THE Chemical Age

VOL. LXXI 9 OCTOBER 1954 No. 1839

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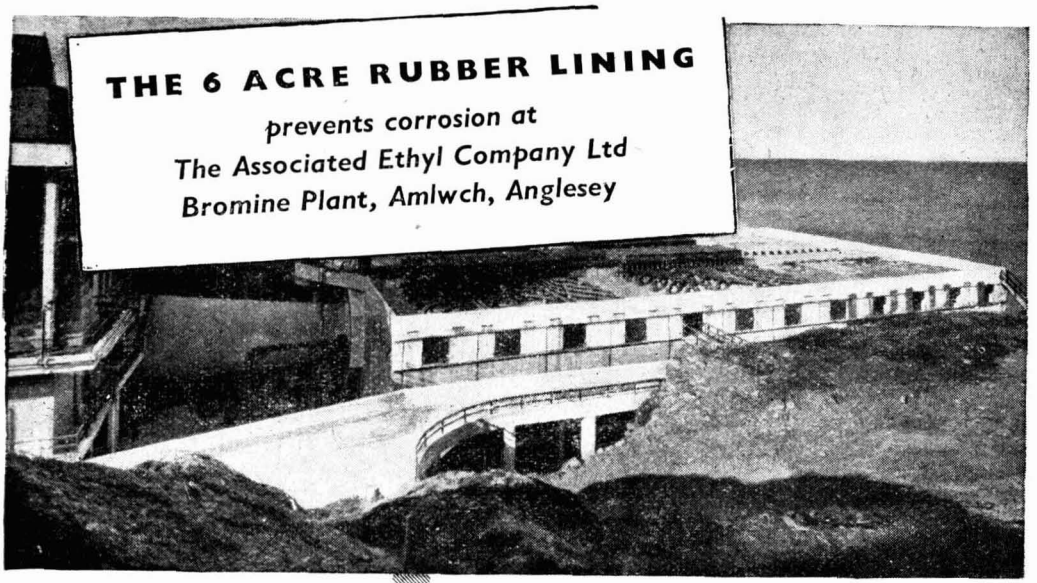

This huge rubber-lining contract completed by the General Rubber Goods Division of the Dunlop Rubber Company represents one of the largest plant-lining assignments ever undertaken. Rubber and rubber-based compounds were the only materials capable of protecting concrete and metal from the constant attack of hydrobromic, sulphuric and other acid mists liberated during the production of bromine... a vital element in the manufacture of "additives" for modern fuels.

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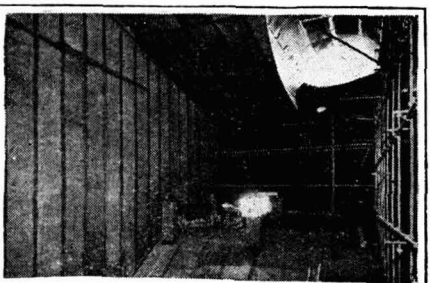
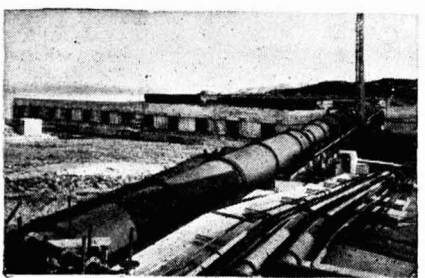
In the Absorber Unit, 30 tons of rubber and rubber compound form a self-vulcanised inner lining and and an "overcoat" of sheet rubber which was vulcanised in situ.





Large-bore pipes such as this sea-water main, storage vessels and ducting throughout the plant are rubber lined, and rubber again covers the huge fan units and 4 miles of steel girders.

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The Chemical Age

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CONTENTS . 9 OCTOBER 1954

Technical Information	762
Research at East Kilbride	763
An Important New Instrument	768
A Canadian Sulphur Plant	769
Petroleum Process Research Planned	773
Indian Newsletter	777
The Importance of Collagen	779
Corrosion—A Factor in Design	781
The Chemist's Bookshelf	783
Home News Items	785
Overseas News Items	786
Personal	787
Publications & Announcements	788
Law & Company News	790
Next Week's Events	792
Market Reports	794

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Chemical Engineers

THE Presidential Address to the Institute of Chemical Engineers, delivered earlier this year by Mr. Stanley Robson and soon to be published, leaves no room for doubt that the separate profession of chemical engineers is now not only firmly established in this country, but is vigorously expanding. A pattern first forged in the United States is being actively followed here.

The membership of the Institution was 803 in 1934; in 1954 it has grown to 3,038. This evidence of steady growth is perhaps not as striking as that to be obtained from a more recent breakdown of membership numbers. From 1948 to 1952 membership increased by 31 per cent, a rise to be broadly compared with the general rise in the same period—of 20 per cent—for scientifically qualified chemical industry employees of all types. It seems fairly safe to assume that so far in the post-war period the proportion of scientists trained as chemical engineers has been increasing at an above-average rate. This trend in chemical education matches chemical industry's requirements. In the same period, 1948-52, the plant and equipment used in the industry has grown by 73 per cent, as measured by £-value. Production has risen by 61 per cent, but total employment by rather less than 7 per cent; indeed, the unqualified labour force has risen by only 1.7 per cent, the main increase being the 20 per cent increase for technically qualified employees. Where investment in plant and productivity has risen so steeply, the need for chemical engineers must have expanded similarly.

The employment of chemical engineers in industry here is of a widespread nature. About half are employed in the authentic branches of chemical industry, e.g., heavy chemicals, dyes, explosives, etc.; about one-seventh are employed in the chemical plant manufacturing industry; and the rest are employed in branches of industry that are indirectly rather than primarily chemical. Perhaps today this sort of classification is somewhat meaningless for each year it becomes more difficult to say which branch of industry is or is not chemical. However, it would appear that the contribution of the chemical engineer has now secured an extraordinarily wide recognition. Analysis of the types of duties undertaken in industry is even more revealing. A survey by the Institution among its members has given the following information:

Administration	20.2 per cent
Plant operation, production and maintenance	22.8 „ „
Design, construction, installation, commissioning	20.4 „ „
Development and research	21.8 „ „
Technical sales and service	2.0 „ „
Teaching	3.0 „ „
Consulting	3.0 „ „
Others	6.8 „ „

The fact that a fifth of the force of chemical engineers occupy positions at the higher management level seems particularly significant. In the US, despite the longer past period of recognition for the chemical engineer, the comparable percentage is only 10.5. The British figure must be interpreted as evidence that the chemical engineer, once he has established himself in industry, is able to make an outstandingly impressive contribution; indeed, there can hardly be any other explanation. The plant and production group of duties, occupying 22.8 per cent,

is a remarkable duplication of US facts for there the percentage of chemical engineers employed on these duties is 22.1 per cent. The most marked difference is in the use of chemical engineers in research and development; here, 21.8 per cent are thus used—in the US, 30.6 per cent. Some of this difference may be a matter of classification for while research is relatively easy to define, development work in industry is not; even allowing for this possible source of error in the comparison, however, the difference seems significant, and it suggests that chemical engineers in America are being given a rather larger function in preparing the processes of tomorrow. The background of the US industry has, of course, been far more competitive in the past 10 or 12 years than in this country. It is a difference in background that is fast fading and there should currently be some increase in the number of chemical engineers fully devoted to research and development duties here.

Facilities for training chemical engineers have expanded from courses at only four university centres in 1934 to more than 20 today. There are now four University Chairs of Chemical Engineering, and several more are shortly to be established. The present annual output of new chemical engineers is substantially above 200 and perhaps approaching 300. At the older centres of education the demand for places considerably exceeds capacity, and it is believed that those who do not secure places often turn to other subjects and careers rather than study chemical engineering at one of the non-university centres. The comment of the Institution's president, that 'this requires serious consideration' is perhaps an intentional understatement. Who can blame the young student from wanting to feel that his course of higher education has been of university status? It is humanly understandable and it is also a viewpoint with some practical justification. The time may come when a university education as such carries less influence in later life, but it has not come yet. The dissociation of university status and recognised technical courses at numerous educational centres in this country is a serious obstacle to national progress and it should not continue to exist so stubbornly in a country whose economic future depends more than upon any other factor on the extent to which science can be industrially harnessed.

There seems to be no reason to fear that the demand for chemical engineers in the future will decline. On the contrary, the demand is almost certain to expand. The sizes of plant units are steadily enlarging, often with greater operative complexity. The problems that are created by this economic trend call for every kind of chemical and engineering knowledge, but few today will dissent from Mr. Robson's opinion that team-work between specialists is not enough by itself. 'The most common mistakes arise in the border-line territories of the various intellectual disciplines and for these reasons, and because of the complexity of modern processes, there is an insistent demand for chemical engineers whose field is as clear and distinct as that of the civil, mechanical, or electrical engineers with whom they will so often have to work.' Basically, this has always been true, even in the days when the description 'chemical engineer' had not become part of our verbal coinage. In the past century some of the boldest industrial contributions of chemists were made by men whose chemical knowledge was accidentally or instinctively combined with practical knowledge of mechanical ways and means; they were not perhaps chemical engineers by training but they were by nature. Today we are producing them by training for we are no longer able to rely upon chance to solve the problem of having enough right men in the right places at the right time.

If there is any need for American evidence to fortify these British views, a recent editorial (*Chemical & Engineering News*, 1954, **32**, 3583) dealing with the various technical skills needed in atomic fission developments might well be quoted: 'The chemist and chemical engineer in the years ahead will play major roles in every stage—research, development, and large-scale operations . . . Still another characteristic of chemists and chemical engineers, that of team-work, will be important in the further development of peacetime uses of atomic energy, including power.

Notes & Comments

Have Your Cake—

A RESEARCH paper of considerable usefulness to the fertiliser industry has appeared in the *Journal of the Science of Food & Agriculture* (1954, **5**, 455). The source is perhaps somewhat unexpected, being the Macaulay Institute for Soil Research, but the problem tackled is technological and of wide concern to the industry. Although in theory the modern process of granulating compound fertilisers overcomes the old problems of setting and caking, in practice, especially during long storage periods, granules still tend to display this troublesome habit. Caking does not occur consistently, of course; but it does occur quite severely and almost unpredictably from time to time. In many ways an 'erratic' fault in a product is a greater liability than one that is accepted as familiar.

—& Heat it Too

GRANULES and fertiliser raw materials have been examined by modern X-ray crystallographic and optical methods. Ammonium chloride has been exposed as the principal cause of trouble. Ammonium chloride is not used as a raw material for compounding but there is always sufficient chloride (from potassium chloride) relative to the amount of ammonium ion present; as a result, a considerable amount of ammonium chloride is formed during mixing. In samples of granules which had caked badly during storage, a pronounced surface concentration of ammonium chloride was always found. In contact with moisture and air, crystals of this substance develop needle shapes, thus causing granule-interlocking. The cause of this surface concentration of ammonium chloride is suggested as sublimation during the drying process given to granules, and this supposition was confirmed by finding that the highest surface concentrations were associated with the highest drying temperatures. The conclusion to be drawn is somewhat disturbing—that the risk of caking can be reduced by avoiding high drying temperatures and relying upon longer time periods for drying. It is disturbing because this must reduce through-put and raise production costs per ton. However, there are other means of increasing drying efficiency which may have less adverse cost effects. One simple point is certainly clear—the critical operation in granulation is drying.

Quicksilver

A FEW months ago (see THE CHEMICAL AGE, 1954, **70**, 1289) we commented upon the steep advances in the price of mercury. In May the price of a 76 lb. flask had reached $240 on the New York import market. This trend has certainly not eased; in September the price rose to $301, a level that has brought private buying and selling to a virtual standstill. The spot market for small quantities is reported to be swept bare, and large users are being forced to deal directly with foreign producers and make future-delivery arrangements. Whether this is for some secrecy-classified use or whether the US Government is simply building up a strategic stockpile of the element is not officially revealed, but there is no doubt that abnormally large Government purchases have created these abnormal market conditions. Mercury is now at least $90 dearer per flask than at any time during World War II. The output from the main European sources seems to have been fully bought by barter or semi-barter deals. Closed mines in Mexico, the US and Canada are reported to be reopening, and everywhere mines are sharply raising their output. Recovery of mercury from scrap has jumped by more than 100 per cent. For established users of mercury or mercury salts the outlook is certainly difficult. If a new and major use for the element has developed, high prices and short supplies are obviously likely to continue. If, however, an official stockpiling programme is the cause of the current market state, the fulfilment of that programme will be followed by an abrupt descent of prices.

Technical Information

EPA Organises European Meeting

REPRESENTATIVES of 13 countries attended the first meeting of National Technical Information Services Officers at the Department of Scientific and Industrial Research, London, from 27 September to 2 October. The meeting was organised by the European Productivity Agency of the Organisation for European Economic Co-operation, and the delegates were welcomed by Dr. King, chairman of the Productivity and Applied Research Committee of EPA and head of the Intelligence Division of DSIR.

During the conference several delegates described the technical question and answer services in their own countries. There was some discussion on the finance of question and answer services, and there was a general agreement that they could not be organised so that they paid for themselves. It was felt that OEEC could help by preparation of a paper on how question and answer centres were financed in different countries.

Interchange Facilities

On the subject of interchange of questions and answers between national centres, it was thought that as far as possible specific questions should be directed to countries in which the relevant specialised sources of information existed. OEEC could help by treating as urgent the preparation of a guide to specialised technical information services in Europe.

The meeting also discussed the question of technical digests, and the problem of developing a European digest service was considered. It was thought that the best way of starting such a service would be for EPA to place contracts for the preparation of digests from the national literature in member countries. As far as possible these contracts would provide for the translation of the digests into one of the official languages and would specify the type and quantity required. In the meantime, the United Kingdom offered to make available to any interested national centres copies of UK digests prepared for circulation within the country.

Delegates expressed their opinions on the selection and distribution of documents under the Documents Exchange Scheme. It was clear that there was no homogenous scheme for selection, and opinions as to the value of the documents received differed widely. There was general agreement that the scheme was useful for documents that were not available through normal commercial channels, but there was considerable doubt in some countries whether the scheme was useful for documents which could be bought through a bookseller. Various recommendations for improving the scheme were discussed.

Terylene For Canada

CIL Buy Ontario Plant

THE first Canadian Terylene textile fibre plant, which is being constructed at Millhaven, Ontario, and 1,400 acres of land there are being purchased by Canadian Industries (1954) Limited, it has been announced by CIL president H. Greville Smith following a meeting of the company's board of directors.

Acquisition of this property and construction of the Millhaven works were undertaken early in 1953 by Imperial Chemical Industries of Canada Limited, who announced at that time that the project would subsequently be offered to Canadian Industries (1954) Limited. Pilot plant production has now begun at Millhaven and it is expected that full operating capacity will be available by next summer.

The $20,000,000 plant, situated on Lake Ontario, 11 miles west of Kingston, will be capable of supplying over 11,000,000 lb. of yarn and staple annually to the Canadian textile industry which until now has been receiving small quantities of the fibre produced in Great Britain. The large area of the Millhaven site lends itself to the development of other chemical undertakings by the company.

When in full operation the Terylene plant will employ about 800 people. Present employees will become part of the CIL organisation and will enjoy the full programme of the company's employee benefit plans including the retirement and disability pensions, disability wages and company contributions for health and life insurance plans.

In announcing the decision of the board of directors, Mr. Smith said that marketing of the new textile fibre would benefit from the extensive CIL research, development and technical services.

Research at East Kilbride

Essential Knowledge for Chemical Engineers

A COMMITTEE under the chairmanship of Sir Henry Guy was set up by the Department of Scientific and Industrial Research in 1945 to report on the essential needs for research in mechanical engineering. In accordance with its recommendations, the Mechanical Engineering Research Laboratory was established in 1947 to conduct basic and generic research, not carried out systematically elsewhere, over the whole field of mechanical engineering.

In April 1949 a Committee on Chemical Engineering Research was appointed by DSIR, following an approach to the Department by the Council of the Institution of Chemical Engineers. Its chairman was Mr. H. W. Cremer, O.B.E. From the evidence placed before it, this committee found that there were certain outstanding requirements for research for which adequate facilities were not then available. After surveying the requirements for research in heat transfer, it concluded that the more urgent needs appeared to be heat transfer on viscous fluids, 'fluidised' solids, and condensing vapours in the presence of non-condensible gases. It was also considered that in view of the increasing use of tonnage oxygen for the burning of fuels in oxygen or oxygen-enriched air, gas radiation data for steam and carbon dioxide at high temperature should be collected and made available.

Special Central Organisation

The need for a central organisation specially adapted to undertake research in heat transfer is being met by the new research station which MERL is establishing on a site of about 70 acres at East Kilbride, near Glasgow. The construction was started in October 1949, but was considerably delayed by restrictions on Government expenditure introduced in 1951. In December last year, however, £6,000,000 was granted to DSIR for the erection of new buildings during the period 1954-59. The amount allocated to MERL will enable much of the original building programme to be completed by 1959. MERL will then have a staff of between 600 and 700 and will be the second largest research station administered by DSIR.

The buildings so far completed are the first stage of the Materials building (at present used as a general purpose building), a central workshop, boiler-house, electrical sub-stations and staff restaurant. A Hydraulic Machinery laboratory is nearing completion and work will be started this year on buildings for the Mechanisms and Metrology Division and for the Heat Division. A building for the Plasticity Division and an administrative building will also be provided during the next five years.

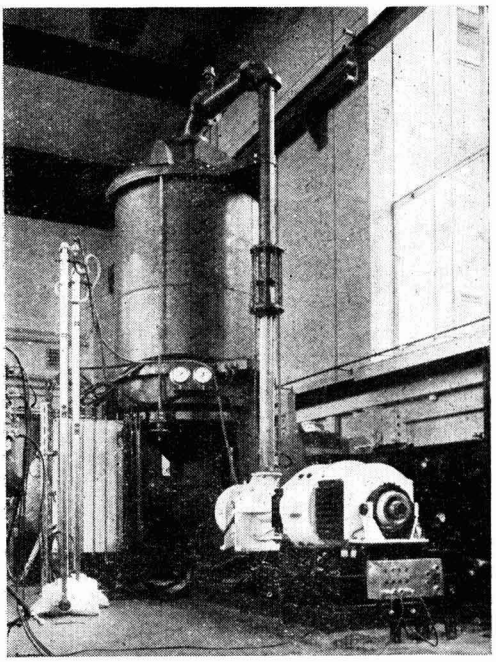
Construction Handicaps

Though severely handicapped by the time-lag in building construction, MERL is engaged on an extensive programme of both fundamental and applied research which covers a very wide field. The staff employed at East Kilbride and Thorntonhall now totals nearly 300, of whom over 100 are scientific and experimental officers, and much highly specialised equipment has been installed.

The Heat Transfer and Thermodynamics Division consists at present of three sections under Mr. E. J. Le Fevre. One section is engaged in the collection and presentation of thermodynamic data for technically useful gases and gas mixtures. Another section deals with the more fundamental aspects of heat transfer, with special reference to such factors as convection under carefully controlled conditions. The third section is concerned with applied heat transfer, which embraces the testing of heat exchange plant.

It is hoped that construction of the heat transfer laboratory will be started in the coming autumn and that the building will be available for occupation towards the end of 1956. Meanwhile experimental space has been made available to the Division in the Materials building.

The research programme on the heat transfer side falls broadly into two main categories; basic measurements of heat transfer both in the absence and in the presence of phase change and chemical



Centrifugal pump test rig

change, and work aimed more directly at the improvement of plant.

Experiments already in progress include a study of the effect of an abrupt change of section on the heat transfer from a pipe to water flowing in it. Both abrupt divergence and abrupt convergence are being studied. Water flows from a constant head tank through an experimental pipe consisting of 9 ft. of 1 in. diameter and 18 ft. of 2 in. diameter pipe. By reversing the direction of flow the same pipe combination has been used for studying the effect of an abrupt convergence. Heat is generated in the pipe walls by the passage of a direct current along the pipe. The thickness of the pipe wall is so arranged that heat is generated at the same rate per unit length through the pipes, both before and after the change in section. Experiments are made of inlet and outlet water temperatures, water flow and heat input. Outside pipe-wall temperatures are measured at a sufficient number of different positions to give a complete picture of temperature distribution along the pipe. Inside wall temperatures and corresponding water temperatures are then calculated and the distribution of heat transfer coefficient along the pipe is deduced.

The distribution of water pressure along the pipe is also being measured, in order that the effect of change of section on heat transfer may be compared with its effect on pressure drop. A similar series of experiments is being carried out using air instead of water as the working fluid, but with the same 2:1 diameter ratio. At a later date experiments will be undertaken with a range of pipe diameter ratios.

It has been known for some time that in steam-condensing plants considerably higher rates of heat transfer can be obtained under 'dropwise' conditions. If these conditions could be reliably maintained, a considerable saving in the capital cost of new plant should be possible, and the capacity of existing plant might be increased. Extra-departmental research has therefore been sponsored at Queen Mary College, University of London, where a critical examination is being made of the mechanism of dropwise condensation. A fundamental investigation of the physico-chemical properties required of a surface promoting dropwise condensation has also been sponsored. The results of this work are likely to be of great practical value.

On the thermodynamics side the main objective is research on the determination of the thermodynamic properties of technically important gases and the presentation of data in a form suitable for use in industry. The properties to be considered are: enthalpy (total heat), entropy, specific and latent heats, free energy function, and P-V-T data. These properties are required for some 25 gases, so that the field to be covered is extremely wide. This enormous task is being carried out on a co-operative basis; as the scheme develops it is proposed to extend it to other countries. The Advisory Committee and various research workers in industry have collaborated in a number of surveys, which will shortly be published. The gases so far dealt with comprise air, acetylene, argon, ammonia, ethylene, carbon monoxide, carbon dioxide and propane.

Studies of Viscosity

The Division has carried out some theoretical work on transport properties and measurements of thermal conductivity are about to be started. Recent work on the liquid state has shown that the viscosity of any substance can best be studied by

considering it to be the sum of two parts. One of these is a function of temperature alone and is the limiting value of the viscosity when the density is vanishingly small; the other arises from the transport of momentum by the direct effect of intermolecular forces, and is an exponential function of the reciprocal of the temperature. A study has therefore been made of the low density viscosity of substances in general. It seems that for the great majority of substances the viscosity can be estimated as a function of the reduced temperature within about 5 per cent, provided the critical properties are known.

Within the Division an extensive bibliography of heat transfer literature and data is being assembled and indexed. Reviews dealing with particular aspects of heat transfer will be published periodically and the first has already appeared. In view of the limited information available on heat transfer, this service is of great importance to industry.

Industrial Flow Problems

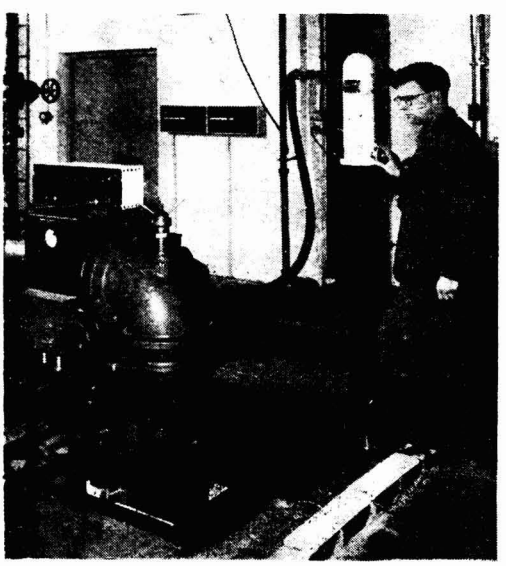
Techniques developed for solving problems in aeronautics have much to offer in other branches of mechanical engineering. It was partly with the object of investigating their possibilities that a Mechanics of Fluids Division was formed by the Mechanical Engineering Research Laboratory. The Head of the Division is Mr. W. J. Robinson, and its terms of reference exclude the aircraft industry, but cover a very wide range of flow problems encountered primarily in the heavy industries. The fluids with which it is concerned range from water, air or oil, to liquids, with solids in suspension, non-Newtonian liquids, and particles transported in gas streams.

The scope of a research programme embracing the needs of all industries requiring a closer knowledge of the behaviour of gases or liquids (or a mixture of both) would be very extensive. Rather than try to cover all potential requirements, it was therefore decided to begin by providing a hydraulic machinery laboratory designed mainly for the investigation of fluid flow and allied problems in turbines and pumps of various kinds, valves, pipes, ducts and other associated equipment.

In several countries—notably in France, Germany, Switzerland and the United States—research on hydraulic machinery has long been carried out on an extensive scale, but in Great Britain it has been restricted by inadequate facilities for experimental work. It was therefore decided to build a laboratory where accurate experiments on small-scale models could be carried out.

Besides the investigation of specific problems of design, the laboratory will be used for fundamental research having as its immediate objective a closer understanding of basic principles affecting the design and operation of machinery. The research programme envisages, for example, further elucidation of the behaviour of incompressible fluids and the mechanism of boundary-layer flow and turbulence, leading to a fuller understanding of fluid friction and surface roughness. Fundamental studies on cavitation and erosion will also be undertaken.

In a hydraulic machinery laboratory of the kind envisaged, building construction details are largely governed by the type of water-circulating system adopted and the building becomes, in effect, an integral part of the laboratory water-supply system. The first requirements, therefore, were to determine the maximum water-flow capacity of the laboratory and the most suitable type of water-circulating system. Officers of the Division visited the Continent and the United States to obtain first-hand information regarding the facilities available in these countries. It was concluded that open



Diverter assembly at the end of the flow-calibration line

and closed types of water circuit each had their own advantages and that, if the laboratory was to be given the widest scope in its activities, both types should be available. It also became evident that flow capacity was dictated largely by considerations of model construction; if the precision manufacture of small models could be developed, a normal maximum flow rate of about 30 cubic feet per second would be sufficient for much of the work.

The hydraulic machinery laboratory, when completed, will offer six principal facilities. There will be a main hydraulic test bay, approximately 120 ft. by 50 ft., for open circuit experiments, and also a closed water-circulating system with a maximum flow of approximately 20 cubic feet per second, which has been designed primarily for precision tests on pump models and for general pump research. A variable-pressure water tunnel will be provided for turbine research and for research on cavitation problems. An oil and special fluids laboratory will be available for problems such as arise in the oil, chemical and process industries, and there will also be an aerodynamics laboratory in which the main facility will be a variable-pitch fan supplying 20,000 cu. ft. of air per minute at the design point. Provision has also been made for flow measurement facilities for calibrating laboratory sub-standards and industrial venturi meters.

To be Occupied Soon

It is anticipated that the new building, which should be among the finest laboratories of its kind in the world, will be available for occupation in the late autumn. At present the Division is housed in the Materials building, where accommodation is extremely limited. Much of the work so far undertaken has been concerned with the design and calibration of experimental equipment. It is noteworthy that certain design problems of the new laboratory could not be solved from available data and in consequence model experiments had to be undertaken.

In order to assess the efficiency of hydraulic machinery it is necessary that precise flow measurements should be made. With normal commercial installations an accuracy greater than ± 1 per cent cannot readily be achieved, whereas for research purposes it is desirable that the error should be of the order of ± 0.1 per cent. It was decided to design and manufacture special flow-meters at East Kilbride and to install them in a circuit where high accuracy could be obtained.

For the main flow-calibrating line a control valve was needed to vary the quantity discharged into the laboratory sump. To measure the flow, the discharge from the control valve and associated downstream fishtail is diverted from the sump to a measuring tank. Experiments on a 6-inch model of a 'spear' valve, with a downstream fishtail, showed that air ventilation of the jet was far more critical than the design of upstream elbow used. The same rig is being used to study the effects of roughness and ageing on venturi meters.

Special Measurement Problems

Electronic techniques are also being applied to special problems of measurement. For example, a strain-gauge type pressure transducer is being used to measure transient conditions in a pipe line, and a barium-titanate transducer of cylindrical pattern to measure fluctuating pressures such as occur in the casing of a centrifugal pump. The use of pitot tubes in water has been investigated outside the range of conditions in which their performance was known previously.

Investigations into design factors affecting the performance of hydraulic and pumping machinery are also in progress. For example, the maximum speed at which a reciprocating pump can safely be operated is usually limited by the performance of the self-acting valve. This factor is therefore being studied in a pump so rigged that all the important quantities can be varied. High-speed ciné photographs can be taken of valves in operation and pressures can be measured throughout the cycle. It is hoped that the information so obtained will allow operating speeds to be increased, thus cutting down the size of the driving unit and also that of the pump itself. The flow conditions inside a commercial centrifugal pump are also being investigated, the aim being to find out where the liquid losses take place and to what extent theoretical data are incorrect. It is hoped that this work will enable the design of centrifugal pumps to be improved.

In hydraulic control circuits difficulties are often presented by large and unbalanced

forces acting on piston valves. A two-dimensional model of a valve is being used to study the influence of the shape of the ports on these out-of-balance forces. The investigators hope to find the optimum shape of port. They are also interested in the flow pattern in the valves and in the possibility of predicting the forces on any particular shape of port.

Cavitation reduces the efficiency of hydraulic machines, causes erosion of the material, and gives rise to mechanical vibrations which may become serious. It is important to be able to predict whether a particular machine will be affected by cavitation and at what point of its operating cycle this phenomenon will occur. Work is in progress to determine the extent to which the starting point is affected by physical properties of the water, such as dissolved gas, small nuclei, and the presence of corrosion inhibiting chemicals in solution. It has been found, for example, that the amount of dissolved gas in the water affects cavitation appreciably and allowance should be made for it when predicting the performance of plant from model tests.

Of considerable importance to Scotland is a study of the problems associated with pumping peat over large distances. Peat can be successfully burnt and converted to useful energy in a prime mover, thus enabling large rural areas now covered by this material to be cleared for agriculture and forestry. A major difficulty is the cost of transportation, and one possibility of reducing this is to pump raw peat from the bog to the drying field. One problem is that of losses, because peat in its raw state is a 'fluid' whose mechanical properties are unknown. Apart from the composite nature of peat, air enters the hopper inlet and complicates the laws of flow on account of its compressibility. One of the main experimental difficulties is to obtain reliable measurements of pressure along the pipe and this has been overcome by the development of special measuring devices.

This account of MERL's activities has been confined to the work of the Heat Transfer and Thermodynamics Division and the Mechanics of Fluids Division, which are the two Divisions concerned most specifically with chemical engineering problems, but the chemical and allied industries should also derive many benefits from the research programmes of other divisions.

Wood Protection Compound

A NEW type of compound for the universal protection of wood has been developed by the New System Manufacturing Co. Ltd., of Imperial Dye Works, Cairns Road, London, S.W.11. It is said to combine protection against fire, weather, dry-rot, moulds, fungi, and animal and vegetable organisms.

Application is by immersion, brush or spray treatment and it is said to leave the treated wood clean, odourless and practically unstained; when applied to new woodwork in its finished state it does not cause swelling or shrinkage, nor does it interfere with the subsequent application of paints or varnishes.

The fire-proofing of the wood is achieved by the formation, after treatment, of a compound on the surface which has a continuous coat of an inorganic mass which adheres very strongly to the wood, and during fire a new layer of gases above the inorganic coating is developed. This combination on the surface of the wood in extreme cases becomes carbonised but does not catch fire and will not burn away.

The company has also developed a compound for fire-proofing and glow-proofing of textiles, which has proved a deterrent to moths and mildew bacteria as well. It can be applied by way of immersion, brushing or spraying by incorporating a powerful surface active agent. The liquid is said to be neutral and odourless.

New Physical Tables

THE Smithsonian Institution has recently published the 9th revised edition of the Smithsonian Physical Tables, compiled by Dr. W. E. Forsythe. These comprise 901 tables, including completely revised data appearing in previous editions plus new sections on nuclear and atomic physics. This volume is an indispensable reference work for libraries, physicists, scientific laboratories, and science teachers. Orders should be sent to the Distribution Section, Editorial and Publications Division, Smithsonian Institution, Washington 25, D.C. Prices, post paid: $9.00 (paper bound); $10.00 (cloth bound).

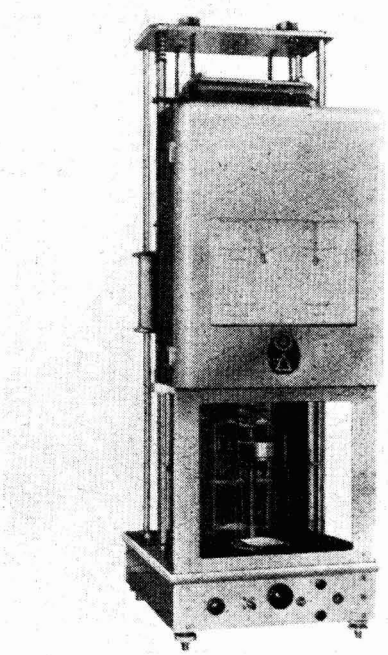
An Important New Instrument

Stanton Recording Thermo-Balance

LATEST addition to the range of precision balances manufactured by Stanton Instruments Ltd., 119 Oxford Street, London, W.1, is the recording thermo-balance briefly referred to in our issue of 28 August (page 422).

This instrument is air damped and suitable for a total load of 100 g. The balance is surmounted by a bifilar nichrome wound furnace of 2 in. internal bore which is silica lined and arranged with a removable top. The standard furnace shown in the model illustrated is suitable for 1,000°, but alternative furnaces can be made for both low and high temperatures.

The furnace is designed for use with an inner silica sheath when it is desired to heat the charge in a gas atmosphere. It is counterbalanced with its own low voltage transformer and may be raised or lowered over the charge. Its position above the balance renders convection currents inoffensive and the provision of heat radiation shields between the furnace and the balance makes the effect of stray radiation negligible. Its bifilar winding prevents field effects when magnetic or conductive materials are heated. A simple but effective combined programme and limit control can be fitted and works in conjunction with variable high/low switching.



The balance fitted with the standard furnace and recorder

Twin Pen Electronic Recorder

The object to be tested may be placed on either the lower pan or on a silica platform located in the furnace and mounted on a silica rod which rises from the top of the rear suspension piece. Furnace temperature and change of weight are followed simultaneously on a twin pen electronic recorder fitted above the balance and in front of the furnace. The curves are thus seen at eye level and are both shown by continuous lines side by side.

The twin pens are power driven by servo motors and receive their information from a platinum-rhodium I platinum thermocouple and a capacity follower plate located over the balance beam. This plate faithfully follows every minute movement of the beam and yet has no direct or mechanical contact with it. Thus the balance may be arranged for either 1 mg. sensitivity or for 1/10 mg. sensitivity with the same proportional accuracy of scale.

The ability of the instrument to record change of weight is limited neither by the range of chart nor by the range of a single beam deflection. Advantage is taken of the servo driven mechanism to operate electric weight loading at the end of each full beam movement. By this means it is possible to follow weight change up to plus or minus 1 gramme automatically on the 1 mg. sensitivity model, or plus or minus 0.1 gramme on the 1/10 mg. version.

The instrument once set will reproduce and record time, temperature and weight changes for periods up to several days. Three chart speeds are available and at the slowest speed the spool holds sufficient paper for 20 days' work.

A Canadian Sulphur Plant*

Prairie Oil & Gas Aids Pulp & Paper Industry

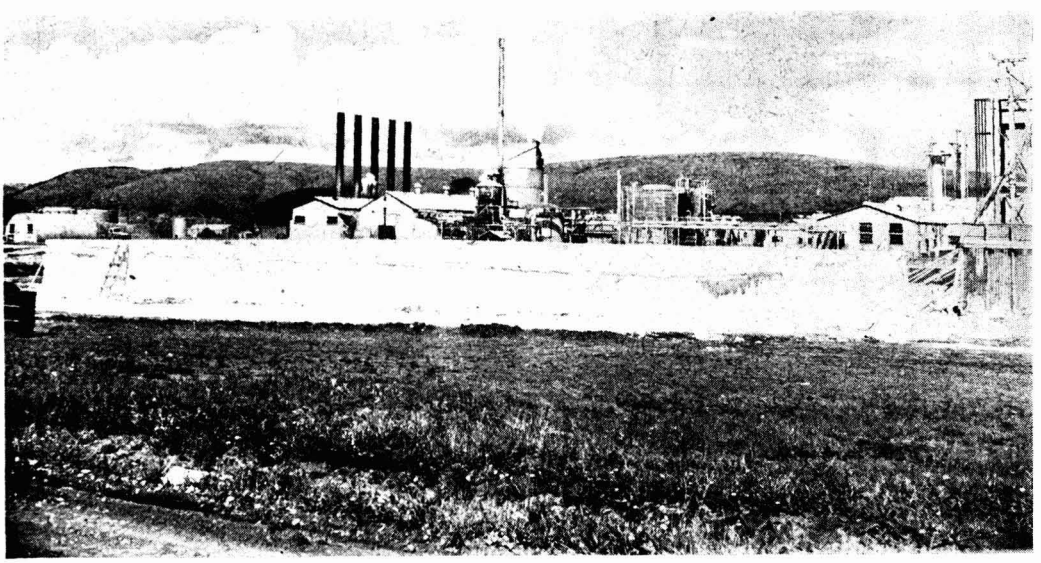
GREAT interest is being shown in the tremendous wealth of oil and natural gas known to exist in Western Canada, and, when one remembers that the Athabasca tar sands alone are said to contain as much petroleum as the whole of the rest of the world's known reserves, this is understandable.

Not only are the great international oil companies being attracted to the area but several American chemical companies are keeping a careful watch on developments and some are said to have laid tentative plans to use either oil or gas as a raw material. Among those interests which will review the situation from time to time are the great American sulphur producers, for Canadian natural gas contains 3.5 per cent by volume of hydrogen sulphide or more. This is roughly equivalent to about 3 lb. of elemental sulphur per 1,000 cu. ft., and gas from some fields contain up to 7 lb. Once a market for the gas is found and production is on a large enough scale Canada can easily produce most of her sulphur requirements. With the completion of pipe lines to the West Coast and down into the US this day may not be far distant. When it does arrive the Shell Oil Co. of Canada will have a big advantage over anyone else as they already have a big sulphur plant in operation at Jumping Pond, Alberta.

In the very near future Shell's scrubbing plant will be treating up to 60,000,000 cu. ft. per day and 80 tons of sulphur will be recoverable each day from the waste and acid gas produced. This is about double the present output and the increase has come about owing to the growing demand from pulp and paper mills in the Canadian and US West. It is rumoured that Shell may also build a sulphuric acid plant to meet the demand from the oil refining, fertiliser and mining industries, but so far these rumours have not been confirmed.

Many well-informed people believe that the rapid growth of Western Canada's mining and fertiliser industries and the likelihood

** The third in a short series of articles on the Canadian chemical industry, written by the editor following an extensive tour of the Dominion. Previous articles appeared in our issues of 25 August and 11 September. The author gratefully acknowledges the assistance he received from Mr. W. J. Speerstra of Shell's Calgary office with this article.*



A view of Shell's sulphur plant at Jumping Pond, Alberta, before present extension work commenced

that new pulp and paper mills will be built in Northern Alberta and Saskatchewan will result in the establishment of a large sulphur industry in the oil and gas fields and refinery centres of those provinces.

Shell Oil of Canada's plant for the recovery of elemental sulphur from hydrogen sulphide started operation during February 1952. It is now producing approximately 32 long tons of sulphur per day with a conversion efficiency approaching 90 per cent. The sulphur plant is located in the Jumping Pound Field, 35 miles west of Calgary, and is associated with gas treating and dehydrating facilities and a gasoline plant.

Conventional Cycle

Sour gas is first processed in the gas treating plant, which operates with a conventional cycle utilising a solution containing monoethanolamine, diethylene glycol and water. Natural gas containing 6 per cent carbon dioxide and 3.5 hydrogen sulphide is purified in the treating unit at 830 lb. pressure to a purity of less than 0.25 grain hydrogen sulphide per 100 cu. ft. and negligible carbon dioxide. The purified gas is subsequently processed for the recovery of gasoline and is dehydrated in a dry bed type of dehydration plant. The gas processing plant, which was designed and constructed by The Fluor Corporation Ltd., of California, has been in operation since April, 1951, and supplies purified and dehydrated sales gas for the city of Calgary.

Hydrogen sulphide and carbon dioxide absorbed in the contactor of the treating unit are stripped from the solution in a conventional stripping column. After passing through a cooler-condenser, this gas constitutes the feed for the elemental sulphur recovery plant. It is available at approximately 43°C and averages about 34 per cent hydrogen sulphide, 56 per cent carbon dioxide, 9.5 per cent water vapour and 0.5 per cent hydrocarbons. As the presence of excess hydrocarbon in the feed to the sulphur plant is detrimental to its operation, the hydrocarbon content of the acid gas stream is maintained at a low level. This is accomplished by flashing dissolved hydrocarbons from the rich amine solution prior to its entry into the stripping column.

A simplified flow diagram of the sulphur plant is given in Fig. 1 on the opposite page. Acid gas from the reactivator of the gas treating plant, after condensation of excess water, is fed directly into a specially designed reactor furnace which operates under sufficient pressure to drive gases through the sulphur plant. Air is supplied to this unit by a steam turbine driven blower. Sufficient air is admited to convert one-third of the total hydrogen sulphide gas to sulphur dioxide and water, and all of the hydrocarbons entering the furnace to carbon dioxide and water. The principal reaction occurring in this unit may be written as follows:

$$2H_2S + 3O_2 \rightarrow 2SO_2 + 2H_2O \quad (1)$$

This reaction and the hydrocarbon combustion reactions are highly exothermic, and a temperature of approximately 870°C is attained by the gas leaving the furnace. During normal operation the entire acid gas stream is fed to the furnace and a small amount of sulphur is formed therein. The production of sulphur may be assumed to result from the following reaction:

$$2H_2S + SO_2 \rightarrow 3S + 2H_2O \quad (2)$$

although in actual practice it may not be so simple.

Combustion gases from the furnace are cooled in the waste heat boiler to a suitable temperature for catalytic conversion. From the boiler, which generates approximately 7,000 lb. per hour of steam, the cooled gases enter the first stage of catalytic conversion. In this stage an appreciable portion of the elemental sulphur is produced and, in addition, undesirable side reaction products are eliminated. As the reaction of hydrogen sulphide and sulphur dioxide to form elemental sulphur is exothermic, the gas increases in temperature while passing through the catalyst. A second cooling step is therefore required to enable the final catalyst stage to operate at a satisfactorily low temperature. This is accomplished in a boiler feed water economiser so that the heat content of the gases can be recovered economically. The cooled gases are then passed through the second catalyst bed which operates at approximately 260°C. At this temperature a maximum sulphur conversion is obtained without the deposition of liquid sulphur on the catalyst.

Counter-Current Recovery

Sulphur containing gas from the second catalyst bed enters the bottom of a wash tower in which it is contacted counter-currently with cooled liquid sulphur. The sulphur which is recycled to the top of the

tower serves to cool the gases and efficiently collect the condensed product sulphur. Tower exit gas, which consists primarily of nitrogen, carbon dioxide and water vapour, is vented to the atmosphere, and the product sulphur which accumulates in the wash tower overflows by gravity to a sulphur run-down pit where it is maintained in a molten condition by steam coils. Sulphur is periodically pumped from this pit to storage vats where it is allowed to solidify by atmospheric cooling.

The plant is designed for simplicity of operation and extreme flexibility by the use of adequate instrumentation and strategically located by-passes. Essentially automatic control of the unit is attained with a flow ratio controller which maintains the proper ratio of air to acid gas and automatically varies the air rate to compensate for variations in the quantity of acid gas fed to the plant. This is supplemented by periodic analyses of the exit gas to ensure that the correct ratio of air to acid gas is being maintained.

Three By-Passes

Three by-passes have been installed to permit the maintenance of optimum operating conditions with varying feed gas composition and quantity. A by-pass around the reactor furnace and waste heat boiler permits hydrogen sulphide to be admitted directly to the feed to the first catalyst bed. This can be used to reduce the quantity of gas flowing through the furnace and boiler and permit the portion which does pass through these vessels to undergo more complete combustion. In this way a higher temperature feed for the waste heat boiler can be obtained.

A second by-pass is located on the furnace exit gas line so that a portion of the high temperature furnace exit gas can be made to by-pass the waste heat boiler, permitting precise control of the gas temperature to the primary converter. A third by-pass is provided in the gas stream across the feed water economiser. As this heat exchanger has sufficient surface to take care of the maximum plant load, the by-pass is normally held partially opened in order that the optimum feed temperature for the second catalyst bed can be maintained.

Primary duties of the operator are maintaining proper boiler operation, lubricating the air blower and sulphur pumps, watching for any irregularities in plant performance,

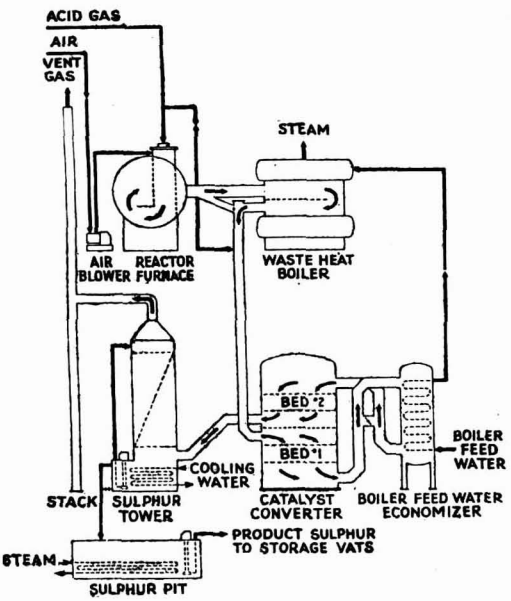


Fig. 1

and running routine analyses on the tail gas to maintain the optimum hydrogen sulphide to sulphur dioxide ratio. Theoretically, the hydrogen sulphide and sulphur dioxide should be present in the gas stream leaving the last converter in the ratio of two molecules of hydrogen sulphide per molecule of sulphur dioxide to obtain the optimum yield of sulphur. The analysis used for control is a modification of the Tutweiler procedure in which an initial titration of the gas with standard iodine solution indicates the total quantity of hydrogen sulphide plus sulphur dioxide, and a subsequent titration of the resulting solution with standard sodium hydroxide gives an indication of the relative quantities of the two acid gases present.

Steam generated in the waste heat boiler is utilised for driving the air blower and the sulphur circulating pump. Low pressure steam is used for heating the sulphur pit and all jacketed liquid sulphur lines. Exhaust steam from the turbine drivers is condensed in an air cooled Fin-Fan condenser. Steam condensate is collected and re-used in the boiler. Product liquid sulphur from the plant is periodically pumped by way of an insulated steam jacketed line to unsheltered storage vats. The walls of the vats are made of two by four studding with corrugated galvanised sheet metal siding. The sulphur is allowed to spread out in a thin layer

on the surface and solidify. As the height of solid sulphur increases in the vat, the sheet metal siding is moved up. When a vat is completely filled, the walls are stripped from the sulphur, leaving a large rectangular block which is subsequently broken up for shipment.

Sulphur produced from hydrogen sulphide by this process is extremely pure, analyses indicating a purity better than 99.9 per cent. As it has less ash than the mined material, it is excellent as a raw material for chemical manufacture, and improves the operation of sulphur burners.

This plant of the Shell Oil Company of Canada Ltd. represents the first of its kind in Canada.

Fertiliser Sales Growing

FOR the first time in the history of Canada's Consolidated Mining & Smelting Company's fertiliser operation, ammonium nitrate has been sold in liquid form. First delivery was by tank truck with a load of some 2,600 gal. of ammonium nitrate solution. The solution was piped into the stainless steel tanks of the Inland Petroleum Transportation Company's truck-trailer for hauling to the Columbia Basin agricultural area of Washington State, USA. Part of it will be distributed by spray and some will be used in irrigation water. Normally the product is used in pellet form.

Earlier this summer Consolidated Smelters' fertiliser plants, which are located at Trail and Kimberley, BC, and Calgary, Alberta, passed another milestone with the production of the 7,000,000th ton of high analysis chemical fertiliser. The industry was started in Trail in 1930 to make use of sulphur in smelter smoke. It grew slowly during depression years, but expanded rapidly after the war.

Sales are growing and now represent an average of about half the company's gross operating income. Fertiliser business is counted on to reach 700,000 tons this year. This is an increase of roughly 15 per cent. Next year will see a further increase—perhaps 50,000 tons. This increase will come in the first quarter when the expansion at the company's Calgary, Alberta, ammonia plant comes into play. The greatly increased use of anhydrous ammonia by farmers may call for emphasis on production of this high grade fertiliser.

Leather Trades' Chemists

AT the annual conference dinner of the Society of Leather Trades' Chemists at the Great Northern Hotel, Leeds, on Friday, 24 September, the retiring president, Mr. G. Forsyth, of Runcorn, conferred honorary membership upon Mr. Arthur Harvey, of Croydon, editor of the Society's journal, in recognition of his services for over 40 years. Mr. Harvey was the seventh to be so honoured, the last being Professor D. McCandish, of Leeds, in 1948. The other speakers were Dr. Ian C. Somerville, of Philadelphia, US, Dr. R. G. Mitton (new president), and Mr. Leslie L. Bedford (director of the Yorkshire Dyeware and Chemical Co. Ltd., Leeds). The following were elected to the Council: Dr. F. H. Kroch (managing director of Lankro Chemicals Ltd., Eccles), Mr. David Woodroffe (head of the Leather Department, College of Technology, Northampton) and Mr. G. R. Percival Ross (Forestal Laboratories, Harpenden). Professor D. Burton (head of the Leather Industries Department, Leeds University) was re-elected hon. treasurer and Mr. G. H. W. Humphreys was re-appointed hon. secretary. Professor J. T. Randall (Professor of Physics at King's College and honorary director of the Medical Research Council Biophysics Unit at King's College, in the University of Liverpool) delivered the sixth Procter Memorial Lecture.

Processing Study Approved

THE first study of chemical and metallurgical processing problems associated with nuclear power systems has been approved by the US Atomic Energy Commission, chairman Mr. Lewis L. Strauss has announced.

The study, to be financed and conducted by the Vitro Corporation of America, will be part of the AEC's industrial participation programme for development of competitive nuclear power. A total of 14 independent studies of other problems of nuclear power are now authorised under that programme.

The Vitro Engineering Division will investigate matters such as removal of fission product poisons, recovery and re-working of unspent fuel, recovery and decontamination of fissionable material produced in reactors, and radioactive waste disposal.

Process Research Planned

Petroleum Equipment Manufacturers Seek New Markets

BOTH in his annual report and in his speech at the annual general meeting luncheon at the Dorchester Hotel on 30 September, the chairman of the Council of British Manufacturers of Petroleum Equipment, Mr. Douglas Wilson, stressed the points that the future of the industry lay in developing overseas markets and that the promotion and encouragement of long-term process research must be a major part of future policy.

In his annual report Mr. Stewart, who is also president of the Fédération Européenne des Constructeurs d'Equipment Petrolier, said that the executive committee of the Council had been studying plans for research as he was confident that these must be part of their next objective. He had received most welcome encouragement from many sources but especially from Col. Auld, who at the beginning of his second term as president of the Institute of Petroleum, had been able to interest that body. Detailed information would be placed before members of the Council as soon as plans were formulated but in the meantime a research flavour had been given to the 1954-55 programme of activities and he hoped members would use the visits planned to supplement their own efforts and as additional opportunities to keep their own engineers in close contact with the users' technologists.

Effects of Decontrol

Mr. Wilson also said that many factors were bringing them into something like open market conditions, where quality, price and delivery were the deciding factors. Freeing of controls, such as was implied by the trend towards convertibility whether in the near or distant future, must further emphasise these factors and should also give impetus to those with new and original equipment to offer, backed by knowledge and experience.

Mr. Wilson, in his annual report, also emphasised the importance of 'the international shop-window.' Referring to the recently announced Chemical and Petroleum Engineering Exhibition which is to be held at Olympia in June, 1958, and at four-year intervals thereafter, he said that it must be such as to demonstrate what these two industries were capable of doing. As far as the Tulsa Exposition was concerned it had been decided that the Council could not participate as such but members were being encouraged to show. The executive committee had decided that it would be better to participate in the International Trade Fair at Toronto. The importance of the Canadian market was apparent to everyone in the industry and it seemed equally important to make it clear that British industry was vitally interested in Canada. It might be that a British petroleum equipment section would be developed at Toronto. The specific date in mind was 1956.

Welcome to Guests

In welcoming the guests to the CBMPE annual luncheon Mr. Wilson said:—

'Once again, it is my privilege and pleasure to welcome so many of our distinguished friends from every section of the great oil industry. It is very gratifying to realise from their presence that we have well-wishers here from foreign governments, Her Majesty's civil and armed services, the oil companies and from the oil producing territories throughout the world. We are always glad to have with us representatives of our government departments because our relationship with them is one of continued friendliness and close co-operation. Indeed, we regard their collaboration as invaluable, more especially as their guidance and advice in many directions is indispensable to our operations. That so great a number of important executives of the oil companies have given valuable time to be present, gives cause for satisfaction, inasmuch as I feel that, instead of being on opposite sides of the fence, they are among us in the happiest possible relationship.

'Last year, the Minister of Fuel and Power stated that the development of the oil industry in the 50 years of the Twentieth Century constituted the great success story among the primary fuel industries. Most of you are familiar with the origin and development of the Council and what it has achieved during the 11 active years of its existence. There is tangible evidence of the versatility and comprehensive-

ness of the equipment industry in this country in our "Classified List of Products" so ably edited by our technical adviser, Mr. Bonstow. It is a most impressive document in itself, but the facts that it contains of the scope and range of products now being made in this country is even more impressive. We are justifiably proud of the efforts which have been made by all our members to achieve this state of affairs. . . .

'We are doing all possible, subject to the limits imposed by world economics and other factors, to encourage our members to go out and explore the vast potential markets overseas. We are convinced that British built equipment is second to none. We believe we are competitive, and now that materials are becoming more readily available, we have confidence that delivery promises can be reasonably kept.

Many Problems

'We, of the Council, are deeply conscious of the responsibilities which rest upon our shoulders to foster and develop all our resources in this great new industry. There are many anxious problems which occupy our thoughts, but they are all directed to the maintenance of the successes we have already achieved and with the sincere hope of rising to even greater heights.

'Among the many matters engaging our attention, not only with respect to the present, but also as a major part of our future policy, is that of research. Last year I spoke to you on this subject and stressed the importance which the Council must, of necessity, place on this aspect of development. This opinion was endorsed by the Minister and we know that every possible encouragement and guidance is likely to be forthcoming, not only from the Government Departments, but also from other bodies having a like object in view.

'It is not entirely fortuitous that we have with us today distinguished scientific members from our universities and elsewhere. We invited them here so that they might know something of our aims and objects. We want again to remind them that the petroleum industry is a virile and progressive one and, moreover, that its advancement is of vital importance to the Nation. We would like them to continue to impress their students and all others in their universities and laboratories with the urgent need to promote a more intensive interest in petroleum technology. We have given much serious thought to these long term problems so that we may achieve joint action, not only with the blessing and support of the oil companies, but also with others whose interests lie along the same road.

'It has been clear to us from the inception of this idea that the Council had two very definite jobs to do.

'The first was to encourage our members to learn as much as possible about our new refineries from the inside by sending their most highly qualified technologists to talk with their opposite numbers on the job, and from these discussions of the operational problems to develop new and more efficient equipment.

'The second of these was to aid and abet basic research into processes and process design.

'As a Council, we are not constituted to carry out such research, but we believe it to be up to us to help, where such help is possible and welcome. These beliefs are clear and definite and, as regards the first of these developments, we owe a debt of gratitude to the oil companies who have so willingly thrown open their plants to our members and have, at all times, been willing to discuss their problems. We hope and trust that these discussions have been fruitful, both to the oil companies and our members.

'As regards the second, many discussions have taken place and the time is approaching when we will be able to formulate our plans in a more precise manner. These matters take time. Negotiations require patience, but the job is so well worth while that no effort can be too much on our part to bring about this desirable state of affairs.

Hope of Action

'That so many important and outstanding personalities are here today as our guests, leads me to believe that these particular proposals will not fall on unsympathetic ears and we hope that, as a result, tangible and co-operative action will result.'

Lieut.-Colonel S. J. M. Auld, O.B.E., M.C., D.Sc. (president of the Institute of Petroleum) in replying on behalf of the guests, said:—

'. . . . We all know that the ball does bounce well for the players who are up with it and are able to take their chances. The bouncing of the ball, in the Middle East

particularly, has been taken full advantage of, and the opportunity has been grasped by the whole country and particularly by the people who have formed this Council. . . .

'As a humble follower of the exact sciences I regard statistics, rather as the drunk regards the lamp-post to which he is clinging, as being more for support than illumination. I mention that because there are one or two figures which my fellow guests would care to hear or to have repeated to them. The first is that during recent years the value of goods manufactured in this country for the petroleum industry has been over £80,000,000 annually; and that does not include orders for similar equipment placed otherwise than through the major oil companies (of which I personally know there is a considerable amount). Nor does it include marine equipment and particularly the building of oil tankers. . . .

'The second thing is the number and nature of your members, more than 400 firms of great repute and substance, and among them some of the biggest in the land. If you think of it in terms of the capital represented by the member companies, it amounts to something in the way of national security that can scarcely be exaggerated. . . .

'There can have been few things in the industrial history even of this country to compare with the emergence and development of petroleum refining in the United Kingdom during the last decade. The bare figures of a refining capacity of 2,500,000 tons in 1944 rising to the present figure of 29,000,000 tons are self-expressive. It is apparent also that the country as a whole is becoming continually more oil conscious. . . .

Importance of Design

'Looking into the past of the country's great industries—our iron and steel, our cotton, and so on—they have been at their greatest not only when they were great producers of goods, but when they were great designers and manufacturers of equipment for producing goods. The key word is "design." It is such design that leads to manufacture and thence to production. This sequence seems essential and one can trace it in half a dozen cases. The sequence must be applied to oil in terms of ingrained understanding, followed by continued improvement at the producing end by reason of that understanding. As engineers we have got to think and act fundamentally inside and of the industry. As chemists, all concerned must march with the petroleum industry into its provocative future. . . .

'If we are to be a big oil country we must become so by virtue of our refineries and our interests abroad, from our use of oil and our development of new products from oil. That is going to be the difficult way. But I do not think it will not be equally effective in placing us in the position we are determined to fulfil.

'During the recent rapid expansion of the world's oilfields, and paralleled by the great refinery and tanker building programme, everything has been *couleur de rose*. Orders have flowed in; comforting back-logs were built up and, may I say, deliveries correspondingly delayed.

End of the Honeymoon

'Now the honeymoon is drawing to a close. Present programmes are nearing completion and housekeeping has to start in real earnest. European countries are anxious to build for themselves; markets which we thought were our own are having to be competed for, and at the same time there is a considerable amount of internal competition arising which is drawing somewhat at our entrails. This, of course, is not, and is not meant to be, alarmist. On the contrary, it is just the ordinary fight for preeminence. It means that in the housekeeping on which we have to embark after the honeymoon we have to take our share in the future. . . .

'A short time ago there was a temporary slackening in world crude oil production/consumption, possibly due to the tap being turned on too hard. Also in some countries there may have been an over-building of refinery capacity. Lulls from such causes may recur; but they are mere ups and downs. Taking it altogether, world consumption, and therefore the production, of petroleum will continue on its present upward curve, which means that it will approximately double in the next 12 years. . . .

'You can take it that the future for oil is secure. There are great demands in the world for oil which are completely unsatisfied. There are great industries such as those producing plastics and synthetic fibres which are dependent on oil. The future is there, we have got the oil to deal with, and that will give the real parity on which we shall work.

'Under present conditions stimulation and nourishment could be supplied by the big customers and contractors. They might, for example, bring reserve projects out of the bag or help by refusing to take advantage of the circumstances to put the screws on as regards price level. Or still better by arranging for equipment to be purchased solely in this country so long as the goods can be made in this country. And that for the time being would be all of it. I know little in the way of petroleum equipment which cannot be made, which is not made and which is not best made in Britain. . . .

'You have the support and the collaboration of the great oil companies. . . . We have the support of the great contractors, most of them American in origin. That was obtained more easily that we expected. British engineering, thanks to the Council, has really begun to learn what the oil industry is and where it is going.

Part of the Industry

'What is needed on top of this, in my opinion, is: (a) We want to aim at the assurance of continuity and progress; and (b) I would like it to be established that the Council represents not only the British production of petroleum equipment, and the suppliers, but is as much part and parcel of the oil industry as a whole as are the oil companies themselves. . . .

'It is certain that a more intimate alliance between the manufacturers and the oil companies would be a good thing for both parties; and I do not think we shall have to look very far for the registrar or parson to sign the contract or to bless the union. The obvious one is the Institute of Petroleum, which is a professional and progressive body, if not a very pious one.

'Nationally and individually our American friends have encouraged and partaken in the development of the petroleum industry in this country. But there is one thing our friends cannot do for us; they cannot give us their vested experience. On the process side of our interests, for example, major action emanates from the US. Even the few great processes originated elsewhere have been and could only have been turned into realities in America. It is natural, for example, because of their 600 long-established refineries to our 60 in Europe, that these processes should have originated or have been designed and engineered in the US; also that the manufacturing of the plant and equipment should be primarily American, and that the "pickings" should be American.

'On these lines I feel one might well say "let us get cracking," "Let us take the bull by the bush," "Let us carry out research and invent our own processes."

'There is a long trail attached to that brave thought—money; research stations; schools of applied chemistry and chemical engineering; university grants and fellowships; more money; the oil companies; the Department of Scientific and Industrial Research. Much can be done, but at a big cost in (as they say) folding money; and at the very best, slowly.

'Nevertheless, it is a course which has much to commend it and which, under proper guidance, may well be embarked upon; and, if I may interpolate a thought, as much in the direction of applied chemistry as of chemical engineering, since the search, by premise, would be for processes.

'But while this might be going on at the universities or schools of technology, it seems to me that quicker and possibly equally far-reaching results might be got by the organisation of "groups" of manufacturers within the Council, capable of taking on complete jobs and so gaining experience in the kind of process work which inevitably leads to improvement and invention. There is a big financial load to be carried, but I think this proposal is realistic and it would certainly be a justification by faith if the Council were to embark on it and, with the help of the oil companies, see it through.

Strengthening Process Side

'But however it is attained—by process research or operational experience, there is little doubt that the strengthening of the process side would see that £80,000,000 quickly doubling itself.

'Perhaps almost equally important, joint action between those two branches of the petroleum industry should be in public relations development. We are all apt to be P.R. minded these days, but I don't know that it gets us very far yet. There are other things in public relations besides advertising and statistics and the gossip columns. But the joint aim I visualise in this respect is the consolidation to which I have referred—to make petroleum part of the blood and bones

[continued on page 778

Indian Newsletter

FROM OUR OWN CORRESPONDENT

THE export duty on managanese ore has been abolished according to a notification of the Government of India. It has been stated that the measure is calculated to improve the position of India in the international market and to meet the severe competition in the trade from other countries. The abolition of the duty, though belated, is hailed by mine owners and exporters as a step in the right direction. It may be added here that recently some shipping companies have announced certain concessions for manganese ore cargo from Calcutta to ports in the United Kingdom. It is too early to state how these measures will help India to retain her hold in the manganese ore trade of the world.

* * *

A party of officials of the Government of India, after a preliminary survey, has selected Macherla, Guntur District (Andhra State) as the site for the location of the proposed Rs. 60,000,000 (£4,500,000) soda ash factory. The State Government of Andhra have stated that the selection of the site has been made in view of the encouraging demand for soda ash in that state and other neighbouring states. Other favourable factors which have influenced the decision are availability of abundant reserves of limestone and salt nearby and a perennial water supply.

* * *

A new rayon yarn plant, the biggest in the country, is proposed by the Silk and Art Silk Mills' Association, Bombay, with an authorised capital of Rs. 100,000,000 (£7,500,000). The plant is expected to have a production capacity of 15 tons per day, of which 10 tons will be utilised for the production of rayon yarn and the remainder for staple fibre yarn. It is also proposed to have a small plant of about one ton per day capacity for the production of polyamide yarn and fibre. The Association has enlisted the support of Snia Viscosa of Italy for technical assistance. The Italian firm is expected to contribute 10 per cent of the share capital while the Government of India will contribute 30 per cent. Although the exact location of the plant has not been decided, it is believed that the factory will be situated in the vicinity of Bombay.

It is learnt that the Dharamsi Morarji Chemical Company, Bombay, has secured official sanction for putting up a contact acid plant with a daily capacity of 30 tons of sulphuric acid. The company is expected to import standard designs of machinery from the United Kingdom and the Continent. The company is reported to be negotiating with the Burmah Shell Refinery for the supply of about 9,000 tons of sulphuric acid per annum. It is expected to make use of the sludge discharged by the refinery for conversion to sulphuric acid.

* * *

The report of the Development Council for Heavy Chemicals (Acids and Fertilisers) just released, estimates that by 1957 the requirements of various nitrogenous fertilisers in India would be about 173,000 tons of nitrogen per year, while internal production would then be 109,000 tons only, thus leaving a shortfall of 64,000 tons. As the Council feel that consumption will actually increase, an additional capacity of 100,000 tons of nitrogen per year should be planned. It suggests increased production of ammonium sulphate, urea, ammonium phosphate and mixed fertilisers. The consumption of phosphatic fertilisers has been far below production capacity. A questionnaire has been issued calling for certain information from parties concerned. The Union Minister for Production recently announced that two more fertiliser factories were to be proposed shortly. He also said that production at the Sindri Fertiliser factory (now about 350,000 tons per annum) would be stepped up to 600,000 tons per annum by 1957.

* * *

The chairman of the board of directors of the Kolar Gold Field Mining Companies has announced the discovery of a very large load of gold bearing quartz, near one of the existing mines. The discovery, he said, promises to become one of the biggest gold mines in India, if it can be successfully exploited. It may be recalled that the Ooregaum Gold Mining Company, one of the four in the Kolar Field, closed last year owing to uneconomic operations. The recent find of new gold may, it is believed, not only restore Indian production to past levels but raise it to new heights.

The vice-president of Ram Seyer and Miller Inc., consulting engineers of New York, and an Indian associate of the firm have arrived in India at the instance of the Ministry of Commerce and Industry of the Government of India. Their visit has been sponsored by the US Technical Co-operation Mission. The experts visited the Mysore Iron and Steel Works at Bhadravati and had consultations with officials and technicians. They have submitted a report to the Government suggesting expansion of the activities of the steel works. The expansion of the Mysore Iron and Steel Works forms part of an all India plan of the Government to increase iron and steel production in India. The Government recently sanctioned a Rs. 100,000,000 (£7,500,000) interest free loan to the Tata Iron and Steel Works, Jamshedpur, for expansion and modernisation of their plant.

Chemistry Congress

THE Fourteenth International Congress of Pure and Applied Chemistry is to be held in Zurich from 20 to 28 July, 1955, under the presidency of Professor P. Karrer, of Zurich. At the same time, from 21 to 27 July, the opportunity will be taken to hold the Eighteenth Conference of the International Union of Pure and Applied Chemistry at which Professor A. Tiselius, of Uppsala, will preside. Further information about the conference can be obtained from Professor R. Delaby, 4 Avenue de l'Observatoire, Paris 6e.

The congress will be concerned exclusively with pure and applied organic chemistry and has been provisionally sub-divided into three main sections: theoretical and physical organic chemistry (molecular structure, stereochemistry and reaction mechanisms); natural products (aliphatic and alicyclic compounds including terpenes and steroids, carbohydrates, amino-acids, aromatic and heterocyclic compounds, alkaloids and glyosides); and synthetic, industrial and analytical organic chemistry (dyestuffs, plastics, tanning agents, synthetic resins and synthetic and analytical methods).

Those wishing to read papers—of 10 to 20 minutes' duration—must send a short summary before next February. All inquiries should be sent to the Secretary-General, XIVth International Congress of Pure and Applied Chemistry, Zurich 1.

Alberta Plant to Expand

FURTHER expansion is forecast for Canadian Chemical and Cellulose Company's Edmonton, Alberta, plant. Harold Blancke, New York, president of Celanese Corporation of America, parent company of Canadian Chemical and Cellulose, declared at Edmonton that he sees a steady industrial growth for Alberta, based on the abundance of basic materials, largely gas and oil. He said that further development was expected at the Edmonton plant of Canadian Chemical and Cellulose, with greater use being made of chemical products and by-products. Products of the petro-chemical plant are being supplied to many countries, said Mr. Blancke. The products include various chemicals, acetate cellulose and acetate filament yarn.

Canadian Lithium

WORK is now in progress to bring into production Canada's first supply of lithium —for export to the USA. It is being carried out about 25 miles north-west of Val d'Or in Abitibi, Que.

The existence of the lithium ore body has been known for years, but it is not known why the United States is now taking an interest in it; it is possible that the demand comes from the US Defence Department, as the metal is connected with American H-bomb production.

CBMPE Luncheon

continued from page 776

of the community. That is something we have got to tell the country; they have got to realise that petroleum is part of their blood and bones, that it is the outstanding leader in chemical engineering; it is the essence of combustion and mobility and synthesis.

'This is the oil age, and let no one forget it. Oil gives so much to the community that it merits all the understanding and support and recruitment and rewards which there are to give. Perhaps we are being rushed off our feet and the front pages by the nuclear physicists. But the "oil way of living" will be ours for another century, or as long as the present prime-movers persist—even if the unlimited resources of nuclear energy have to be used to synthesise it from carbon and hydrogen.'

The Importance of Collagen

Professor Randall Gives Leather Chemists Lecture

THE annual general meeting and conference of the Society of Leather Trades' Chemists was held in the University, Leeds, on 24 & 25 September.

The Friday morning session was under the chairmanship of Mr. G. Forsyth, president of the society, and after the lunch interval the chair was occupied by Mr. A. Harvey, F.R.I.C., who introduced the Procter Memorial Lecturer, Professor J. T. Randall, F.R.S.

Professor Randall, who is Wheatstone Professor of Physics at King's College in the University of London, and Honorary Director of the Medical Research Council Biophysics Research Unit, delivered the Sixth Procter Memorial Lecture. The subject of his discourse was 'Observations on the Collagen System.' During the last eight years he has built up, with the help of the University of London, the Medical Research Council, and the Rockefeller and Nuffield Foundations, the largest school of biophysics research in this country. The techniques which are being used in collagen research include those of electron microscopy, interference microscopy and cine-film studies of tissue cultures; cytochemical, biochemical and X-ray diffraction studies also play a large part in this work.

New Information

Professor Randall emphasised the necessity for an integrated approach to the problems of the collagen system, and illustrated this by studies of living and fixed fibrogenic cells which had been made in his laboratory. The importance of certain cytoplasmic filaments and granules in fibrogenesis was discussed with the help of many striking photo and electron micrographs. X-ray studies have recently revealed much new information about the fibre-structure of collagen and it seems as yet too early to propose any satisfactory model for the polypeptide chain structure.

The formation of fibrils from collagen solutions has been studied experimentally and theoretically and the general principles of fibre formation *in vitro* were outlined. This work may be of importance both with regard to fibrogenesis in the living body and to the behaviour of large charged molecules in general.

The collagen research at King's College has been carried out by a group of about ten research workers and represents an attempt to understand the processes of fibre formation in the body and the structure and properties of the fibres. These problems are formidable even in the normal healthy animal or human being, but later on these researches may help us to understand some of the important and painful diseases associated with collagen—those of rheumatism for example. On the more technical side the study of collagen in the laboratory, especially its chemical nature and affinity for dyes, will undoubtedly bring a better understanding of the processes used in the leather industry, which is essentially a collagen industry.

Honorary Membership

The remainder of the afternoon session was taken up with the annual general meeting of the society during which honorary membership of the society was conferred on Mr. A. Harvey in recognition of his services to the society over the past 40 years. It was also announced that the president for 1954-5 is Dr. R. G. Mitton.

The annual dinner was held at the Great Northern Hotel on the Friday evening, at which the guest of honour was Mr. A. Harvey, and prior to this a cocktail party was given by the Yorkshire Dyeware & Chemical Co. Ltd.

Amongst other papers presented was one on 'Chrome and Zirconium Tannages—a review and comparison,' by Ian C. Somerville.

The first processes for making leather on a practical scale with salts of chrome, and later zirconium, were developed along the Delaware Valley in the eastern United States. The historical background of both processes is a matter of considerable interest which was reviewed in this paper, pointing out some of the difficulties which had to be overcome in making successful new leathers. Though zirconium tannage has not begun to assume anything like the importance of chrome tannage, it appears to

be the greatest advance in mineral tannage since chrome was developed.

Zirconium salts will produce strong through-white leather of solid character which gives a fine nap on finishing for suede. The tannage is fast to light, stable on ageing, and cannot be washed out with water. In the initial period, the main outlet was in the production of a wide variety of white leathers. In recent years more interest has been shown in the United States in its use in combination with other tanning materials to utilise properties other than its whiteness, particularly in the plumpness and solidity obtainable.

Cost Will Fall

The high cost of zirconium salts has been a determining factor in preventing a much wider usage. In recent years, however, there has been a great increase in interest in zirconium for other purposes and new sources of zirconium ore have been found. These will eventually lower the cost of the product, and already some steps have been taken to make available a cheaper tanning salt.

The chemistry of tanning with zirconium sulphate is very complicated. As a first step in elucidating this, evidence was advanced regarding the ionic condition of zirconium salts in tanning solutions, and concerning the nature of the zirconium salt picked up by the skin. Some of the more speculative theories of tanning which have been suggested in the literature were reviewed briefly.

Another paper, by D. G. Roux, was on 'Some Oxidative and Reductive Conversions of Black Wattle Tannins.'

In water, an apparent parallel exists between the affinity for collagen and for cellulose of some classes of polyphenols. This relationship was found to be effective especially for the major black wattle polyphenolic (tannin) constituents, and paper chromatograms run with water as irrigant may, therefore, be used to interpret differences and changes in the affinity of black wattle polyphenols for collagen.

On the above basis the affinity or 'astringency' of black wattle phenolic 'non-tans' and 'half-tans' was shown to increase as a result of atmospheric oxidation. This may be supported by evidence from the leather literature, and has an important bearing on the hide-powder method of tannin analysis, on some differences between fresh-bark and commercial extracts, and on the percentage of fixed tans present in leather.

Similarly bisulphiting both in the hot and cold reduces the affinity of true tannins and 'half-tannins' present in black wattle extract. The reaction appears to be selective, especially in the cold. This behaviour of wattle polyphenols after bisulphiting may be related to evidence available in the leather literature and to some specific problems of the wattle and tanning industries.

Protagonists of the various theories of tannage have largely overlooked these differences in affinity for collagen which exist amongst the polyphenolic constituents of wattle and other vegetable extracts. The parallel (not without certain exceptions) which exists between their affinity for collagen and for cellulose lends support to the idea that hydrogen bondage plays an important part in vegetable tanning.

Charity Performance

A SPECIAL charity performance of John Whiting's comedy, 'A Penny for a Song,' will be given in aid of the John Benn Boys' Hostels' Association by the Stock Exchange Dramatic and Operatic Society at the Scala Theatre, London, on 1 December at 7.30 p.m. All seats are reserved and prices of admission are: orchestra stalls, and dress circle, £1 1s., 15s. and 10s. 6d.; stalls, 7s. 6d. and 5s.; circle, 7s. 6d. and 6s.; upper circle 3s. Tickets are obtainable from Mr. R. Howell, Bouverie House, Fleet Street, E.C.4.

The John Benn Boys' Hostels' Association, which was founded in 1927 by the late Sir Ernest Benn, Bt., then chief proprietor of Benn Brothers Ltd., publishers of THE CHEMICAL AGE, in commemoration of the work of his father for London boys, celebrated its silver jubilee three years ago. At present it maintains King George's House, Stockwell, the largest residential boys' club in London, where accommodation is provided for 200 homeless boys.

Investigation of Japanese Fertiliser

The New Zealand Federated Farmers' fertiliser committee have decided to ask their Government to send experts to Japan to investigate production there of fused calcium-magnesium phosphate and to see if production of this fertiliser in New Zealand would be desirable.

Corrosion : A Factor in Design

Recommendations of OEEC Mission

AT its 22nd session in December 1952, the Chemical Products Committee of OEEC agreed on a technical assistance project under which a mission was to be sent to the US to study problems of maintenance in the chemical industry, with special reference to corrosion. A comprehensive programme was recommended, dividing the mission into three groups whose respective spheres would be the heavy chemical industry, the light chemical industry and the petrochemical industry. This programme was accepted by the MSA, on the understanding that the mission's main task would be to study those methods which were less familiar in Europe.

The members of the mission carried out a six weeks' tour of the US from 6 June to 15 July 1953, visiting nearly 40 research institutes and industrial concerns. Their report, 'Corrosion: Problems and Prevention in the Chemical and Petrochemical Industries in the USA,' has just been published, price 8s. 6d.

Not a Maintenance Problem

The most important point from the report is that corrosion has hitherto been considered as a maintenance problem, when it should properly be considered in the design stage. This presents many difficulties, as there is a marked lack of knowledge concerning both the nature and the process of corrosion. It is the last factor to manifest itself in plant operation; it differs according to the conditions of the operation; and according to the capacity at which the plant is used.

Shutdowns and accidents—such as the opening of a wrong valve—introduce unforeseen factors. Corrosive agents formed during shutdown may be different from, and more destructive than those in the process fluid. Overloading, which begins with the straining of a plant to secure maximum production, aggravates or introduces new corrosion problems. Moreover, it is not infrequently followed by plant modifications, which may lead to disproportionate corrosion.

The designer is called on in three main connections: plant extension, in which practical knowledge is readily available to make improvements based on operating experience; operation of a process already in use elsewhere, requiring the combination of data and prior experience; and the setting-up of a new process, which presents the greatest problem.

Most problems of corrosion should be studied from three angles: changing the process to make it less corrosive; using more resistant materials, which will involve important economical considerations; or applying a surface protective coating. External corrosion can be controlled by intelligent layout: siting the plant to windward to known sources of corrosive vapours; siting water-cooling towers so that the moisture drift towards other equipment is kept to a minimum; routing corrosive effluents to the side of the plant; and properly scrubbing gases and smokes before venting.

Careful observation of the equipment and critical examination of results in pilot plant will show which of the various types of corrosive attack are likely to occur, and will indicate further tests which should be made.

General design features should include:

(a) Ample wall thickness to withstand pressure plus corrosion allowance. A small additional allowance may in some cases add several years to the life of equipment.

(b) Welds relatively smooth and shaped to avoid pockets and traps.

(c) Outlet connections shaped and located to allow complete drainage at shutdown.

(d) Supervision of velocities to eliminate corrosion-erosion. Particular concern should be exercised to keep velocities low in nozzles and other constrictions.

(e) Avoidance of sharp angles, and recesses likely to retain corrosive product or moisture.

(f) Reduction of concentration of mechanical stress.

(g) Precautions in welding, to avoid porosity or denaturation of stainless steel, copper and aluminium alloys.

(h) Bearing in mind the possibility of bimetallic corrosion; pilot plant work should show the degree of caution necessary.

(i) Avoidance of infiltration at outlets of brick-covered plant.

(j) Keeping corrosive-carrying pipes above ground wherever possible.

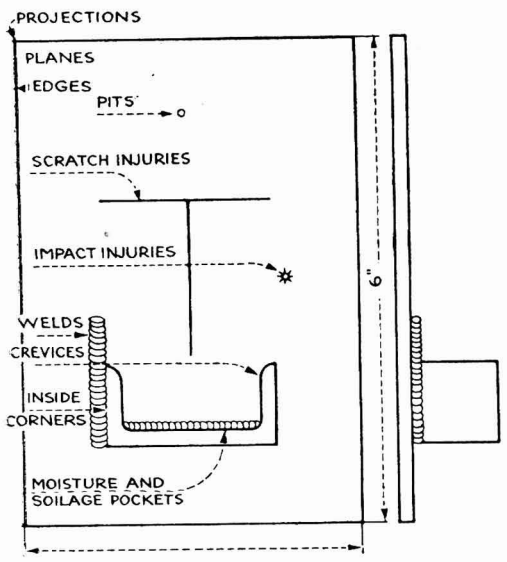
(k) Adequate ventilation of shops to reduce condensation on structural steelwork.

(l) Maximum accessibility of all equipment and piping.

(m) Application of heat-insulation material in such a way as to prevent moisture from breathing into and out of the contact surface between insulation and pipe.

The report stresses that it is now realised that accelerated corrosion testing in the laboratory serves no useful purpose, since service tests alone give a true indication of performance. The Kenneth Tator Associates test panel, which the mission noted with interest, is claimed to perform screening and elimination functions simultaneously and to cut elimination panel testing time by 50 to 75 per cent.

All surface characteristics which promote failure, such as sharp and rounded edges, projections, rough wells, pits, crevices, inside and outside corners, moisture pockets, are incorporated in the design of the panel (see illustration). The KTA test panel is exposed on conventional racks in the plant area, and it is claimed that unsuitable paint will fail significantly in eight weeks; very few conventional coating systems will survive a 25-week exposure without significant deterioration; and types and sequences of coating failure found on the panel have accurately predicted the type and sequence of failure in actual plant use.



The KTA test panel

With regard to painting, the mission recommends three-coat systems with a minimum total thickness of 0.125 mm. as a standard in normal conditions. The choice of surface preparation, to be viewed in the light of the job in hand, is an important factor in paint economics. Periodical retouching and single maintenance coats are recommended before corrosion and deterioration of the paint manifest themselves.

The report highly commends the activities of the National Association of Corrosion Engineers, and recommends the formation of a European counterpart.

Glycerine Prices Reduced

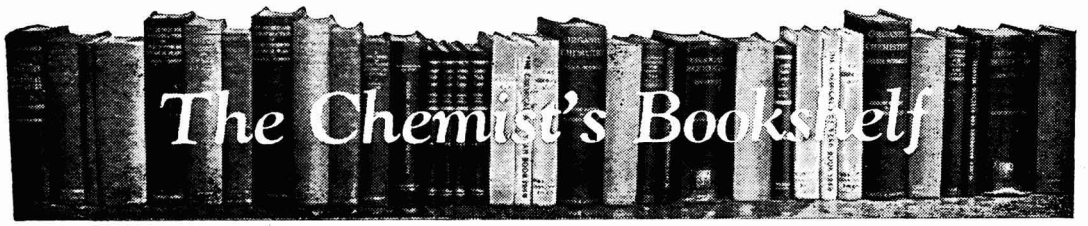
REDUCED prices of chemically pure and industrial glycerine, which took effect from 1 October, have been announced by Glycerine Limited of Portman Square, London, W.1. At the same time the price list has been simplified and terms of sale altered. Payment should now be made within 28 days of invoice date or within 14 days of invoice date to qualify for the $2\frac{1}{2}$ per cent discount.

The new prices, per cwt., range from £12 17s. 6d. for bulk deliveries in tank waggons (25 tons and upwards) to £15 1s. (under 1 cwt. in 14 lb. tins). Refined pale straw industrial glycerine remains at 5s. per cwt. less than chemically pure.

Germans Work Longer

MEN employed in the German chemical industry did on an average 50.1 hours work a week in February, according to figures quoted in the *Ministry of Labour Gazette*. Their weekly earnings averaged DM94.77 (£7 18s. approx.). Women in the industry worked for 46.1 hours and their average weekly wages amounted to DM55.14 (£4 12s. approx.). Both earnings and hours of work showed an increase from February, 1953.

The Gazette also quotes figures for the Swiss chemical industry (October 1953) in which 19,626 workers were engaged. Skilled men earned on an average Frs.3.28 an hour (5s. 5d. approx), unskilled men Frs.2.79 (4s. 7d. approx.) and women Frs.1.82 (3s. approx.).



INSTRUMENTAL ANALYSIS. By J. H. Harley and S. E. Wiberley. John Wiley & Sons Inc., New York; Chapman & Hall, London. 1954. Pp. vii + 440. 52s.

This book sets itself out to provide a treatment of instrumental analysis for senior and graduate students in the United States, and consequently could be regarded as aiming at the Final Honours student in this country. As university courses are constituted here at present the student will naturally not have the opportunity to cover completely the course recommended by the book. Nevertheless, it should be possible, and it would undoubtedly be profitable, for the student to work through selected parts of such a course and to become thoroughly familiar with the content of the remainder.

The instrumental methods dealt with are absorpton and emission spectroscopy (including infra-red and Raman work and flame photometry), fluorimetry, determination of *p*H, potentiometric and conductimetric titrations, polarography and amperometric titrations, high-frequency absorption methods, X-ray analysis, mass spectrometry and radioactive determinations.

Among the wealth of books on instrumental analysis that have appeared over the past decade this is undoubtedly one of the best for teaching purposes and indeed for use by anyone other than the extreme specialist. What may be considered by some an undue amount of attention has been paid to spectroscopy; but in the reviewer's opinion it is not altogether a disadvantage to have one section more highly developed than the remainder, as long as the student bears clearly in mind the fact that most other instrumental methods would be susceptible to the same degree of emphasis.

The theory of the methods, the fundamental instrumentation, the working out of this in actual commercial instruments, and applications are all dealt with in turn. One very welcome point is that a critical appraisal of various methods will help the student to realise the limitations of each method as well as its advantages. Consequently, a critical faculty should be developed permitting the production of rounded analytical chemists rather than devotees of methods for their own sake. Excellent bibliographies are appended throughout.

The fact that the commercial instruments used as illustrations are of American origin does not detract seriously from the merits of the book from the point of view of the British reader. The commercial instrument aspect of the book is its least important, and since any instrument normally has its own detailed instruction sheet, the book may readily be adapted for use in conjunction with British instruments.

A useful chapter gives a detailed laboratory course on instrumental methods of analysis which is designed to supplement the remainder of the book, but which has not been so simplified as to blind the student to the difficulties that may present themselves in 'real life analysis.'

Although primarily intended for teaching purposes, this book will have interest and value for all analytical chemists who are concerned with the use of instruments and particularly with the selection of methods.
—CECIL L. WILSON.

THE HISTORY OF UNILEVER. 2 Vols. By C. Wilson. Cassell & Co. Ltd., London. 1954. Vol. 1. Pp. xx + 335; Vol. 2, pp. 480. 45s. per set.

In this two-volume history of one of the world's greatest commercial undertakings a Cambridge historian who has specialised in Anglo-Dutch commerce and finance, Mr. Charles Wilson, tells a fascinating story. It is more than just an interesting tale, however; it is, as its sub-title indicates, 'a study in economic growth and social change' and as such deserves serious study.

'The History of Unilever' is a reference book to a very complicated organisation (how many people, even employees of the firm, understand the relationship between the Dutch and British interests?) and as the

author had absolute freedom to study even the most private records and letters he has been able to answer most of the puzzling problems. He tells in great detail how Unilever grew from three separate sources—a British wholesale firm (Levers) and two Dutch butter trading families (the Van den Berghs and the Jurgens). Every detail of planning, financing and day-to-day operations is given and it makes stimulating reading to see how this vast network of over 500 companies (now operating in nearly every country in the world) resulted from the vision, confidence and energy of one man—William Lever, First Viscount Leverhulme.

This book can be strongly recommended to all those interested in either rationalisation or the concentration of capital and skill and to those who can appreciate true genius. It is bound to interest all those who long to understand 'big business,' those who have wondered just how Unilevers is organised, and to all those interested in the soap and margarine industries. Nowhere will a more detailed history of these two industries be found.—E.A.R.

SPOT TESTS, VOL. II: ORGANIC APPLICATIONS. By F. Feigl. Translated by R. E. Oesper. 4th English Edition, 1954. Elsevier Publishing Co. Ltd., Amsterdam. Distributed by Cleaver-Hume Press Ltd., London. Pp. xv + 436. 37s. 6d.

Volume I of this work has already been reviewed in THE CHEMICAL AGE (1954, **70**, 1261) and it is therefore unnecessary to repeat here the general remarks made at that time. Although the two volumes are complementary, the present one has been made largely independent of the first, for the benefit of those interested only in the application of spot tests to organic materials, by including here also the chapter on Spot Test Techniques by Professor P. W. West, and by giving sufficient detail to enable the identification of inorganic residues to be carried out without reference to Volume I.

The remainder of the book can be divided into preliminary tests, spot tests for functional groups, spot tests for individual compounds, and special applications.

In the previous edition about 120 pages were devoted to organic spot tests. It is safe to forecast that the expansion indicated by the size of the present volume is only a beginning. How much this branch of organic analysis owes to the the stimulating work of Professor Feigl himself will be revealed by a brief inspection of the bibliographies. But by making this separate volume available, many organic chemists should now be inspired to follow up the lines of investigation indicated by the introductory chapter, and the results should be extensive and rewarding. To the pioneer studies of the author there will undoubtedly be added a flood of organic applications comparable to that which the same author, 20 years ago, brought forth in the inorganic field.

Every organic chemist interested in analysis should study this volume (with or without Volume I, though preferably the former), and few will do so without being convinced that spot test analysis has at least as many attractive possibilities in the organic field as it has in the inorganic analysis with which it has, for so long, been more closely associated.—CECIL L. WILSON.

ARTIFICIAL FIBRES. By R. W. Moncrieff. 2nd Edition. George Newnes Ltd., London. 1954. Pp. 445 + xii. 30s.

Mr. Moncrieff is well known as a consultant in the textile field, and this book faithfully reflects its author's experience and interests. As the preface to the first edition stated, he 'endeavoured to include the salient facts relating to each fibre that has been produced for use, even on a small scale.' These facts include such data as a complete description of the chemical structure and details of manufacture, spinning, elasticity, specific gravity, other physical and chemical properties, dyeing and finishing.

In this new edition the fibres described include not only such oddities from the first edition as Soybean, Zein and PeCe, but such relative newcomers as Acrilan, X-51, Merinova, Fibre E, Rhovyl, Vinylon and Vinyon HH.

Outstanding developments in the last few years have been the introduction of new methods of dyeing and the great strides made by staple fibre, and considerably more attention has been paid to these topics. A new chapter has also been added on the economic and social aspects of artificial fibre production.

This is a volume which impresses one by the completeness of its treatment. As a reference book for those who use or who are considering the use of synthetic fibres it should prove very successful—B.I.

HOME

Industrial Disputes

In the first eight months of the year a otal of 1,000 working days was lost in ndustrial disputes in the chemical and allied rades. This is the same amount as in the orresponding period of last year. There vere five stoppages of work, involving 200 vorkers in all.

Firm Invites Councillors to Canada

Four Ellesmere Port (Cheshire) councilors and their sanitary inspector are to fly to Canada. A local firm (Cabot Carbon Ltd.) naking carbon black sought to extend their plant. The council wanted to be assured hat there would be no pollution of the itmosphere, so the firm invited members to go to Canada to see an escape-proof type of plant which they propose to erect.

Unemployment in August

A total of 4,003 workers in the chemical and allied trades were unemployed in Great Britain on 9 August. Of this number 2,414 were men and 1,589 women, and nearly all were wholly unemployed, as opposed to being temporarily stopped. Almost half the unemployed men (1,017) came from firms making chemicals and dyes.

Productivity Mission Here

A European Productivity Agency Mission to study the use and grading of wood waste, chip board and the use of fibre board in Austria, Belgium, France, Germany, Italy, the Netherlands and the United Kingdom is visiting this country from 7 to 10 October. The mission, which consists of nine members, is to visit the Timber Development Association, the Furniture Development Council, the Vere Engineering Co. Ltd. and the Forestry Commission.

Fullers' Earth Bid

The offer by Laporte Industries for the whole of the issued capital of Fullers' Earth Union on a share exchange basis, reported several weeks ago, has now been posted to shareholders. The Fullers' directors unanimously recommend acceptance and announce that they intend to accept on behalf of their own holdings. Laporte Industries have called an extraordinary meeting for 25 October to create capital to finance the deal.

Fewer Accidents in August

The number of workers killed in industrial accidents during August was 87, compared with 96 in the previous month and 110 in August, 1953. Five occurred in factories making chemicals, oils, soap, etc. There were no deaths from industrial diseases, but nine people were affected by lead poisoning and 13 by chrome ulceration.

Fertiliser Plant for Leith

Scottish Agricultural Industries Ltd. are to carry out a major expansion scheme at Leith, using land reclaimed from the Firth of Forth. A large new fertiliser manufacturing plant will be constructed on this site with deep water access and direct overhead conveyor contact with the existing premises in Leith. SAI recently announced improved methods of production of compounded fertilisers, whereby the problem of solidification has been largely eliminated.

Laporte Buys Yorkshire Company

Laporte Industries Ltd. has bought for cash the whole of the issued share capital of the Cleckheaton Chemical Company Ltd., Yorkshire, who manufacture sulphuric and hydrochloric acids and other chemicals. Mr. D. P. B. Davies is continuing as managing director. Mr. J. Jones (vice-chairman of Laporte Acids) has been appointed chairman of Cleckheaton Chemical and Mr. A. C. Nicholson (joint managing director of Laporte Acids) has been appointed to the board.

Zinc Alloy Die Casting Exhibition

The Zinc Alloy Die Casters Association is holding an exhibition of zinc alloy pressure die castings at the Birmingham Exchange and Engineering Centre, Stephenson Place, in Birmingham, from 25 to 30 October. It will be open each day from 9 a.m. to 5 p.m. The exhibition is designed to bring to the attention of the public the wide variety of products made by the pressure die casting process. It will consist of over 200 different zinc alloy die castings made in the United Kingdom ranging in complexity from the letterbox surround to the motor car carburettor and including one of the smallest castings produced, weighing approximately 1/100 oz.

• OVERSEAS •

New Director for Sindri Factory

Mr. N. K. Mathulla has been appointed managing director of the Sindri Fertiliser Factory in place of Mr. A. B. Chatterjee ICS, who has gone on leave. Mr. Mathulla, who has already assumed charge of his new office, has been controller of accounts at Sindri since 1951.

More Petrol Used in Australia

Consumption of petroleum products in Australia is continuing to set new records. The Minister for National Development, Senator Spooner, said that figures released for the first six months of this year indicated that the overall consumption of all petroleum products this year would be about 9 per cent higher than in 1953.

Chilean Acetate Plant

The Pacific Steel Company has announced that it has signed an agreement with two German firms—Otto Woolf and Fritz Workes—for the construction of a cellulose acetate plant at Coelemu, about 50 miles from the city of Concepcion. The plant's production capacity will be about 70,000 tons annually. Pine will be used.

US Lead Production Falls

Although lead supplies in the USA declined during 1953, they were still well in excess of demand, according to the Bureau of Mines, United States Department of the Interior. Supplies reported from all sources were 1,376,000 short tons, a decrease of 101,000 tons from the 1952 total, but still 173,000 tons greater than total distribution. Domestic mine production fell and imports went down by 12 per cent.

Styrene Monomer Plant for France

France is to soon have an annual production of 10,000 to 14,000 tons of styrene monomer, a chemical with important civilian and defence uses in the manufacture of plastics and synthetic rubber and paints. The French firm Houllieres-Pechiney-Progil (HPP.) has started building a styrene monomer plant at Mazingarbe, in northern France, and an American concern, the Koppers Company of Pittsburg, will furnish operating instructions under an agreement.

£16,000,000 Oil Search

The West Australian Petroleum Company has told members of the State Parliament that it is prepared to spend £A20,000,000 (£16,000,000 sterling) by the end of 1956 in searching for oil in Western Australia.

New Oil Show in Nigeria

A show of oil has been encountered by the Shell D'Arcy Petroleum Company of Nigeria—a joint enterprise of Anglo-Iranian and Shell—at its deep test well at Ituk Mbang in the Calabar province of the eastern region of Nigeria. It is still too early to say whether there is oil in commercial quantities, but the preliminary tests are encouraging. This is the second time an oil show has been encountered in Nigeria.

Expansion of Greek Salt Works

A Swiss firm is to invest $680,000 worth of foreign capital in imported equipment for expansion of the Missolonghi salt works, Greece. The increase in salt production is planned for export and for increased production of caustic soda to be used in conjunction with local production of alumina from Greek bauxite. Greece's potential salt output is almost unlimited, but it has been restricted by domestic demand.

More Canadian Natural Gas

Estimated gross production of natural gas, less field waste, was 101,500,766,000,000 cu. ft. in 1953, 14 per cent higher than in 1952, the Canadian Department of Mines and Technical Surveys has announced. The most important development in the natural gas industry in Canada during the year was the export of Alberta natural gas to central Canada. A reserve study made during the year by the Petroleum and Natural Gas Conservation Board of Alberta showed that marketable reserves of Alberta natural gas on 30 June, 1953, were 11,500,000,000,000,000 cu. ft. As a result of this finding, 3,500,000,000,000,000 cu. ft. was made available for export to central Canada. The Board anticipates an increase in reserves of 1,250,000,000,000,000 cu. ft. each year during the next 10 years, which would also be available for export.

· PERSONAL ·

At a meeting of the board of directors of Monsanto Chemicals Ltd. held on 28 September MR. J. W. URBAN, director of overseas relations, was appointed director of the company. Mr. Urban, who first joined Monsanto in 1929, has had 35 years' experience in the chemical industry. He will continue his duties as director of overseas relations, in which he is responsible for personal contact with the company's agents, associates and other industrial interests in overseas markets. At the same meeting the resignation of DR. W. D. SCOTT from the board was accepted with regret.

Mr. J. W. Urban

MR. G. A. S. NAIRN (whose retirement from Lever Brothers, Port Sunlight Ltd., of which he was chairman, took place last week) is being succeeded by MR. F. S. WALKER, who started his career with Lever Brothers at Port Sunlight and has been a commercial member of the United Kingdom Soap Executive of Unilever Ltd. in London.

MR. M. F. STEVENS has retired from the board of the Sturtevant Engineering Co. Ltd. He joined the firm in 1914 and was appointed a director in 1947.

The Perkin Medal of the Society of Dyers and Colourists has been awarded to DR. ARTHUR ZITSCHER for his work leading to the discovery of the new class of azoic dyes based on the arylamides of *o*-hydroxycarboxylic acids. The presentation will be made at a meeting of the society to be held in the University of Manchester on 15 October, when Dr. Zitscher will deliver a lecture on his work.

DR. and MRS. G. T. MILLS, of Glasgow University Biochemistry Department have left Britain for the US where they will spend a year doing research work at the Medical School of Western Reserve University, Cleveland, Ohio. Dr. Mills, senior lecturer in biochemistry, has been awarded an Eli Lilly Travelling Fellowship for one year by the Medical Research Council. His wife holds a Beit Memorial Fellowship for medical research.

After 27 years' service with the Shell Group, MR. I. A. MACMILLAN, manager of Shell Chemicals' London Division, is to retire and settle in Jersey. He will be succeeded by MR. A. D. BUCKLAND-NICKS, who is at present head of the Detergents Division of Chemical Industry Administration, the Shell Petroleum Co. Ltd. Mr. Macmillan joined the Asiatic Petroleum Co. Ltd. in 1927 and was on the staff of their fuel oil department until he joined the army in 1940. He saw 4½ years' service overseas in the Middle East and PAI Force, and rose to the rank of Lt.-Colonel. He held a staff appointment in Berlin for three months before demobilisation in 1945, and shortly after returning to the Shell Group he became the first manager of London Division of Shell Chemicals Ltd. Mr. Nicks, who is at present in Canada and the USA on Shell's chemical business, joined the Shell Petroleum Company's technical products department in 1939, but within three months was serving with a Middlesex unit of the Royal Artillery. He saw service in France and Germany, and was demobilised with the rank of major in March, 1946, re-joining Shell shortly afterwards. He has been largely responsible for the rapid development of Shell's detergents in overseas markets since the war.

I. A. Macmillan

A. D. Buckland-Nicks

Publications & Announcements

A NEW type of hydrostatic dust collector has been added by Dallow Lambert & Co. Ltd., of Leicester, to their present range of patent Multiswirl models. Previously available in the MSE series and applied in the main as an individual unit for fettling booths, double end polishers and grinders, the new series ME is for large volumes of air and heavy dust concentrations. Employing the Dallow Lambert patent hydrostatic cross tube element, it scrubs dust-laden air in either water or oil. It is claimed to attain a very high separation efficiency and to bear a high air volume to cost and space ratio; it is compact and operates without pumps or sprays. It is suitable for the dusts created in the various processes connected with the manufacture of chemicals, plastics, paints, etc.

* * *

SUBSTANCE of a lecture delivered last February to the North Wales Section of the RIC, 'Analytical Chemistry of the Proteins and Amino-Acids' by Professor H. D. Springall has recently been published by the Institute (30 Russell Square, London, W.C.1). Professor Springall describes the most important methods of analysis—chemical degradation, isotope dilution, microbiological methods, countercurrent extraction and ion-exchange—and illustrates his points with the example of the complete analysis of insulin.

* * *

WITNESS to the increasing importance of nuclear energy as a peacetime potential, the first number of *The Journal of Nuclear Energy* (Pergamon Press, 242 Marylebone Road, London, N.W.1) has just been published. An article of particular interest is that by P. Fortescue, of AERE, Harwell, on 'The Design of Totally Enclosed Pumps —with particular reference to a 50 HP sodium pump.' The journal, which is edited by Dr. J. V. Dunworth, of Harwell, is a quarterly, subscription £4 10s. per volume, or £3 10s. to private subscribers.

* * *

BOOKLET from British Titan Products Co. Ltd., York, describes three anatase grades of titanium dioxide: grade E, which is a general purpose pigment, readily dispersible in organic media; HR, which is specially manufactured to be self-dispersing in water; and Granular, a free-flowing grade suitable for vitreous enamel frits. Tables outline uses for which the different grades are suitable, and list their advantages over rutile pigments, or alternatively the uses in which rutile grades are preferable.

* * *

EVIDENCE of serious weighing errors on microchemical balances due to the use of riders has been causing concern to both balance designers and users. Since the determination of the weight of a sample usually involves at least three or four different weighing operations each of which is subject to these errors, the uncertainty in the weight of the sample can clearly be quite considerable and is generally significant. The most serious aspect of this loss of precision is that it is not self-evident to the observer. It is only by carrying out a somewhat protracted and controlled series of observations that the precision of a single reading can be determined. Even then the best the observer can do is to apply the error to his readings and obtain a 'known uncertainty' in his results. He cannot do very much towards eliminating the error. The introduction of the new Oertling riderless microchemical balance eliminates all rider errors and replaces the rider mechanism by a direct reading of weight from weight dials and a calibrated scale. Any variations in scale calibration over a period can be rapidly checked and a simple correction applied to weighing results. The magnitude of the weighing error is thus considerably reduced and the value of the error can be simply and quickly determined by the user. Tests made with the new riderless balance indicate, it is said, that for the first time in microchemical weighing, it is possible with certainty to weigh samples 'correct to the nearest microgram.' Full details can be obtained from L. Oertling Ltd., St. Mary Cray, Orpington, Kent.

* * *

CONTINUED development of industrial control systems, electronic apparatus, computers, schemes of instrumentation and aircraft electrical equipment, has brought about the need for a multi-purpose relay which is small in size and yet is extremely robust and reliable coupled with a long life and ample safety margins. Recognising this situation, Besson & Robinson Ltd., 6 Government

Buildings, Kidbrooke Park Road, London, S.E.3, have designed a miniature relay which, they claim, satisfies all these requirements. In spite of its small physical dimensions, this type J.01 relay incorporates many of the constructional refinements which are normally only found in high quality full size units. Among the design features (for which provisional patents have been obtained) are rapid operation of both AC and DC, inherent freedom from buzz while operated on AC, heavy contact pressure, and low coil consumption. The relay is particularly suitable for close stacking in applications where many millions of operations may be required.

* * *

AVAILABLE scientific literature on outdoor air pollution is summarised in an exhaustive bibliography compiled by the US Bureau of Mines. The publication, a bulletin, was prepared at the request of the chairman of the United States Technical Conference on Air Pollution, held at Washington, D.C., in May, 1950. It contains more than 3,900 references dating from 1819 to 1952. Polluted air, the bulletin says, has been troubling mankind for centuries. It may cause damage to his health, to his forests and crops, and even to his buildings. With the great industrial development it has become in many instances an all-important problem and, according to the American Municipal Association, only four United States cities with populations over 25,000 have not established some sort of control. The bibliography lists references under such subjects as: General aspects of air pollution; nature and origin; composition of pollutants; effects on health, materials and structures, and vegetation; methods of determination and control; legal aspects of the problem; and costs in damage by air pollution. Abstracts under each subject are in chronological order, arranged alphabetically by authors. An index of authors is included. Bureau of Mines Bulletin 537, 'Air Pollution, A Bibliography,' by S. J. Davenport and G. G. Morgis, can be obtained only from the Superintendent of Documents, United States Government Printing Office, Washington 25, DC, for $1.75 a copy.

* * *

CHEMICALS from petroleum are increasingly in use and Epikote resins—made by Shell—are enabling the manufacture of chemical-resistant surface coatings which may go far towards solving the corrosion problem in industry. Tretol Ltd., 12-14 North End Road, London, N.W.11, manufacture coatings of this type under the name of Tretol Chemiprufe Enamel M.90. They publish an article entitled 'Epikote Epoch' in the summer edition of their technical magazine *Building Topics*. Maintenance Engineers and others may obtain copies of *Building Topics* and details of the new development free and post free from Tretol Ltd.

* * *

THE introduction of plastic tubes for conveying water and a variety of chemicals is proving successful in a wide range of applications. Erinoid Ltd., of Stroud, Glos, have now brought out a booklet describing their range of polythene tubes of from $\frac{1}{8}$ in. to 6 in. bore. The tubes are exceptionally resistant to inorganic chemicals and can be used for most strong acids and alkalis, aqueous salt solutions and certain gases. They are also claimed to be corrosion proof, weather resistant and lighter and more flexible than metal tubes.

* * *

THE engineering firm of Robey and Co., Limited, of Lincoln, celebrates its centenary this year. Starting as manufacturers solely of agricultural machinery, the firm now makes electric and steam winders for mining, steam and diesel engines, boilers, air compressors and other industrial engineering products. The full range is described in catalogue G.850, an illustrated booklet recently issued by the company. The catalogue describes the standard products, but the factory is equipped to deal with any type of heavy engineering, and the Robey facilities are not tied rigidly to a set range of goods.

* * *

THE British Welding Research Association, a Government-aided body, is engaged in research problems affecting all aspects of welding. It also has a department dealing with members' day-to-day problems and a library and issues technical reports to members. The association has now prepared a booklet, *Welding Research for Industry*, which describes its services in detail. Attractively produced and well illustrated, the booklet can be obtained from the Director of Research, BWRA, 29 Park Crescent, London, W.1.

Law & Company News

Commercial Intelligence

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

Mortgages & Charges

(Note.—The Companies Consolidation Act of 1908 provides that every Mortgage or Charge, as described herein, shall be registered within 21 days after its creation, otherwise it shall be void against the liquidator and any creditor. The Act also provides that every company shall, in making its Annual Summary, specify the total amount of debt due from the company in respect of all Mortgages or Charges. The following Mortgages or Charges have been so registered. In each case the total debt, as specified in the last available Annual Summary, is also given—marked with an *—followed by the date of the Summary but such total may have been reduced.)

G. O. WOODWARD & CO. LTD., London, S.W., manufacturing chemists. 26 August, charge to Barclays Bank Ltd., securing all moneys due or to become due to the bank; charged on 45 Morrish Road, Brixton. *Nil. 4 June, 1951.

REGENT OIL CO. LTD. (formerly Texas Oil Co. Ltd. & Texaco Petroleum Products Co. Ltd.), London, W. 18 August, £150,000 sub-mortgage, to Eagle Star Insurance Co. Ltd.; charged on specified properties. *Nil. 17 June, 1954.

Satisfactions

J. F. MACFARLANE & CO. LTD., Boreham Wood, manufacturing chemists. Satisfaction 11 September, of bond, etc., registered 5 January, 1953.

Increases in Capital

The following increases in capital are announced: FISONS LTD., from £8,500,000 to £15,000,000; WILSON AND WOODS LTD., from £100 to £500; MARCHON PRODUCTS LTD., from £100,000 to £735,000; RECKITT & COLMAN HOLDINGS LTD., from £18,897,895 to £21,874,335; ENERGEN FOODS CO., LTD., from £100,000 to £250,000; EVANS CHEMICALS LTD., from £2,500 to £50,000; BCR FACTORIES LTD., from £36,050 to £100,000; CORNBROOK CHEMICAL COMPANY LTD., from £160,000 to £210,000; GRIFFIN & GEORGE LTD., from £200,000 to £280,000.

New Registrations

Dorman Long (Chemicals) Ltd.

Private company. (538,415.) Capital £100,000. To enter into an agreement with Dorman Long & Co., Ltd., and to carry on the business of refiners of all kinds of coal by-products, distillers of benzole oil and tar and manufacturers of pitch and pitch preparation, etc. The subscribers (each with one share) are: John D. Moston and Frank E. Poulter. The first directors are not named.

H. C. Fairlie & Co. Ltd.

Private company. (30,267.) Registered in Edinburgh. Capital £1,250. Objects: To acquire part of the business of H. C. Fairlie & Co. Ltd. (in liquidation) and to carry on the business of chemical manufacturers and merchants, etc. Directors: James Fairlie, John C. Fairlie, Frank W. Fairlie and Henry C. Fairlie. Reg. office: 8 Gordon Street, Glasgow, C.1.

Dispel Ltd.

Private company. (30,269.) Registered in Edinburgh. Capital £100. Manufacturers, exporters and importers of chemicals, disinfectants, etc. The subscribers (each with one share) are: Henry Cowan and Robert Bow. The first directors are to be appointed by the subscribers.

Munmor Oils & Chemicals Ltd.

Private company. (538,009.) Capital £2,000. Manufacturers, blenders, importers and exporters of and dealers in chemicals, including synthetic fatty esters and other additives for use in the preparation of lubricants of all kinds, etc. Directors: Cecil W. A. Mundy and Robert H. H. Morley. Reg. office: 1a Market Street, Altrincham, Cheshire.

Lacquer Developments Ltd.

Private company. (537,855.) Capital £5,000. Objects: To acquire the business of a detergent and paint manufacturers carried on by Clifford Schofield at 4/8 Masonic Street, Oldham Road, Manchester. Directors: Clifford Schofield and Kenneth M. Hargreaves. Reg. office: 4/8 Masonic Street, Oldham Road, Manchester.

Company News

A. J. White Ltd.

Net group profit before taxation, of A. J. White Ltd. for the year ended 31 March, 1954, was £195,771, against £216,281 for the previous year. The decrease, the chairman, Mr. C. L. Fawell, told the annual

general meeting on 30 September, was mainly due to increased competition. A final dividend of 7½ per cent, making 12½ per cent for the year, was approved.

Quickfit & Quartz Ltd.

Speaking at the annual general meeting of the Triplex Group of Companies in London on 29 September, Sir Graham Cunningham, chairman and managing director, reported excellent progress by Quickfit and Quartz Ltd., manufacturers of interchangeable laboratory glassware, of Stone, Staffs. Sir Graham said the firm had recently received its first bulk order from the United States and it was hoped that this would be only a beginning of much larger exports to that country. A new catalogue which had been brought out earlier in the year had been selected by the Federation of Master Printers and the Council of Industrial Design as one of the best of the year. The profit of QVF Ltd., the new subsidiary, for July was nearly as large as for all the preceding seven months put together, which augured well for the future.

Saunders Valve Co. Ltd.

Group profits of Saunders Valve Co. Ltd. for the year ended 30 April fell from £229,603 to £204,303. This, says the chairman, Mr. J. C. Billingham, F.C.A., is attributable mainly to the passing of the somewhat artificial position in 1952-53, when orders and deliveries were to some extent above current consumption. Orders, particularly from overseas, have increased and have still been above the output rate, although steps have been taken to expand production. A dividend of 20 per cent is recommended for the annual meeting on 20 October.

George Cohen Sons & Co. Ltd.

A 'very satisfactory' outcome of the year's operations was reported by the chairman and managing director, Mr. Cyril M. Cohen, at the annual general meeting of George Cohen Sons and Co. Ltd. on 29 September. He pointed out that last year he had predicted a return to less abnormal times and a fall in turnover and profits. Turnover, at £18,000,000, was, in fact, some £3,500,000 less than last year and profits after depreciation were down by £550,000 to £1,214,000. Net profit was £340,000 (£450,000). A final ordinary dividend of 8½ per cent was approved.

The Distillers Co. Ltd.

A block of 1,500,000 4s. Ordinary shares in the Distillers Co. Ltd., owned by the National Distillers Products Corporation of the US, has been placed with insurance companies and oher investment institutions and with Stock Exchange dealers. The shares were part of the 2,000,000 allotted to National Distillers in part payment for certain assets held in the UK.

Aspro Ltd.

Net profit of the group attributable to Aspro Limited for the year ended 31 March, 1954, was £459,370 compared with £346,601 in the previous year. The Ordinary dividend is 22½ per cent for the year on an Issued Ordinary Capital of £1,000,000 as compared with 35 per cent last year on an Issued Ordinary Capital of £500,000.

Courtaulds (Australia) Ltd.

Courtaulds (Australia) Ltd., a subsidiary of the British company, made a loss of £A190,123 during the year ended 30 June. This compares with the previous year's loss of £A78,632 and is largely accounted for by the fact that £A174,793 against £A35,533, was provided for depreciation. The business was established in 1949, and a statement by the directors says that in the absence of unforeseen circumstances and provided that reasonable tariff protection is given, operations for the current year will result in a profit.

Bradford Dyers' Association

Bradford Dyers' Association is paying an interim dividend at the rate of 4 per cent on 30 October on account of the year 1954 on the £3,388,191 ordinary capital as increased by 50 per cent scrip issue. This is at the same rate as for the previous year, when the total was made up to 15 per cent, less tax, with a final of 8½ per cent and a bonus of 2½ per cent, all on £2,258,794 capital.

Sangers Ltd.

Group trading profits of Sangers Ltd. dropped from £472,360 to £406,641 in the year ended 28 February, 1954. After adding other income, the total is down from £481,213 to £433,196. Net profit is £137,984 (£163,964). A second interim dividend of 17½ per cent in lieu of a final dividend makes the year's total 27½ per cent, the same as that paid for the previous two years. The meeting is to be held on 12 October.

Next Week's Events

MONDAY 11 OCTOBER

The Chemical Society

Durham: Science Laboratories, The University, 5.15 p.m. Joint meeting of Newcastle and Durham and The Durham Colleges Chemical Societies; 'Recent developments in radiation chemistry,' by Dr. N. Miller.

Society of Chemical Industry

London: Royal Institution, Albermarle Street, W.1, 7 p.m. Fine Chemicals Group: 'The economics of research in the fine chemicals and pharmaceutical industries,' by Dr. G. M. Dyson.

TUESDAY 12 OCTOBER

The Institute of Metals

Swansea: Metallurgy Department, University College, Singleton Park, 6.45 p.m. South Wales Local Section: 'Production and manipulation of titanium,' by D. E. Yeomans.

Society of Instrument Technology

Manchester: College of Technology, 7.30 p.m. 'Some quality recording instruments for oil refineries,' by G. C. Eltenton.

WEDNESDAY 13 OCTOBER

Institution of Chemical Engineers

Birmingham: University, Edmund Street, 6.30 p.m. Graduates' and Students' Section: 'Photography in scientific research,' by Dr. J. F. Padday.

Society of Chemical Industry

London: Chemical Society's Rooms, Burlington House, Piccadilly, 6.30 p.m. Food Group Nutrition Panel meeting: 'Food, chemistry and nutrition,' by Dr. Magnus Pyke.

Manchester Metallurgical Society

Manchester: Central Library Lecture Room, 6.30 p.m. Presidential address by J. D. Hannah.

THURSDAY 14 OCTOBER

The Institution of Chemical Engineers

London: The Royal Institution, Albermarle Street, W.1, 5.30 p.m. 'Pre-design estimation of the capital cost of chemical plant,' by R. Edgeworth Johnstone.

The Royal Institute of Chemistry

Brighton: Technical College, 7 p.m. 'Small-scale methods of analysis,' by Dr. C. L. Wilson (with the Brighton Technical College Chemical Society).

The Chemical Society

Nottingham: University, 4.45 p.m. 'Direct hydroxylation of organic compounds,' by Professor W. Bradley.

Belfast: Agriculture Lecture Theatre, Queen's University, 7.30 p.m. 'The production and properties of titanium and titanium alloys,' by Dr. N. P. Inglis. (Joint meeting with Royal Institute of Chemistry and Society of Chemical Industry).

Edinburgh: North British Station Hotel, 7.30 p.m. 'Chemical research at Harwell,' by Dr. R. Spence. (Joint meeting with the Royal Institute of Chemistry and the Society of Chemical Industry).

London: Society's Rooms, Burlington House, W.1, 7.30 p.m. Meeting for the reading of original papers.

Institution of Chemical Engineers

Leeds: Fuel Department, The University, 7 p.m. Graduates' and Students' Section: Illustrated lecture on 'Iron, steel and steel tube manufacture,' followed by a film (presented by Stewart & Lloyds Ltd.).

Liverpool Metallurgical Society

Liverpool: Engineering Society's Rooms, 9 The Temple, Dale Street, 7 p.m. Presidential address by G. T. Callis.

Incorporated Plant Engineers

Newcastle-on-Tyne: Roadway House, Oxford Street, 7 p.m. 'The classification of fire hazards,' by D. McClean, John Kerr & Co. (Manchester) Ltd.

FRIDAY 15 OCTOBER

Institution of Chemical Engineers

London: Caxton Hall, S.W.1, 6.30 p.m. Graduates' and Students' Section: 'Steam jet refrigeration,' by G. G. Betts.

The Royal Institute of Chemistry

London: Rubens Hotel, Buckingham Palace Road, S.W.1, 7 for 7.30 p.m. London Section sixth annual dinner and dance.

Society of Dyers and Colourists

Manchester: Large Chemistry Lecture Theatre, The University, 7 p.m. Presentation of the Perkin Medal to Dr. A. Zitscher and address by the medallist.

The Society for Analytical Chemistry

Sheffield: Chemistry Lecture Theatre, The University, 7.30 p.m. Joint meeting of the Microchemistry Group with the North of England Section of the Society and the Sheffield, South Yorkshire and North Midlands Section of the Royal Institute of Chem-

istry. 'The microchemical determination of niobium and tantalum,' by A. A. North, and 'A statistician's approach to sampling problems,' by D. R. Read, followed by a film.

SATURDAY 16 OCTOBER

The Institution of Chemical Engineers

Birmingham: The University, Edmund Street, 3 p.m. Midlands branch: 'Transport, storage and general handling of caustic soda' and 'Transport, storage and general handling of caustic soda,' by N. L. Evans, and 'Handling common chemicals—benzene, toluene and xylene,' by I. M. Smallwood.

Market Reports

LONDON.—Active conditions persist in most sections of the industrial chemicals market and a fair weight of new business has been reported on home account. The volume of inquiry for shipment is also keeping well up to recent levels. With the exception of the non-ferrous metal compounds, prices, for the most part are unchanged with a firm undertone. The basis quotations for white lead have advanced to £143 per ton, and ground white lead to £157 per ton. Red lead is higher at £138 10s. per ton and litharge £140 10s. per ton. Copper sulphate is now quoted at £83 10s. per ton following the advance of the price of metal. In the coal tar products market there is a better call for pitch on home and export account, and most other products in this section are in brisk demand.

MANCHESTER.—Trading activity on the Manchester chemical market has been maintained at a reasonably satisfactory level during the past week. The textile bleaching and finishing trades are still calling for fair quantities of a wide range of products and a steady demand from other leading outlets in the Lancashire area has also been reported. Prices generally are on a firm basis. Sulphate of copper has moved up sharply this week in sympathy with the metal to £86 per ton. Moderate buying interest continues to be shown in fertilisers. The tar products are mostly going steadily into consumption.

GLASGOW.—Very little change in the general outlook with a steady week's trading reported from all sections of the trade.

CLASSIFIED ADVERTISEMENTS

SITUATIONS VACANT

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

A. BOAKE, ROBERTS & CO., LTD., LONDON, E.15, Fine Chemical Manufacturers, have vacancies for **JUNIOR ADMINISTRATION ASSISTANTS** in their Production Department, **SHIFT LABORATORY STAFF,** and **DAYWORK PLANT CHEMISTS.** For the first two categories a salary of not less than £550 a year is envisaged with shift differential, where applicable, of £50 a year. Candidates should be at least of Inter.-Science Standard. For the Plant Chemists a salary of £700 upwards is envisaged, and for these posts academic or professional qualifications and experience are necessary. Applications, clearly stating the post applied for, to **PERSONNEL MANAGER.**

A. BOAKE, ROBERTS & CO., LTD., LONDON, E.15, require **SENIOR CHEMISTS** for their Process Development Department. These appointments would appeal to qualified men with some years of experience of Organic Chemistry, seeking the opportunity to lead a team in developing new projects from laboratory to plant scale, so as to provide new or improved products. The minimum salary envisaged is £800 per annum.

The company also requires **ASSISTANT CHEMISTS** to participate in these projects. Industrial chemical experience is desirable in these appointments. Minimum salary is £550 per annum. Applications in detail to **PERSONNEL MANAGER.**

APPLICATIONS are invited by **MUFULIRA COPPER MINES, LIMITED, NORTHERN RHODESIA,** for post of **ASSISTANT GENERAL FOREMAN** in furnace and casting section of electrolytic refinery. Successful candidate will be required to commence work early in 1955. Applicants must have expert knowledge of casting copper wirebars, cakes and billets, together with long experience in position of responsibility connected with furnace refining of copper. Commencing basic salary, £1,176 per annum, plus copper bonus at present 57 per cent on basic salary and cost-of-living allowance currently £66 per annum. Free outward passage. Leave at 51 days per annum may be accumulated over three years. Write **MINE EMPLOYMENT DEPARTMENT, SELECTION TRUST BUILDING, MASON'S AVENUE, COLEMAN STREET, LONDON, E.C.2.**

THE **POWER - GAS CORPORATION, LTD., STOCKTON - ON - TEES,** require **CHEMICAL ENGINEERING GRADUATE,** with or without previous technical experience. Work will be basic design of gas and chemical plant. Permanent position. Pension Scheme. Apply, giving age, qualifications, etc.

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