• MR. W. MORGAN THOMPSON, sales director of Monsanto Chemicals Ltd., has been appointed a director of Monsanto Plastics Ltd., a wholly-owned subsidiary of Monsanto Chemicals Ltd.

• On 13 September SIR ROBERT ROBINSON celebrates his 70th birthday. In connection with this event Interscience Publishers Inc. is publishing *Perspectives in Organic Chemistry* which is edited by SIR ALEXANDER TODD and dedicated to Sir Robert. In this volume a number of his pupils and friends, such as PAUL BARTLETT, LINUS PAULING, R. B. WOODWARD, KARL ZIEGLER and others have contributed essays about their particular branches of organic chemistry. Sir Robert is now on his way to the US where he is to lecture at the William Perkin centenary celebration in New York.

• All research activities in the Industrial Chemicals Division of Olin Mathieson





Left, Dr. Bruno H. Wojcik; right, Mr. W. J. Parker

Chemical Corp. have been combined under the direction of DR. BRUNO H. WOJCIK, who has been named manager of research and development for the division, it was announced on 24 August by JOHN O. LOGAN, divisional vice-president and general manager. Dr. Wojcik will be located in Baltimore. BERNARD H. NICOLAISEN has been appointed assistant manager of research and development in charge of the division's laboratories at Niagara Falls, NY, and DR. CHESTER WHITE will supervise the Rochester, NY, laboratories, formerly the Genesee Research Corporation. Dr. Wojcik came to Olin Mathieson in 1950 from the Hooker Electrochemical Co., Niagara Falls. He is known for his work in the polymerisation and high pressure hydrogenation fields, and he holds a number of patents on the preparation of organic sulphides, fluorides and chlorides.

• MR. RICHARD C. FENTON, M.A. Camb., vice-president of Pfizer International, New York, has been appointed the first chairman and managing director of the company's British subsidiary, Pfizer Ltd. of Folkestone. He has also been appointed area manager for all Pfizer undertakings in Northern Europe and Africa. MR. PHILIP V. COLE-BROOK, works and production manager of the Pfizer plants at Sandwich and Folkestone, has been elected to the board.

• MR. J. G. WISTREICH, has relinquished the post of head of the British Iron and Steel Research Association's metal working laboratory at Hoyle Street, Sheffield 3. He has taken over control of the mechanical working division in the place of MR. W. C. F. HESSENBERG, deputy director of BISRA, who will be able to devote the whole of his time to his duties. MR. S. S. CARLISLE, head of the BISRA South Wales laboratories, becomes reputy head of the division.

• The International Synthetic Rubber Co. whose £5,000,000 plant is now being erected at Fawley, Southampton, announce the MR. KENNETH G. appointment of BURRIDGE as their works manager and of MR. ALASTAIR F. CRAWFORD as secretary and accountant. Mr. Burridge who is 31, is manager of the chemical engineering § section in Dunlop's central research division and for the last four years has been working. on the process design of the synthetic rubber plant now being built at Fort Dunlop.

LEGAL STUDIES

by Peter Pain MA

LIABILITY FOR EXPLOSION

A FACTORY chemical explosion from causes which could not be explained with any certainty led to an interesting discussion of legal liability in the Court of Appeal (Moore v. R. Fox and Sons 1956: \angle . Weekly Law Reports, pp. 342). Despite the difficulty of proving exactly how the accident happened, the widow of the operative who was killed in the accident was held to be entitled to recover damages from the employers. In making this decision the Court of Appeal reversed Mr. Justice Streatfield, who had decided the case in favour of the employers at first instance.

Workman's Employment

The workman was employed as a phosphater by the defendants who are cellulose spraying and bronzing specialists. He was attending to a tank used for 'de-rusting'. The tank was filled with liquid chemicals maintained at a temperature of 140°F. and the man had to put into it the metal objects which required de-rusting, leaving them there for about 10 to 15 minutes each.

Heating in the tank, and maintenance of the requisite temperature was achieved by a thermostatically controlled regulator so ated underneath the tank and visible from the outside through a slit in the outer casing of the appliance. The burner was of the bar type, having several vents or ports. The main gas supply of the burner passed through a thermostatically controlled regulator so contrived that when the desired heat was attained the supply was automatically cut off: when the temperature fell below the required level the supply recommenced.

During the day the tank was operated continuously and the gas supply was turned on and off about once every 20 minutes. In order to ignite, or re-ignite, the burner when the supply was flowing, a pilot jet flame, which should have been about six inches in length, was provided near to the burner and was supplied by a separate pipe. There was also a third and much smaller pipe, called a "bleeder', which served to burn away the small overflow of gas from the regulator. There was, finally, a contrivance known as a 'draught-interrupter', designed to prevent a down-draught from extinguishing the burner flame.

The explosion occurred underneath the tank and blew the various components seriously out of position. It severed the main pipe at one point and put the draughtinterrupter out of operation entirely. It was agreed that the explosion was caused by an accumulation of unlighted gas mixed with air. This accumulation must have been due to a failure in the proper functioning of the pilot jet by reason of :--- (a) the workman having himself tampered with the mechanism; or (b) some kind of obstruction in the pilot pipe; or (c) the pilot pipe being out of position; or (d) some down-draught due to failure in operation of the draught-interrupter; or (e) a combination of two or more of these causes. The manager of the firm conceded that the possibility of an explosion from one or other of these causes rendered the tank potentially dangerous, if not properly looked after.

It was proved that the workman was not to blame for the explosion. The employers proved that there had been no failure in the gas supply and that the pipes and broken pieces of the machine, when examined after the accident, showed no evidence of want of maintena..ce, or any physical obstruction, particularly through the presence of tarry or gummy deposit or corrosion.

No Obstruction

They also proved that the suggestion of there having been an obstruction could be disregarded and that the mechanism should not have required any overhaul, or tampering with pipes or jets, four months after installation. It was also established that the machine apparatus had worked satisfactorily until just before the accident, from which it might be inferred that the explosion was due to some sudden and temporary obstruction which happened shortly before the explosion.

Four expert witnesses were called by the employers. The sum of their evidence was that the explosion was inexplicable; there were several hypotheses as to how the accident took place and certain of these hypo-

Liability for Explosion

theses, but not all, were consistent with an absence of negligence in the employers.

In English law the burden is always on the plaintiff to prove his case. If a thing remains inexplicable then the plaintiff fails. But this rule is mitigated by the doctrine of *res ipsa loquitur*—which means 'the matter speaks for itself'. Put more fully this rule is that where the machine or process is shown to be under the management of the defendant, or his servants, and the accident is such that in the ordinary course of events it does not happen if those who have the management use proper care, it affords reasonable evidence, in the absence of explanation by the defendants, that the accident arose from want of care.

Plaintiff called this rule to her aid, saying that if the process in which her husband met his death had been properly conducted, there would have been no explosion. The Court of Appeal accepted this submission which meant that the burden of proof was then cast upon the employers to show that the accident was not due to their want of care. They failed to discharge this burden because they could not point to any definite cause. All they could do was to speculate about a number of possible causes, some of which would not have been their fault. The Court of Appeal decided that this was not sufficient to show definitely that the accident was not their fault and therefore the plaintiff's claim must succeed.

Petrochemical Sulphur

PETROCHEMICAL sulphur plants in the US are being pushed to new production goals according to Seymour Schwartz, president of S. Schwartz & Associates, consulting engineers of New York. Reasons for this are the reduction of atmospheric pollution and various favourable economic factors. S. Schwartz & Associates specialise in the sulphur chemicals industry.

Mr. Schwartz predicts that recovered sulphur in 1956 will exceed last year's record tonnage of 401,650 by about 12 per cent. He expects the 1957 tonnage to exceed last year's figures by 36 per cent, and by 71 per cent in 1958, at which time the production will probably amount to 686,000 long tons, roughly 10 per cent of the then anticipated Frasch production.

Effect of Potash

DURING the course of the fourth meeting of the International Potash Institute, London, 1 to 3 August 1956, Dr. D. A. Boyd of Rothamsted Experimental Station read a paper on 'The Effect of Potash on Crop Yield'.

The paper brings together the results of a large number of annual experiments carried out in Great Britain on the effect of potash on crop yield. Expressed as a percentage of the mean yield, the largest responses were obtained from potatoes and somewhat smaller responses from root crops and beans; in general the effect of potash on cereals was small. Responses in Scotland were approximately double those obtained in England.

The average effects of potash obtained from a four-course rotation experiment at Saxmundham and of six-course rotation experiments at Rothamsted and Woburn are also discussed. At Saxmundham, where the fertiliser treatments are repeated annually on the same plots, beans and clover were more sensitive to shortage of potash than wheat, mangolds or barley. At Rothamsted and Woburn, where substantial maintenance dressings of potash were applied during the rotation, only potatoes at Rothamsted gave substantial responses.

The interaction of potash with farmyard manure and with other fertilisers is briefly discussed.

Prompt Action Saves Acid

Prompt action was taken by ICI chemists on 28 August when a tanker carrying nitric acid developed a leak. The tanker, which was travelling on the Stockton-Darlington road, lost about eight gallons of acid as a result of a faulty flange. A lorry load of chalk was rushed out to neutralise the escaped acid, and fitters with face masks and rubber gloves mended the flange. The tanker was then able to continue on its way with its 10-ton load.

Across the River

The Cementation Co. Ltd. has moved from Victoria Street, London SW1, to a new office south of the Thames. The new address is: PO Box 151, 20 Albert Embankment, London SE1. The new telephone number is Reliance 7654, the telegraphic address, Grouting, London, Telex, and the cable address, Grouting, London.

Plant Construction

Report of a paper

by N. P. Inglis, M.I.Chem.E., F.I.M.

T WOULD be impossible in the prescribed space to cover the whole field of recent advances in metals which might be used for chemical plant and the paper therefore concentrates on developments in chromiumnickel austenitic steels, recent advances in welding and other forms of fabrication of copper-base and aluminum-base alloys, and the emergence of titanium as a completely new addition to the range of metals available to the chemical engineer.

In the field of chromium-nickel austenitic steels, reference is made to the relative merits of titanium and niobium as carbide stabilising elements and the tendency for US practice to change to the British practice of using titanium rather than niobium. The superiority of the niobium addition in the special case of resistance to concentrated nitric acid is mentioned, but recently published work suggests that by suitable modification of the carbon and titanium contents the titanium stabilised steel can be made equally satisfactory in this case.

Extra Low Carbon Steels

The development of the extra low carbon chromium-nickel austenitic steels is mentioned but the paper suggests that the value to chemical industry may not be as widespread as might be thought at first sight. The addition of other elements, particularly molybdenum and copper, to improve the range of corrodents to which these steels are resistant, is discussed, together with some of the metallurgical problems to which such additions give rise. The work now in progress to develop a corrosion-resistant steel of much higher strength than previously is briefly mentioned and the possible interest to the chemical industry discussed.

Reference is also made to the present serious nickel shortage and the relatively unsuccessful attempts so far to substitute manganese for some of the nickel content of this class of steel. The relatively good high temperature strength of the chromiumnickel austenitic steels is pointed out, but developments, mainly in connection with gas turbines and jet engines, have now made available complex steels and alloys with good creep strength at temperatures

Metals as Materials

In our issue of 18 August (p. 295) we published an article on 'Plant Construction With Non-Metals as Materials'. The present article, which is also a summary of a lecture delivered at the 75th annual meeting of the Society of Chemical Industry, describes some of the more recent advances in metals of use as materials of chemical plant construction and new methods of fabricating these metals into the shapes and parts required by the chemical industry.

approaching 900°C, and such metals may have considerable potential for high pressure/high temperature plant.

the traditional non-ferrous metals In field-copper, aluminium, and their alloyschief emphasis is on the important developments which have recently taken place in methods of fabricating these metals. Argon arc welding and inert gas-shielded arc welding with consumable electrodes have greatly simplified and improved the welding of these metals. This is illustrated by the very large vessels for chemical plant made by these improved methods. An entirely new form of construction is described for making sheets of metal with tubes and tube patterns integral with the sheets. It is suggested that the availability of this new product will be of great value to the designer of heat transfer equipment.

Similarly, the design and cost of heat transfer equipment should benefit by the methods developed for making tubes with integral fins and the paper gives illustrations of such finned tubes made in steel, copperbase alloys, aluminum, titanium, and also of the bi-metal type.

Uses of Titanium

Although the very rapid development of titanium and titanium-base alloys during the past six years was mainly sponsored by the attractiveness of this metal to the aircraft industry, its combination of high strength and very great corrosion resistance must merit careful consideration by the chemical plant designer.

While its resistance to a very wide range of meria is briefly mentioned, its outstanding

Monsanto Expansion

IMPORTANT developments in the manufacture in Great Britain of new industrial chemicals from petroleum were announced by Monsanto Chemicals Ltd. on 30 August.

The company plans to spend some $£8\frac{1}{2}$ million on the first stage of a long term expansion programme. As was indicated in the company's report for the year 1955 a new factory will be constructed on a 100-acre site alongside the Fawley, Hampshire, refinery of the Esso Petroleum Co. Ltd., from which Monsanto will draw feedstock for conversion into a wide variety of raw materials for use in the plastics, textile, rubber, paint, paper and other manufacturing industries.

The first plant to be erected will be for the manufacture of 10,000 tons of polythene a year. Survey work is being carried out on the site, construction will begin shortly and production is scheduled to start in 1958.

The next products in the company's programme will be copolymers of acrylonitrile, butadiene and other monomers. The copolymers have a wide range of uses in the rubber, paint, plastics, paper and other industries.

Following this a major plant is to be constructed for the manufacture of acrylonitrile, a chemical not yet made in this country. Acrylonitrile is an essential raw material for synthetic polymers and synthetic fibres.

Plant Construction

resistance to the most ubiquitous corrodent in chemical plant, namely water, is discussed in some detail. Test results are given for high speed turbulent conditions, deposit attack or shielded area conditions, and conditions involving a combination of corrosion and erosion with sea water as the corrodent in all cases.

It is shown that of the large number of metals subjected to this series of tests, titanium was the only metal which gave completely satisfactory results in all tests. Fatigue and corrosion-fatigue data are quoted which show that titanium is completely immune to corrosion-fatigue effects in sea water—a result not found for any other of the large number of metals similiarly tested. The relatively high price of the metal is considered but there may well be circumstances, which are discussed, where its use could be economically justified.

Dyestuffs Development Procion Range Introduced by ICI

THE dyestuffs division of Imperial Chemical Industries Ltd. has introduced the first three members of a new range of dyestuffs—the Procion dyestuffs—which are of a unique type, and will be of interest to dyers and printers, particularly dyers and printers of cellulose fibres. The first three to be made available are a yellow, a brilliant red, and a blue.

The Procion dyestuffs are dyes of an entirely novel type and the first to be introduced to the dyeing trade that achieve their high wet fastness by formation of a chemical bond between dye and fibre. For over 60 years it has been a target of dyestuffs research to find a means whereby simple dyes with low physical affinity for cellulose fibres could be made, and then induced to react with the fibre to produce a very high degree of wet fastness. It is claimed that this target has been achieved with the Procion dyestuffs.

The reaction between the Procion dyestuffs and cellulose fibres proceeds rapidly under alkaline conditions; and this fact enables them to be applied by an entirely novel cold dyeing technique in conventional dyeing machinery with a consequent improvement in control over the process, a saving in steam and an improvement in dyehouse conditions.

The low physical affinity and high aqueous solubility of the Procion dyestuffs renders them particularly suitable for continuous application with freedom from 'tailing', particularly by a new pad/dry technique which has been developed for their use.

Thus Procion dyestuffs can be applied continuously with the minimum of capital expenditure. Dyers already possessing pad/ steam or Standfast Molten Metal continuous dyeing machinery will also be able to use the Procion dyestuffs.

Oil Search in Papua

Drilling for another deep test well has begun in Papua, where the British Petroleum Co. Ltd., is searching for oil in association with Australian and American interests. The new site is known as Barikewa, and is four miles south-west of the middle reaches of the Kikori river. A second new site for a deep test well has been chosen in southwest Papau, and a rig is being erected close to the Morehead river.

Handling Sulphuric Acid

IN RoSPA's *Industrial Bulletin* (current issue) there is a reply to one of the Society's industrial members who is concerned to secure maximum protection for operators who have to transport, dilute and extract sulphuric acid from carboys.

The inquirer is referred to the publication: Acid Handling—the Transport and Handling and **H**ydrofluoric of Sulphuric Acids (Imperial Smelting Corporation (Sales) Ltd., 37 Dover Street, London W1) (10s 6d). Later, the Bulletin says there are no regulations concerned specifically with sulphuric acid, but its manufacture and recovery are covered by the Chemical Works Regulations, cerned, acids generally are covered by section 18 (Vessels containing dangerous liquids), and section 47 (Removal of dust or fumes likely to be injurious to persons employed).

Another source of information given is the ABCM publication Marking Containers a System for Warning Labels for Containers of Hazardous Chemicals. The recommended label for sulphuric acid is quoted: 'Corrosive—Causes Burns. Avoid contact with skin, eyes and clothing; do not put water into container. In case of contact or spillage, drench with water; for eyes, give prolonged irrigation with water and get medical attention.'

Gifts to Technical College

Alderman Revis Barber, chairman of Bradford Education Committee, announced on 27 August that three firms were making gifts of equipment and money to a total of $\pounds 1,350$ to Bradford Technical College. The firms are Imperial Chemical Industries, who are giving a Pegg high temperature dyeing machine worth $\pounds 800$; the British Optical Association, a $\pounds 300$ co-incident optometer: and the Shell Chemical Co., who are to donate $\pounds 250$ toward the cost of an electric motor for the raw wool scouring set.

NCR Co. Uses Fibreglass

Among the many uses which have been found for Fibreglass is that of casings for the Class 31/2 accounting machines made by the National Cash Register Co. The raw fibreglass is obtained in a soft, pliable form and is moulded and treated with resins by Ashdowns Ltd. of St. Helens, Lancashire, to make it rigid.

Postmen Fight Smog

ABOUT 20 to 30 postmen in London and Manchester are volunteering to wear 'smog' collars this autumn—should it be necessary —to neutralise the harmful effects of smog. This experiment is being undertaken in cooperation with the Treasury Medical Service, the Department of Scientific and Industrial Research and the Union of Post Office Workers.

As it has been found that ammonia vapour was a cheap and helpful method of neutralising smog, the Department of Scientific and Industrial Research produced small individual containers of ammonia which people, especially those suffering from chronic bronchitis, could carry around with them when walking about in the fog. A scarf was first proposed but later it was decided that a plastic collar fitted with an ammonia bottle would be more suitable.

In view of the importance of Post Office work the Treasury Medical Service suggested that postmen should be asked to volunteer for the experiment.

Plastic Finishing

AN ENTIRELY NEW conception of plastic finishing is described in Technical Bulletin No. 2210, published by Horwitch Smith & Co. Ltd., Pensnett, Staffordshire. Polythene, Perspex, epoxides and nylon resin powders can be applied by the 'fluiddip' process giving finishes and linings which are colourful, adhesive, protective and electrically insulating on metal articles. For the 'fluidisation' of the various polymers used, a whirl sinter apparatus is necessary. This company's Whirl Sinter Unit has a ceramic base through which air or nitrogen is forced under pressure. Overlying plastic powder becomes a homogenous cloud of articles which evenly coats polymer immersed in the cloud. The thickness of the coating is stated to be controlled within fine limits and very high production finishing rates can be maintained. Other advantages of the Whirl Sinter process are a short working cycle, no loss of plastic material and positive and continuous linings, particularly of complex shapes such as narrow channels or deep hollows and drillings. If nitrogen is used, oxidation is almost completely prevented. Only simple equipment is necessary, i.e., heating burner (welding, blow lamp etc.) holding devices (tongs, pliers etc.).

Clean Air Scheme West Midlands Move

ON 4 JULY, the Clean Air Bill received Royal Assent. It is a comprehensive measure of 37 sections and four schedules and a summary of the Act has now been published by the National Smoke Abatement Society, Palace Chambers, Bridge Street, London, S.W.1, as a 12-page handy reference booklet, costing 6d.

In the West Midlands, a score of local authorities and the Solid Smokeless Fuels Association have combined to sponsor a clean air campaign. The campaign will start in Dudley, considered to be the centre of the Black Country, on 9 September. Associated with the campaign is an exhibition composed of several general displays designed to be shown in the towns visited. Each local authority will be responsible for additional exhibits.

A comprehensive tour for the campaign and exhibition has been planned. From Dudley, it will move to Darlaston, then to the Potteries, return to the Black country with a visit to West Bromwich, and then go to Halesowen, Oldbury and Wednesbury. Wolverhampton will be visited early in 1957 and then Coventry, Nuneaton, Rowley Regis and Walsall. Birmingham is likely to have two periods, one in March (7 to 13) and the other extending into April (31 March to 6 April).

Now Making Cholesterol

A Bradford firm is now the world's largest producer of chloesterol, said Professor J. B. Speakman of Leeds University, on 22 August. Mr. C. O. M. Stewart, executive director of W. & J. Whitehead Ltd. had been responsible for the discovery of a method of extracting cholesterol from wool wax alcohols said Professor Speakman. For many years Britain had to pay dollars to the United States for supplies of this material.

Record Aimed At

West Germany is aiming at record exports of potash fertilisers this year it is reported from Bonn. In spite of an output second only to the US, West Germany still lags in the export field behind her main rival, East Germany. In the year ended 30 April last, West Germany exported 700,000 tons of potash fertilisers worth about £17 million. Total production was 1.67 million tons.

BAC Join New Federation

THE British Association of Chemists is to join the Federation Internationale des Cadres de la Chimie et Industries Annexes.

This was announced after a delegation from the Association attended the FICCIA meeting in Paris last June.

Associated with the Federation Internationale des Cadres, the Federation was founded by members from Switzerland, Great Britain, Belgium, France, Italy, and Germany and its aims are mainly the protection of professional and economic interests of chemists, their high level representation, and the furtherment of international relations. The regulations of the Federation, approved by the member include the abstinence from political activities, and the complete independence of each member.

Honorary officers are Dr. Ferrero (Switzerland) president, Dr. Guthke (Germany) vicepresident, M. Caillaud (France) general secretary, and Mr. Langdale (Great Britain) treasurer.

It was decided that problems to be dealt with immediately were the top level representation of chemists, and the position of the middle-aged chemist seeking a post.

SIMA at Swedish Fair

THIRTY-FOUR instrument firms of the Scientific Instrument Manufacturers' Association, acting in collaboration with the Board of Trade, are displaying examples of British instrumentation in the fields of optics, laboratory apparatus, electrical, electronic and nucleonic equipment and measuring instruments at the St. Erik's Fair, Stockholm, from 12 September. The British area, covering 5,000 sq. ft., will be entitled British Scientific Instruments.

Synthetic Rubber Plant Extensions

Extensions costing several million dollars are being made to the Shell Chemical Corporation's synthetic rubber plant at Torrance, California, US. A new unit, to be finished this autumn, is being built to produce special synthetic latex for foam rubber goods. The copolymer plant for the manufacture of synthetic rubber is being enlarged and its capacity raised from 89.000 tons to 110.000 tons per year for a wide range of rubber types. The butadiene unit is being extended and a new research laboratory and pilot plant is being built.

Publications & Announcements

PROBLEMS of plant operation and of dependability encountered in modern highand pressure ultra-high-pressure steam power stations have led to the widespread adoption of automatic control systems. The principal article in the Sulzer Technical Review, No. 4, 1955, investigates the mathematical basis of pressure and furnace control in steam generators in the light of presentday technical developments. Account is also taken of reheating, which is now being used on a growing scale. The second article describes the district heating station attached to the city of Berne's refuse incinerating plant, a modern example of the economical disposal of waste. Cascade-type transformers, accumulators, pumps, regulating equipment, water-treatment plant and distribution piping supplied for the district heating station by Sulzer Brothers are detailed. High-temperature panel heating systems installed in French and Swiss factories are considered in another article. The last article is an account of refrigerated egg stores for surplus eggs produced in the main laving season. Storage methods are explained and descriptions given.

THE REPORT of the Analytical Methods Committee of the Society for Analytical Chemistry, covers the work of the Committee since its re-organisation in 1955, and of a very active joint committee of the Society and the ABCM which is preparing recommended methods of analysis of trade effluents. The first three methods were published in The Analyst in January, three more in the March issue and between 20 and 30 others are nearing completion. A two-year Research Studentship at AERE, Harwell, has been awarded for studying trace elements during analysis, using radiochemical techniques. The report may be obtained from the Secretary of the Analytical Methods Committee, 20 Eastcheap, London EC3.

* *

A LUBRICATING oil-blending installation which has recently come into service at Wien-Simmering, Austria, includes what is claimed to be the most modern grease unit in Europe.

Planned by Shell in 1950, these facilities will add materially to the domestic output

С

of high-grade products, which previously had to be imported to meet increasing industrial demand. The combination of the new units and the refinery at Floridsdorf will enable Shell Austria AG to manufacture some 225 products representing 75 per cent of the total it requires for home markets. Indigenous raw material will be used almost exclusively.

The installation consists principally of three main plants: One for grease manufacture, one for oil-blending, and one for the manufacture of products from mineral oils and chemical raw materials.

Peracetic Acid

RELATED to acetic acid, peracetic acid is a new petrochemical developed by Union Carbide & Carbon, US. Claimed to be as significant as the earlier development of ethylene glycol, basis of anti-freeze for cars, peracetic acid is made from acetaldehyde, also used to produce acetic acid. The two materials can be produced by the one process without any reduction in the supply of acetic acid. Plans are now under way for a plant to produce between 25 and 50 million lb. of peracetic acid a year. Its applications are expected to include the plastics field, germ killers, textile bleaches and perfumes.

US World Trade Fair

British industry will be well represented at next year's World Trade Fair in New York to be held 14 to 27 April at the new Coliseum in New York City. In the light engineering section various machinery and industrial accessories will be exhibited as well as scientific instruments. Rubber goods will be shown by one of Britain's largest manufacturers in the field.

Record German Oil Products

West German production of finished mineral oil products exceeded the one million tons mark for the first time (in July), the Association of West German Crude Oil Producers and Processing Firms announced recently. The increase was said to be chiefly due to a higher output of fuel oil, jet fuel, fluid gas and bitumen.

Metal Recovery in US

Important New Process Revealed

R EVOLUTIONARY new method for recovering the rare but important metals tantalum and columbium from ores, concentrates, or smelter slags has been developed by the US Bureau of Mines, the Department of the Interior disclosed last week in releasing a technical report on the process.

Rare and costly, both metals are vital to a nation in peacetime and essential in war. Tantalum is used chiefly in electronic equipment. Columbium is necessary in making special high-temperature alloys employed in jet planes and guided missiles.

Tantalum and columbium occur together, and they are chemically so much alike that for 100 years their seperation has been one of chemistry's most difficult problems. The method commonly used today, a modification of one first suggested nearly a century ago, can be used economically only with high-grade ores or concentrates. The new method developed by Bureau researchers is more efficient and promises to enable industry to utilise low-grade materials.

200 Combinations

Kenneth B. Higbie, Bureau physical scientist now at Washington, DC, and Joseph R. Werning, now with the University of California, Berkeley, prepared the report, based on two years of research at the Bureau's electrometallurgical experimental station. Albany, Oreg. On a laboratory scale, they experimented with some 200 combinations of various organic solvents and mineral acids for separating columbium from tantalum by a technique known as liquid-liquid extraction. When this process is used, the valuable metals in the feed material are first dissolved in an aqueous (water-based) solution. To this is added a second solution, usually an organic solvent, which, like oil in water, will not mix. When the two are churned or shaken together, the organic solvent extracts one of the metals, leaving the others.

From the 200 combinations studied, two were selected for extensive laboratory tests. In the more promising of the two, the mixed metals were dissolved in a solution of hydrofluoric acid and hydrochloric acid and then extracted with methyl isobutyl ketone. The methyl isobutyl ketone extracted the tantalum, leaving the columbium in the acid solution.

Swedish Fuel and Power

SWEDISH half-yearly trade statistics recently published, reflect the continued changeover from solid to liquid fuels. Thus, compared with the corresponding period January to June last year, imports of coal were down by 330,000 tons to 1.11 million tons and imports of coke were 120,000 tons lower at 1.10 million tons. Imports cf petroleum products, which totalled 3.0 million tons during the first half of 1954 and 3.7 million tons during January-June 1955, rose, to 4.8 million tons during the first half of this year, an increase of no less than 57 per cent compared with two years ago.

It is understood that Stockholm Municipal gas works is considering plans to use oil instead of coal as raw material for the production of gas. Prices of coke (and of metallurgical coke) from West German coke suppliers to Sweden have risen substantially.

Static Electricity

THE MANNER in which static electricity is formed and in which charges accumulate is dealt with in comprehensive manner in *The Fire Hazard of Static Electricity* (Booklet 29), recently publish by the Fire Protection Association, London. The booklet suggests methods by which static electricity may be dispersed or suppressed, and recommends precautions that can be taken in various processes, and in the handling of flammable liquids and dusts, to counteract the risks that arise.

Age No Bar

Fifty candidates have been admitted as associates of the Textile Institute as a result of the annual examinations. Eight of the successful candidates are over 40 and three, Mr. David Cuthbertson of Nottingham, Mr. William Markham of Manchester and Mr. James Watmough of Bradford, are 50 or over.

Subsequent separate treatment of the two solutions yielded both columbium and tantalium oxides of more than 99 per cent purity; recovering the metals from these presents no special problem. The report says that the process appears feasible for in dustrial use, is suitable for treating low-grad concentrates, and is effective regardless of the columbium-tantalum ratio of the feed material.

8 September 1956

Eye Accidents

SOME INTERESTING INFORMATION on 'Industrial Eve Accidents' by Miss B. P. Park was published in the Journal of the Industrial Safety Officers, May 1956. The article is now available as a reprint. It was under section 49 of the Factories Act 1937 that eye protection on certain industrial operations became a legal requirement and a number of statutory rules and orders have since been issued. The author of the article states that, in spite of the variety of goggles and other protective devices available today, there are still a large number of eye accidents in factories and workshops. She points out that, ideally, prevention of accidents hould start in the design or planning stage of any machine. The next line of defence should be the screening of processes and the fitting of safety devices to existing machines, thus obviating, where possible, the need for The difficulties encountered in goggles. persuading workpeople to wear protective eye equipment are considered. Regular inspection of eye protective devices and maintenance of a repair service is recommended. It is pointed out that education of workpeople regarding the value of eye protection in preventing accidents must not be neglected by the safety officer, and the problem of defective vision should not be overlooked. Part of the article is devoted to the cost of a complete eye protection programme.

US Visitor

Dr. Walter J. Murphy, editorial director of the American Chemical Society's 'applied' journal who has been in UK on a short visit (THE CHEMICAL AGE, 1 September), recently spent a day at the Folkestone and Sandwich plants of Pfizer Ltd., before moving on to Frankfurt and Lisbon. Dr. Murphy was accompanied by his European editor, Mr. William Q. Hull. Dr. Murphy has recently stated that the total number of editorial pages published annually in the ACS 'applied' journals increased from 3,453 in 1943 to 9,087 in 1955.

Restrictive Practices

The Board of Trade has directed the Monopolies and Restrictive Practices Commission to continue the reference on chemical fertilisers. The reference is being adapted to the Commission's new terms of reference under the Restrictive Trade Practices Act, 1956.

Rain Repellent for jets

THREE chemists have worked for four years on behalf of the US Navy Department's Bureau of Aeronautics to formulate a rain repellent to eliminate the need of mechanical windshield wipers in high speed jet aircraft. The repellent is composed essentially of silicones and a combination of natural and synthetic waxes. Prior to coating glass or plastic windshields, with the repellent, a black bonding paste is applied to the solvent cleaned surface, followed by an application of wax, which is buffed in with a cloth until it disappears. Each application will last for several days of heavy rain. The repellent sets up a hard coating on the windshield which makes water behave more like heavy beads of mercury. The rain is swept off in beady droplet form by the wind and speed of the plane.

British Standard Revised

The British Standards Institution announces the publication of a revision of the BS 874:1956. Part I of BS 874 contains definitions of heat insulating terms and a summarised list of relevant symbols and dimensions of units. The measurement of thermal conductivity and emissivity is described in Part II, including methods used for different types of materials for various temperature ranges. Conversion tables for units in common use are provided in the appendices.

Neoprene Lecture

'Neoprene and Hypalon—Recent Developments' is the title of a lecture to be given at the Savoy Hotel, London, on 20 September by Mr. Neil L. Catton, author of *The Neoprenes* and assistant sales manager for Neoprene and Hypalon products of E. I. du Pont de Nemours & Co. Inc., which are marketed in Great Britain by Durham Raw Materials Ltd. A reception will be held at the hotel after the lecture.

SAC Meeting

At an ordinary meeting of the Midlands section of the Society for Analytical Chemistry to be held on 11 September 1956 at 7 p.m. in the Mason Theatre, the University, Edmund Street, Birmingham 3, Mr. W. E. Clarke, A.R.I.C. (British Cast Iron Research Association, Alvechurch) will read a paper on 'Recent Advances in the Analysis of Cast Iron and Foundry Materials.'

Coking-Plant Wastes

A METHOD of purifying coking-plant liquid wastes, which contain phenol has been presented by H. Guinot and X. Tinchant (Chimie & Industrie, 1956, 75, 1304). Use is made of the formation of trichlorophenols when chlorine reacts with a strongly acidic phenol solution. Since the trichlorophenols are sparingly soluble in water, they are precipitated. The small amount of trichlorophenols remaining in solution can be easily extracted by solvents such as benzene and petroleum which have high extraction coefficients (about 80 to 200) for trichlorophenols. Chlorination also gives oxidation some other rise to of labile impurities in the wastes, and a high degree of purification results. Finally, the authors suggest that the usual solvent extraction technique may be combined with acid chlorination, which gives purified cokingplant liquid wastes after neutralisation with lime.

Suggested Titanium Process

A POSSIBLE route to elementary titanium from titanium sulphide has been reported by R. Schwarz and R. Köster (*Z. anorg. Chem.*, 1956, **285**, 1).

A sulphide of a constitution between TiS_2 and Ti_2S_3 was formed by *passing* hydrogen sulphide and carbon disulphide vapour over pure titanium dioxide at a temperature between 900-1,000°C. The sulphide was then treated with various reducing agents such as hydrogen, aluminium, calcium, calcium hydride and magnesium. A pure product (98-99 per cent titanium) was obtained only with magnesium.

The titanium disulphide mixed with twice its weight of magnesium was pressed into small briquettes which were heated in an argon stream at 1,000°C. Magnesium sulphide and excess magnesium were then dissolved out with 1N hydrochloric acid in the absence of air and the titanium separated by filtration. Adsorbed hydrogen was separated by heating in high vacuum; the titanium was then sintered under argon or in high vacuum as otherwise the product was pyrophoric.

Uranium for Switzerland

As part of a trade agreement between Switzerland and US, the US is to sell 500 kilograms (nearly half a ton) of Uranium-235 to Switzerland for the development of peaceful uses of atomic energy.

Earnings Increased

AN IMPROVEMENT of \$1,280,991 in net earnings for the first six months of 1956, compared to the same period of the previous year, is reported by Canadian Chemical and Cellulose Co. Ltd.

Net profit after taxes was \$310,919 compared with a loss of \$970,072 in the comparable period of 1955.

The report issued by Mr. M. W. Mackenzie, president, states that production of cellulose acetate at Edmonton, which was interrupted by an explosion on 5 December 1955, was resumed on 12 March 1956. In consequence, net sales volume for the six months' period was adversely affected; however, insurance carried against such an emergency covered continuing overhead and operating costs.

Mr. Mackenzie noted that results thus far in 1956 confirmed the general forecast made earlier of profitable operations for the full year of 1956.

Net sales in the first half of this year amounted to \$19.6 million, about \$1.5 million above the same period of 1955 and nearly \$100,000 above the last half of last year. Operating profit was \$5.4 million in the first six months of 1956 (compared with \$4.2 million and \$4.7 million in the previous periods cited).

Net profit as reported remained after providing for \$1.8 million of interest on bonds and notes; just under \$3 million for depreciation; \$110,253 for bond discount amortisation; \$135,032 for write-off of pre-operating expenses, and \$58,208 for income taxes.

Investments in Argentina

New proposals approved by the Argentine Ministry of Finance for the investment of foreign capital in Argentina include a plant for the manufacture of antibiotics by a US company at a cost of US \$2.5 million and plans to spend US \$847,000 in constructing a plant to produce thermoplastic raw material by the Venezuelan subsidiary of a US concern.

Israeli Bromine

Exports of bromine from the Dead Sea bromine factory are expected to commence this autumn after production tests are concluded. The factory, built at a cost of I£2 million with equipment financed from German Reparation Funds, will have a capacity of 2,000 tons per annum. 8 September 1956

REMOTE CONTROL of VALVES

Right, Telektron motorising unit fitted to a valve. Manual adjustment can be made without difficulty

STANDARD motorising units supplied by Telektron (Great Britain) Ltd. are meeting many marine and industrial demands for the remote control of all types of standard valves. These motorising units can be fitted to valves in situ and among their many untysual features are extreme simplicity and suitability for incorporation into both simple and complex control systems.

The equipment is suitable for operation from 3-15 p.s.i. control signals and is proving especially suitable for group process valve control. The photograph shows a twomotor set which is capable of producing a maximum torque of 100 lb. ft. at an applied air pressure of 10 p.s.i. fitted to a standard parallel slide valve.

A recent development in valve control has been the design of a small compact control panel which provides the operator with the same flexibility and sensitivity of valve adjustment as can be achieved by manual control of the valve handwheel. The panel provides valve adjustment at both high and low speed together with step-by-step movement and position indication.

Motorising Unit

The simple standard motorising unit is fitted to the valve and connected to this control panel by only four small bore air lines. A single valve may be controlled from one or more of these panels arranged in parallel or with a master and secondary panels. The lever type control provides high or low speed operation in either direction, the low speed being adjustable by the operator on the panel face.

Push buttons provide step-by-step adjustment in 36, 58, 76 or 100 positive steps per revolution of the valve handwheel. For each push of the button one step only is taken however long the button is depressed.

A feature of the control panel is the special dual purpose lever control switch having a spring-loaded head, the depression of which in the operational position alters the speed from the adjustable slow



speed to full speed. This switch has many other uses in connection with the Telektron motorising units and is frequently used to provide a single control for interlocked normal or step-by-step operation. For this application, movement of the lever in either direction produces a single step, unless the head is depressed in the neutral 'off' position when movement of the lever in either direction sets the motorising unit into normal continuous operation.

As the head must be depressed from the neutral position it prevents any danger of accidentally putting the unit into normal operation when a single step adjustment is required.

The Telektron motorising units ensure tight valve closure as they are designed to stall against the valve seats at any desired torque selected by adjustment of the applied air pressure. The stalling torque of the units is proportional to the applied air pressure, tooth-wheel size and motor combination.

Differential power can be provided to ensure that valves on which there is a tendency to wedge when closed tight can always be unseated, and provision can be made to prevent similar difficulties arising at the fully open position.

Another and interesting control arrange-

Aluminium Foil

HEAT-SEAL COATED Venesta aluminium foil has been adopted for packing Macprin Buffered Aspirin, the most recent product of Macleans Ltd.

Because of its very nature, Macprin readily disintegrates and is extremely susceptible to moisture.

These two characteristics made it impracticable to pack the tablets in the customary glass bottle, and heat-seal coated 0.03 mm. Venesta-foil was decided upon as the most efficient medium for packaging the tablets.

Experiments and stringent tests extending over two years were carried out before it was established that only foil gave the complete protection required.

Venesta foil is manufactured by Venesta Ltd., Vintry House, Queen Street Place, London EC4.

New Exchange

The telephone number of Dr. R. Lessing of 3 Thorney Court, Palace Gate, London W8, has been changed to: Knightsbridge 8935.

Remote Control of Valves

ment designed by this company is for open/ close valve control with end-point indication and assurance of tight closure from a control panel comprising only two push buttons, one for each direction of travel. When either push button is pressed the head remains depressed until the valve has stalled against its seat which causes the button to fly out again, cutting off the air supply and indicating that the end position has been reached.

An important feature of the Telektron motorising and position indication equipment is the very low air consumption, less than three cubic feet of free air per minute for the single motors and a tenth of a cubic foot for the position indication equipment, enabling a very small emergency air suppiv cylinder to be used to provide sufficient air storage for valve operation and position indication after power and compressor failure. Arrangements are often made to provide for automatic valve movement to the safe position in the event of such failure. In addition manual control is always available at the valve, unless the motorising equipment is in operation, without the complication of clutch or other mechanism.

Price Freeze

LABORATORY furnishers who are members of the British Laboratory Ware Association have decided to stabilise the prices of the laboratory equipment and apparatus, other than chemicals, they manufacture and distribute, for a period of six months from 1 September 1956.

This decision applies to the prices, for the home and export markets, fixed by each laboratory furnisher individually for their own proprietary goods and for non-proprietary goods, and is subject to the costs of materials and wage rates remaining stable.

In order to make this policy as effective as possible, says Mr. N. McKinnon Wood, chairman, the British Laboratory Ware Association approached the principal manufacturers of proprietary goods, for whom the laboratory furnishers act as stockists and distributors, and has obtained an encouraging measure of collaboration in this policy of price stabilisation. The laboratory furnishers will, however, have to charge for proprietary goods at the prices fixed by individual manufacturers.

S. African Methane . . .

African Explosives & Chemical Industries Ltd. are now setting up a plant at their Klipspruit cyanide factory near Johannesburg to synthesise methane from carbon monoxide and hydrogen generated from coal. The methane will be used, in addition to the methane obtained as a by-product in the digestion of sewage at the nearby municipal sewage works, to increase the output of cyanide for use in the gold mines. Units for the plant have been supplied by French, German, British and South African companies. Local raw materials only will be used by the factory.

. . . and Titanium

African Explosive & Chemical Industries and British Titan Products will set up a plant at Umbogintwini, Natal, South Africa, to manufacture titanium dioxide from ilmenite deposits on the south coast. Installation should be completed by the end of 1958. It is hoped to obtain 8,000 tons of the pigment a year. Sulphuric acid required in the process will be obtained from a chemical products factory to be set up in the same area. This will be the first South African sulphuric acid plant. The sulphuric acid will be used mainly in the preparation of superphosphates. THE CHEMICAL AGE



HAND SIZES -FIVE LENGTHS

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Plant for Producing Silver Nitrate

PLANT which, according to Kestner Evaporator & Engineering Co. Ltd., London, manufactures a very large proportion of all the crystalline silver nitrate made in Great Britain, has recently been installed by the company.

On this page is a simplified flow diagram of the unit. The silver is dissolved in a Kestner-Johnson patent dissolving plant which enables the continuous production of 66 per cent silver nitrate solution to be achieved without the formation of any obnoxious liquid or gaseous effluent, and with a complete conversion of all the nitric acid to silver nitrate.

The liquor is then preheated to boiling point and passed to a Kestner climbing film evaporator from which it passes to a Krystal type crystalliser. Part of the liquid from this crystalliser is purged and treated to remove impurities; it is then reconcentrated in a further climbing film evaporator, and returned to the crystalliser. The product, crystal slurry, is centrifuged and

A New Installation

the resulting crystal product redissolved in hot distilled water.

This solution is passed to a further Krystal crystalliser from which some of the liquid is continuously evaporated in a third climbing film evaporator. The final crystal slurry is centrifuged, and the product crystals passed to a rotary hot air dryer which yields dry high-purity, silver nitrate crystals.

Interesting features of the plant are: Use of FMB stainless steel as the material of con-, struction and Fluon gaskets throughout recovery of the condensate from the evaporators which is then used as distilled water n the manufacturing process; very high silver nitrate concentrations achieved by the evaporators; and the extensive instrumentation which enables close control of operating conditions and product quality to be achieved by a minimum number of operatives.

Kestner supplies plant to produce other metal nitrates such as, nickel, bismuth, cobalt, lead, uranium and cadmium.



Flow Diagram for Silver Nitrate

Ion Exchange today performs many tasks in industry, and Permutit manufactures a wide range of these materials. Their application in roles distinct from water treatment has resulted in the development of numerous new industrial processes

these materials. Their application in roles distinct from water treatment has resulted in the development of numerous new industrial processes giving improved results and lower running costs. Some of the materials now available, with their characteristics, are shown below.

- **ZEO-KARB Na** A sulphonated coal product containing both strong and weak acid groups.
- ZEO-KARB 215 A nuclear sulphonated phenol resin containing also hydroxyl groups.
- **ZEO-KARB 225** A unifunctional cross linked sulphonated polystyrene resin in bead form of high capacity and exceptional chemical and physical stability.
- ZEO-KARB 226 A unifunctional cross linked methacrylic acid resin in bead form containing only carboxyl groups as the ion active groups.
- **DE-ACIDITE E** A high capacity anion exchange material of medium basicity.
- DE-ACIDITE FF A unifunctional very highly basic anion exchange resin in bead form based on cross linked polystyrene and containing quaternary ammonium groups.

- DE-ACIDITE G A unifunctional weakly basic exchange resin in bead form based on cross linked polystyrene and containing diethylamino groups.
- DE-ACIDITE H A material similar to "De-Acidite G" but containing dimethylamino groups.
- BIO-DEMINROLIT A mixed cation and anion exchange resin for demineralisation in a single column.
 - DECALSO F A synthetic sodium aluminium silicate suitable for the separation and concentration of vitamins and hormones.
- DECOLORITE-ASMIT A resin of high porosity for removing colour from solutions.
- PERMAPLEX C-10 A highly selective cation exchange resin membrane containing SO₃H groups.
- PERMAPLEX A-10 A highly selective anion exchange resin membrane containing quaternary ammonium groups.

For full technical information please write to :-

THE PERMUTIT COMPANY LIMITED

Dept. V.A. 150, Permutit House, Gunnersbury Ave., London, W.4. Tel: CHIswick 6431

Commercial Intelligence

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

Increases of Capital

JAMES JAMIESON'S (ABERDEEN) LTD. (12,116), Albert Place, Aberdeen (manufacturing chemists), increased by £3,500, in £1 ordinary shares, beyond the registered capital of £5,000.

AVS MANUFACTURING COMPANY (PRESTON) LTD. (380,494), 44 Fleetwood Street, Preston, increased by £3,000, in 2,000 'A' ordinary and 1,000 'B' ordinary shares of £1, beyond the registered capital of £2,000.

GASCOIGNE-CROWTHER LTD. (487,570), 42 Bedford Avenue, London WC1, increased by $\pounds 9,000$, in 3,000 A' ordinary and 6,000 'B' ordinary shares of $\pounds 1$, beyond the registered capital of $\pounds 1,000$.

New Companies

Brome & Schimmer Ltd.

Private company. (570,719). Registered 24 August. Capital £25,000 in £1 shares. Objects: To carry on the business of manufacturers, producers, importers and exporters of and dealers in botanical drugs, pharmaceutical, medical, chemical, industrial and other preparations etc. The first directors are: Albert E. Brome, Inglenook, Ifield, Crawley (director, Sparkes, White & Co. (1948) Ltd.), Robert C. Schimmer, Finchcotts. Edenbridge, Kent (director same company), Mrs. Alice R. Schimmer, Finchcotts, Edenbridge, Kent. Registered office: 7 Leather Market SEI.

Lalon Ltd.

Private company. (570,613). Registered 22 August. Capital £5,000 in £1 shares. Objects: To carry on the business of chemists, druggists, confectioners, drysalters, oil and colour men etc. The subscribers (each with one share) are: D. Walker, 16 Lancelot Road, Welling, Kent, solicitor's clerk, and J. Potts, 7 Union Court, Old Broad Street, EC2, solicitor's clerk. The first directors are not named. Solicitors: Langlois Harding & Co., 7 Union Court, EC2.

McAlpine Chemical Co. Ltd.

Private company. (570,615). Registered 22 August. Capital £1,000 in £1 shares. Objects: To carry on the business of industrial chemists, metallurgists etc. The directors are: Robert R. McAlpine and Mary R. McAlpine, both of 33 Heath Close Road, Dartford, Kent. Secretary: R. R McAlpine. Registered office: 33 Heath Close Road, Dartford, Kent.

Phabio (Pharmaceutical & Biological Products) Ltd.

Private company. (31,697). Registered 13 August in Edinburgh. Capital £2,000 in 5s shares. Objects:— To carry on the business of manufacturers, distributors, exporters, and importers of and dealers in pharmaceutical and biological products etc. The first directors are:— P. J. M. McEwan, Ardachie Lodge, Port Augustus, farmer, I. W. Noble, 8 Buckingham Terrace, Edinburgh, WS, C. M. D. Barrow, and I. N. Lakar.

Sumitomo Shoji Kaisha Ltd.

Particulars filed 27 August (F.4555), pursuant to section 407 of the Companies Act, 1948. Capital: 28,800,000 shares of 50 yen each. Registered in Japan, to import, export and sell iron and steel, non-ferrous metals and products thereof, electric wires and cables, machinery, chemicals, fertilisers, foods etc. British address: 5 Copthall Court EC2, where Eiji Honda is authorised to accept service of process and notices. Directors: Shunya Tohji, Seigoro Seyama, Toshio Sato and 10 others.

Wendell Nicholas (Mumbles) Ltd.

Private company. (570,685.) Registered 23 August. Capital £3,000 in £1 shares. Objects: To carry on the business of consulting, analytical, manufacturing, pharmaceutical and general chemists etc. The permanent directors are: Wendell Nicholas (managing director), 96 Cherry Grove Sketty, Swansea, director of Brekna Salts Ltd., and Alan M. Murphy, 12 Newton [turn to page 466]





BLEACHING AGENTS

Write Dept. B/29 for further details



New Companies

from page 464]

Road, Mumbles, Swansea. Secretary: A. M. Murphy. Reg. office: 12 Newton Road, Mumbles, Swansea.

Company News Boots Pure Drug Co. Ltd.

At a board meeting of Boots Pure Drug Co. Ltd. held on 3 September it was decided to recommend that an interim dividend for the half year ending 30 September 1956, of 3 per cent less tax, be paid on 30 September 1956, to the ordinary shareholders on the register on 8 September 1956.

Potter and Clarke

capital The promised reorganisation scheme of Potter and Clarke, manufacturing chemists, proposes writing off one-third of the ordinary capital, cancelling all preference arrears and as compensation raising the fixed cumulative dividend from six per cent to $7\frac{1}{2}$ per cent as from 1 January last. Under the scheme 4d will be written off each 1s ordinary share, subsequently to be consolidated into 1s shares. The cancelling of the preference dividend arrears (£19,500 gross) will result in an increase of relative preference voting power from 20 per cent to a little over 27 per cent. Immediately after confirmation of the scheme, directors propose to pay nine months' preference dividend from 1 October 1956. Thereafter payment will be made on 1 April and 1 October each year.

As a result of a new trade agreement between Austria and Sweden, several Swedish export items including certain chemicals now have an improved chance in the Austrian market.





MANCHESTER Firm price conditions have been reported during the past week generally throughout the Manchester market for heavy chemicals, and no changes of any consequence have occurred. The textile and allied industries are calling for fair deliveries against contracts and most other outlets are absorbing satisfactory quantities. Both home and export inquiries during the week have been fairly numerous. Basic slag, nitro-chalk and their compounds are the busiest sections of the market for fertiliser materials; most other descriptions are relatively quiet. A steady demand for creosote oil, carbolic acid and cresylic acid, among the tar products, is reported.

GLASGOW The position during the past week in the Scottish heavy chemical market has shown some improvement, particularly towards the latter end. A varied range of chemicals have been requested, and contract demands have been maintained Prices on the whole have remained fairly steady. On the agricultural side the position continues satisfactory. In regard to export the market has been favourable; a good volume in inquiries has been received.

India's £10 M Steel Mill

Krupp has obtained the contract for the steel mill of the Rourkela project in India. The contract is valued at around £10 million, excluding scrap recovery installations and assembly costs for the plant. The, mill will consist of seven furnaces, four of which will be open-hearth and three converters, working on the Austrian Linz-Donawitz oxygen-enrichment principle.

CLASSIFIED ADVERTISEMENTS

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A SCIENCE GRADUATE, age 25-30, with initiative and tact, is required by a medium-sized Company pleasantly situated in the South of England. Functions will include technical sales and sales development of heavy chemicals, involving some travelling at home and abroad. Some experience in this field is desirable. Pension Scheme. BOX NO. CA. 3494, THE CHEMICAL AGE, 154, FLEET STREET, LONDON, E.C.4.

HOME OFFICE: SENIOR SCIENTIFIC OFFICERS IN FORENSIC SCIENCE LABORATORIES. The Civil Service Commissioners invite applications from men for three pensionable posts: (a) Chemist (at Preston), (b) Chemist (at Harrogate) and (c) Biologist (at Harrogate).

Age at least 32° on 31st December, 1956. Candidates for posts (a) and (b) should normally have 1st or 2nd Class Honours Degree in Chemistry or be A.R.I.C. or equivalent and must have sound knowledge and wide experience of modern analytical procedures. For post (c) candidates should normally have 1st or 2nd Class Honours Degree in Botany with subsidiary Zoology or Chemistry, or equivalent; experience in identification of wide range of materials from biological sources is essential. Salary $\pounds1,075-\pounds1,265$. Exceptionally a starting pay

above minimum.

Further particulars and application form from Secretary, Civil Service Commission, 30, Old Burlington Street, London, W.1., quoting No.S4619/56/10. Com-pleted application forms should be returned by 25th Scottember 1056 September, 1956.

*Candidates under age 32 on 31st December, 1956, may be considered but must apply through the open competition quoting No. S4619 /53/56/10. Z875/110/8/56/HM

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INVITATION TO TENDER

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Full details, and forms of Tender (returnable not later than 10 a.m. on 24th September, 1956) may be obtained from the **BOARD OF TRADE**, COMMODITY & **GENERAL DIVISION**, 8 (b).. ROOM 314, LACON HOUSE, **THEOBALDS ROAD**, LONDON, W.C.1. (Telephone: Chancery 4411, Extension 325).

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E. F. AVENIDA PTE. R.S. PENA No. 846, BUENOS AIRES.

8 September 1956

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THE Proprietors of British Patent No. 653588, for "THE MANUFACTURE OF GLYOXAL AND POLYGLYOXAL," are prepared to enter into negotiations for the SALE or for the grant of LICENCES thereunder. Inquiries to be addressed to Carpmaels & Ransford, 24. Southampton Buildings, Chancery Lane, London, W.C.2.

THE Proprietors of British Patent No. 692325 for "IMPROVEMENTS IN AND RELATING TO THE COKING OF LIQUEFIABLE BITUMINOUS SUB-STANCES", desire to enter into negotiations with a firm or firms for the sale of the patent or for the grant of licences thereunder. Further particulars may be obtained from MARKS & CLERK, 57 & 58, LINCOLN'S INN FIELDS, LONDON, W.C.2.

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