Chemical Age

VOL. LXXIV

21 JANUARY 1956

No. 1906

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OWING to the increasing volume of work and the widening scope of the activities of the Chemical Engineering Department, it has been decided to make this a completely separate Division of the Company with permanent headquarters in London. Here it will be in closer touch with the world of chemical engineering and its design facilities will be situated within easy reach of all concerned. The APV Chemical Engineering Division, as it is now to be known, will remain at its present Wandsworth address pending completion of alterations to new headquarters.

Removal details will be announced later but meanwhile, all communications should be addressed to:---

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Transatlantic Commemoration

AND DESCRIPTION OF THE OWNER.

THIS week has witnessed widespread celebrations in the United States and the United Kingdom, all of them commemorating the 250th anniversary of Benjamin Franklin's birth on 17 January 1706, in Boston. It is not wholly accurate to say that Franklin was a great Anglo-American. It is perhaps characteristic of our unconscious British insularity that we have no coined phrase or term that reverses the order of nationalities in 'Anglo-American', and it is such a description that is needed for Franklin as also for many other longsighted Americans since then who have done their best to develop good relations between their country and ours.

It is impossible to classify Benjamin Franklin. His diversity of interests and activities was remarkable even in a century still uncomplicated by specialization. Scientific societies and journals can lay claim to Franklin as a scientist and his name will be found indexed with several page references in most histories of science; yet to say this is merely to emphasize one part of the many-sided story. Franklin was a printer, an author, an inventor, a scientist, a statesman and a diplomat.

It can be said with almost total certainty that Franklin would never have been born in this century for he was the 15th child in a tallow chandler and soap boiler's family of 17. The stimulation of his versatility of talents can be traced in the practical background of his early years. At 10 he was working in his father's business; he found this dull and irksome, but it can be supposed that this impressionable contact with small-scale 18th century industry developed his latent powers of scientific observation. But an older half-brother had a printing shop and at 12 he became an apprentice there. He was 15 when his brother launched a newspaper. This above all was Franklin's education, not in the setting of type, but in the making of words and sentences. After a quarrel with his brother he went to New York and then to Philadelphia. At 17 he was a Philadelphian printer; at 23 he was a newspaper publisher, and his Pennsylvania Gazette became the leading American paper.

Early success as a printer and publisher, and as a prolific writer for his own paper, enabled Franklin to become a leading 'man of ideas'. Perhaps in our own times his exceptional position could be likened to that of a popular TV commentator, for any opinions he desired to express could reach a widespread audience. In his time sheer curiosity was the first prerequisite of scientific progress —almost the entire realm of modern science was there to be probed with ideas and speculations, and most of the industrial and utilitarian revolution was still to be invented. Franklin's interest in science developed gradually, as the natural interest of an educated man in the 18th century. He made himself an educated man, educating others in the process; at 21 he formed a local study circle, at 27 he began to study foreign languages, and at about the same age he founded the first circulating library in America.

His most noted contribution to science is in the field of electricity, but he was 40 when this particular interest first took shape. He retired from printing soon afterwards and was able to devote more of his time to a subject which brought him international recognition. Here, perhaps, is the one note of specialization to be found in all his versatility. In 1750 he proposed a method of proving that lightning and static electricity discharge identical; two years later he were launched a kite during a storm in Philadelphia and proved this contention. This was nearly 50 years before Faraday was born; Europe was then the predominant centre of Western thought and experiment, and America had many years of political development to pass through before even beginning to catch up.

Franklin's inventions are worth listing. They include an open stove giving more heat and using less fuel, an improved clock, the first pair of bifocal glasses (which he constructed to aid his own sight), a new type of harpsichord, and one of the first, and perhaps the first, clothes mangles. It can be reasonably said that his outlook was that of applied science in a period of history when pure science was finding its feet. He showed that gypsum had value as a fertilizerand again it might be remembered that Liebig, the founder of fertilizer theory. was not born until 13 years after Franklin's death. He proved that black absorbs more heat than white and he disproved the idea that oil on the sea suppresses waves. Nor did he leave contemporary medical science in quiet enjoyment of its fixed ideas; he was a staunch advocate of fresh air at a time when closed windows were the rule and of copious drinking of water during

fevers when the accepted treatment was to deny water to the point of dire thirst. At the outbreak of the War of Independence Franklin was 69, for his century an old man. By his diverse contributions to knowledge he was the best known American outside America.

Not many men of science have also been statesmen. On the whole political interests have proved discordant influences. In his own country Franklin was Clerk of the Pennsylvania Assembly. Deputy Postmaster for Philadelphia, and an assembly member for Philadelphia. In local political work he established a police force and fire brigade. In 1757 when he was 51 he was sent to London as Agent for the Colony of Pennsylvania; he stayed in London for five years. He served another period of London duty as as Agent for Pennsylvania and three other Colonies between 1768 and 1775. During these two periods he strove for improved relations between the two countries'; eventually, however, he was driven from hopes of reconciliation to full hearted support of American independence. In 1776, during the War of Independence, he represented the Colonies in France and negotiated a treaty of alliance and loans.

He was 79 when his duties abroad ended; he had two years before been one of the Commissioners responsible for negotiating and signing the peace settlement. He returned to America and became a member of the Constitutional Convention, dying at the age of 84, having seen the first year of the United States under its new Constitution. His name can never fade in American history; in American science it is constantly commemorated by the Franklin Institute. founded in 1826 for the progress of science and the mechanic arts. The various celebrations now and shortly taking place in this country and in France are not historical exaggerations, engineered to embellish the new 20th century cause of Western friendship. They rightfully commemorate the life and work of America's first great man of international status and vision and one of the first of America's flow of great practical scientists.

Notes & Comments

Market Pointer

THE recently announced acquisition of the Murphy Chemical Co. Ltd., by Glaxo Laboratories Ltd., is an exceptionally interesting event in the horticultural chemical field. It foreshadows the widespread use of antibiotics in protecting crops from bacterial diseases and fungal attacks, although at present this type of use is largely in the experimental stage. The Glaxo organization made it clear that their principal reason for buying the Murphy company was their interest in antibiotics and their own lack of experience and facilities for trading in the agricultural or horticultural markets. Confidence in the future for crop antibiotics could hardly be expressed more forcefully. The Murphy Chemical Co. is one of the veterans of this specialized trade-cumindustry. Founded in the earlier part of this century, during the initial phase of commercial spraying developments, it was one of the pioneering firms for tar oil winter washes; however, its list of crop protecting products has always been comprehensive, and the more modern growth of large competitive organizations in the same trading field had no disestablishing effects upon the Murphy Company's position and reputation.

Gram-negative Effective

NTIBIOTICS can be expected to deal with gram-negative bacterial A infections of plants and with specific fungal ailments, the blights and mildews, scab diseases etc. A good deal of work has already shown that streptomycin and terramycin have a number of effective uses, but only in a few countries as yet is crop-spraying with legally permitted. antibiotics Lesser known antibiotics such as cycloheximide and griseofulvin may eventually become the 'big names' in the antibiotic cropspraying list. The latter is easily producible on a large-scale, non-toxic to humans and animals, seems to have no damaging side effects upon plants, and has shown wide range of activity as a systemic fundicide. Glaxo interests in the potentialities of griseofulvin have been indicated in several recent reports.

Much Work Remains

LENTY of laboratory and field trial research will still be needed before antibiotic products for crops can leap from the promising into the established class. Economic difficulties could handicap and delay the speedy success of some projects. Developing new agricultural chemicals is in itself a costly business; so, too, is the development of large-scale antibiotic manufacture unless process is already operating for medicinal or other uses. Nevertheless, it looks now as if antibiotics for crops will be making increasingly important news during the fairly near future.

The Ziegler Story

CCORDING to a recent report in Chemical Engineering (1956, 63 A [1], 104), there was a sizeable element of chance in the development of the Ziegler low-pressure polythene patents. In the 1940s Dr. Ziegler discontinued experimental work on lithium and other metallic hydrides and organocompounds, but he had found the ability in some of these substances, notably lithium ethylate and aluminium acylate, to polymerize ethylene. When later on the ICI high-pressure polythene process drew much more attention to this new family of synthetic polymers, Dr. Ziegler's earlier approach was revived. In one of the experiments a student used an uncleaned autoclave; traces of colloidal nickel in it catalysed a conversion into pure butadiene. From this accidental clue a search for effective polymerizing catalysts began, and finally the combination of aluminium triethylate and titanium tetrachloride, suspended in an aliphatic oil, was reached, and the relatively simple exothermic polythene process was evolved.

Arts into Science?

MPERIAL Chemical Industries Ltd. has been considering making arrange-L ments with a number of universities to offer scholarships to arts subjects entrants---if they agree to transfer to science subjects. This was revealed at a recent conference of schoolmasters by the head of the ICI central staff department. How far in these days of many university scholarships this post-entrance offering of additional scholarships would in fact form an incentive is somewhat difficult to assess. Non-gainers of preentrance scholarships would presumably be the main 'market', and they may be thus situated through lack of ability; if so, they will hardly be good prospects for a late switch from, say, classics to chemistry. It is, of course, dangerously invidious to foster the background idea that university students have 'prices on their heads'. The bevy of industrial job offerers that falls upon university science schools as each academic year moves to its close has inevitably encouraged a certain amount of precocity.

New Deal Overdue

T was also revealed that a staff training post recently advertised by ICI was applied for mainly by science teachers in schools. Yet the post was less important nationally than science school teaching. This was put forward as firm evidence that school teachers are long overdue for a new economic deal. The ICI specification for school education was stated very firmly—as little specialization as possible. The 11-plus examination system was deplored. Breadth of study and outlook is still industrially preferable to the one-subject or two-subject intensive product.

International Exhibition

FROM 9 to 22 April the Royal Norwegian Council for Scientific & Industrial Research and the Norwegian Industries Development Association will present an international instrumentation-automation exhibition in the Abelhaugen Halls in Oslo. The exhibition will cover instruments, apparatus and equipment for industry and research; indication, recording and signal instruments; special electronic and acoustical equipment; and mechanical, electrical, pneumatic and hydraulic equipment for mechanization of working operations.

In connection with the exhibition a special conference (industrial clinic), arranged in limited sections, will be held, where instrumentation, automation and mechanization of working operations and production processes will be discussed.



Norman Mr. Swindin. M.I.Chem.E., A.M.I.Mech.E., chairman of Nordac Ltd., was presented with a television set from employees of the company and a leather-bound book containing signatures of all the company's employees on his 75th birthday on 16 December. A founder-member of the Institution of Chemical Engineers, Mr. Swindin founded Nordac Ltd. in 1928. He has carried out much pioneer work during his long career and is particularly noted for his development of submerged combustion

Fertilizer Production & Use

FAO's World Survey

THE 1955 annual review of world production and consumption of fertilizers, published by the Food and Agriculture Organization of the United Nations, forecasts that production and consumption of all fertilizers in 1956 will increase by four per cent and three per cent, respectively, over 1955. If the 1956 forecasts are achieved, production and consumption of all fertilizers will have increased by 21 per cent and 18 per cent respectively, in the three years from mid-1953.

The review is based on data received from Governments up to 19 August 1955. It gives data for 1953/54 (actual values), for 1954/55 (preliminary estimates), and forecasts of production and consumption for 1955/56, based on developments in progress or on expected trends. Unofficial estimates for countries of Eastern Europe are included, but all computed data exclude figures for the USSR, the Chinese People's Republic, and North Korea.

Statistics given in the review show that world production and consumption of fertilizers has been maintained during the period from 1953 to 1956. After rapid expansion in the years immediately following the second world war, increases in production have been relatively steady during the last few years apart from the disturbance to superphosphate supplies caused by the sulphur shortage.

Increases Continue

Countries which use fertilizers heavily have continued to increase production and consumption. Many other countries which have used little fertilizer in the past have begun to expand consumption and some are now establishing new industries to produce the fertilizers needed.

Combined world production of nitrogen, phosphoric acid and potash in 1954 was 17,692,000 metric tons, an increase of nine per cent over 1953 as compared with the preliminary estimate of six per cent given in the 1954 review. World production of nitrogen in 1954 amounted to 5,570,000 metric tons, compared with 4,894,000 metric tons in 1953, world production of phos-

phoric acid in 1954 amounted to 6,389,000 metric tons, as against 5,978,000 metric tons in 1953, and world production of potash in 1954 amounted to 5,733,000 metric tons compared with 5,393,000 metric tons in 1953.

World Consumption

World consumption of all fertilizers in 1954 was 10 per cent greater than in 1953, which is significantly more than the estimated increase for this period (six per cent) given in FAO's 1954 review. In 1954, 13 per cent more nitrogen and 11 per cent more potash was used than in 1953. Apart from this high value, rates of increased consumption estimated or forecast for each nutrient are relatively steady between two and five per cent annually for the three The review suggests that, given vears. stable economic conditions and little change in policy of the major food-producing countries, fertilizer consumption as a whole may continue to increase annually by at least six per cent during the next few years.

Nitrogen once more showed the largest and most consistent increases in world production and consumption over the threeyear period from mid-1953. The corresponding percentage increases for potash are somewhat lower. Rates of increase in production of phosphoric acid have been rather less than those for nitrogen and potash, but for consumption, phosphoric acid and potash increases have been about the same.

The review states that while the existing pattern of world fertilizer usage is maintained, production and consumption of nitrogen and potash are likely to continue to increase more rapidly than production and consumption of phosphoric acid. In a few years, says the report, the world may produce and use approximately equal tonnages of nitrogen, phosphoric acid and potash.

Reports of recent or projected developments in fertilizer production or use are summarized in the review. The eventual capacity of Austrian superphosphate manufacture is unofficially stated to be 40,000 metric tons. In Finland, says the review, it is planned to double the capacity of the nitrogen fertilizer factories by the end of 1956 or early 1957, and an increase in superphosphate manufacture is also planned.

It is reported from Germany that increasing interest is being taken in 'complex' fertilizers, which now represent 15 per cent of total fertilizer consumption. According to the review, unofficial reports from Hungary state that a new nitrogen plant is being tested in the north of the country, and that the fertilizer unit of the Pet works is being expanded to meet greatly increased fertilizer requirements.

Irish Plants Operating

In Ireland, two new plants for granulated 'compound' fertilizers have begun to operate, with a total capacity of 70,000 metric tons. Consumption in Ireland, in 1955, is estimated to be double the prewar figure for nitrogen, three times for phosphoric acid and five times for potash.

Unofficial reports from the Netherlands state that a factory at Ijmuiden is to be expanded in capacity from 70,000 to 95,000 metric tons of nitrogen within the next two years. It is stated in Portugal that since the existing factories are still unable to meet the demand for nitrogen fertilizers, despite recent increases in capacity by 25,000 metric tons, further expansion of production is projected.

In Sweden new nitrogen plants are planned, using shale oil waste gases as source of energy, to manufacture ammonium nitrate fertilizers at the annual rate of 20,000 metric tons of nitrogen.

In the UK, both of the firms concerned with the possible exploitation of the proved, but very deep, deposits of potash in Yorkshire have decided, on economic grounds, not to undertake their exploitation. The consumption of both nitrogen and potash in the UK reached record high levels in 1954.

The review states that a recent official statement from the USSR said that the 1955 output of mineral (i.e., inorganic) fertilizers was over 10,000,000 tons, or double the 1950 output. It is expected to be three times the 1955 figure by 1965. There are stated to be large deposits of rock phosphate at Khibiny, and very large potash deposits, 770 square miles in extent, near the Urals. Sulphate of potash is stated to be produced in large amounts, and the output of 'complex' fertilizers is being stepped up.

In Yugoslavia, the new nitrogen plant in Bosnia, with a capacity of 27,000 metric tons, is reported to have started up. This would be sufficient to cover present demands.

According to unofficial reports from Canada, new nitrogen plants or extensions of existing ones have recently come into operation in Alberta and Ontario and other new plants are planned in Quebec, Ontario, Manitoba, and Alberta (using natural gas).

Three separate companies are reported to be preparing to develop the extensive potash deposits in Saskatchewan. In one case the shaft has been sunk and mining operations may be expected to begin before long. At present the only operating potash mines in North America are in New Mexico in the US.

In Mexico, it is reported that plans are being made to erect three large nitrogen fertilizer plants, of sufficient capacity to satisfy the country's requirements. At present most of the nitrogen fertilizers used have to be imported.

Suggesting reasons for the plans for large increases in nitrogen production capacity in Canada and in Mexico, the review states that in Canada, nitrogen consumption increased by 23 per cent in 1954, and although no estimated increase has been officially reported for 1955, and no forecast for 1956, similar increases may be expected in those years. In Mexico, nitrogen consumption in 1954 increased to $3\frac{1}{2}$ times what it was in 1953, with an estimated further increase of 33 per cent in 1955.

Gas From Oil

The South-Eastern Gas Board's Isle of Grain project, where gas will be made from oil products, will be capable of manufacturing 20,000,000 cubic feet of gas a day in $2\frac{1}{2}$ years' time. This represents one-fourteenth of the supply needed in the board's area. There is sufficient land available on the site to extend the plant to an output of 80,000,000 cubic feet a day. Capital expenditure on the first stage of the scheme will be about £2,000,000.

The Selection, Training & Control of Overseas Agents or Representatives

by MR. J. W. URBAN

Director of Overseas Relations, Monsanto Chemicals Ltd.

A MANUFACTURER needs a good, active agent in every overseas market where he seeks to do business. Without an agent, he cannot maintain regular contact with his customers nor find additional outlets for his goods; he cannot be properly informed about the demand for his wares, nor about local conditions.

He needs the agent's advice concerning his customer's standing and ability to pay his bills. Finally, the manufacturer's own representatives need the help, guidance and linguistic talents of an agent when visiting the market to call upon customers. So we have decided we need an agent; therefore, let us set about finding the best for our purpose.

The search for an agent frequently begins with a visit to HM Commercial Counsellor on the spot. He usually has a selection of suitable candidates to suggest and can always give information concerning any individual or firm that has applied for an agency. What do we look for in an agent? He must be of good report commercially, financially and socially. He must have an adequate agency organization for our needs -salesmen, transportation, business premises etc. He and his salesmen must be able to speak English as well as the local vernacular, if they are to make the fullest use of commercial and technical visits from headquarters.

An Added Advantage

If the agent and his men also know something of the products to be handled, they have an added advantage. It is not regarded as essential, however, because they can and will be taught that, as we shall see. Lastly, even in the earliest stages of the search, regard should be paid to the succession planned within the agency concern; is there a son or other relative? Is there a younger partner? The candidate should never be a lone operator if it can possibly be avoided. If he is the only and obvious choice, he must be encouraged to find a partner as soon as possible to ensure continuity of representation.

But we are going too fast. Having selected our man, if we can do so at no great expense, we might wish to show him to our colleagues to get their reaction to his personality; we will assume this to be favourable and we now discuss the terms of agreement.

Attractive Commission

The terms of appointment of the agent are usually those the principal has laid down and invariably call for the payment of a commission on sales with, perhaps, an allowace for postage, cables and telephone calls between agent and principal. The amount or percentage of commission must of necessity vary with the type of product to be marketed and will depend on the ease or difficulty with which it can be sold. Commission, therefore, is a matter between principal and agent, but it must be attractive enough to make the agency worth while.

The agency agreement is usually in the form of a simple letter setting out its terms, including an escape clause, and a schedule of products covered by it. If the letter is submitted in duplicate, the agent is invited to sign and return a copy signifying his acceptance of the terms offered. Such a letter of appointment is sufficient to cover most agency arrangements, but a more formal type of agreement might be necessary if the agent is to be given wider powers than those of a sales representative. Now we have an agent, we pass on to the next stage.

We want our agent to know us better, our personnel with whom he will be in day-today correspondence and we want to be sure he understands the uses to which our products can be put. This can be done only at headquarters. So we invite him to spend a couple of weeks with us, in the course

Paper presented at the winter proceedings of the British Institute of Management, Management House, on 10 January. of which he will meet our sales personnel and, by visits to manufacturing plants and technical application laboratories and, perhaps, to customers, will learn how our products are made and used. He is now 'ready for the road.' However, he will need help, especially in his early days.

We shall have to send salesmen and technical men into the field to work with him and his salesmen. We shall have to back him up with local advertising. We shall have to exercise diligent supervision of his work at all times, especially at the beginning of his work for us. We must not allow him to become discouraged if his efforts do not produce the immediate results he had expected. In short, we must not forget him and must give him service from within. It is not enough to indoctrinate the head man of the agency concern.

It is necessary also to ensure that his collaborators know how we like to operate. After all, they represent us in the field in which they work. Thus, periodically, some of the younger men of the agency are invited to headquarters and given much the same treatment as their partner or employer. The expense of such visits is usually borne by the principal.

Agents' Jamboree

In 1949 my company staged what we then called an 'Agents' Jamboree.' We have just a round hundred agents up and down the world, including associated companies that act as our agents, and sub-agents and branch offices. At this first overseas sales conference we had 24 invited agent-guests for eight days. They came from countries in Europe, from Egypt and from South Africa.

We paid all their expenses, including their return air passages, and the operation cost us £6,000 or so. We gave them talks about our existing and projected products and their applications; we took them to our factories and laboratories; we dined and wined them and we gave them some freedom to look at our great capital and its sights. They got to know each other and exchanged views on mutual problems. They went away fired with a new enthusiasm for the work they were doing for us and for themselves.

The exercise was so successful that it was repeated five years later, when we had, again, 24 invited guests, this time the second echelon from some of the firms which had been represented at the earlier gathering, and we included some far away countries like Argentina, Australia, Canada, Burma, Hongkong, Colombia, Jamaica, Malaya, Pakistan, South Africa, US and Venezuela. We were paid the compliment of having, additionally, six uninvited, i.e.—paying guests! This time we were able to complete our programme in five days of work and the total expense was again just on £6,000.

The value of these meetings was never in doubt: the agents and their salesmen have seen our company in action, been shown substantial manufacturing plants and well equipped laboratories; they have seen, spoken and fraternized with men who correspond with them about our business, thus giving rise to a better understanding; they have heard about our policies, about planned new products. Not the least of the benefits they, and we, derived from these visits was to get to know each other, thus being knit together into a family of people with a common interest. Many of them have added to their lines of products through these exchanges, and benefited through diversification.

Having established the need for an agent, let us find the best we can; let us appoint him for a trial period, during which we will get to know each other better and, if we find we get along well, let us confirm him for an indefinite period of time as our agent; let us be mindful, however, that we may wish to terminate the arrangement sometime for very good reasons, which may be connected with our own expansion leading to manufacture in his market, in which case the need to set up our own organization will arise; let us, above all, not neglect but look after him; let us visit him as often as necessary and let these visits occasionally be at management level. And, finally, let us not hesitate to get rid of an idle or otherwise unsatisfactory agent-he is holding us up and doing himself no good in the process.

Chemical Congress

ACHEMA's 12th Chemical Apparatus & Equipment Congress & Exhibition will be held in Frankfurt-am-Main from 31 May to 8 June 1958. These dates have been fixed by the board of management of the DECHEMA, Deutsche Gesellschaft für chemisches Apparatewesen.

New Vehicles Cut Costs

ICI Lime Division Starts Bulk Delivery Service

BULK deliveries of Limbux hydrated Buxton lime can now be made in special vehicles by ICI lime division at Buxton to customers suitably located.

Limbux is made by the controlled hydration of specially selected Buxton lime followed by multi-stage air-classification to give an extremely fine powder that is free from impurities. It is used extensively in a wide variety of industrial processes, particularly those requiring a high standard of purity, and in high-class building. Until now it has been packed and delivered largely in paper bags.

A survey carried out by the lime division showed that considerable advantages could be offered to the division's customers if Limbux were delivered in reasonable bulk quantities into storage vessels on the customers' premises. Apart from economies in the cost of packing and of bags, considerable potential savings in handling at customers' works appeared to be possible in many cases.

Several types of vehicle were considered and it was finally decided to use an AEC eight-wheel Mammoth Major chassis with an aluminium alloy body built by the Duramin Engineering Company Ltd. in collaboration with Henry Simon Ltd.

The prototype vehicle was one which had originally been designed to convey flour in bulk and with certain modifications it was found to be eminently suitable for the transport of Limbux. By the extensive use of light alloy at least $1\frac{1}{2}$ tons of deadweight has been saved, thus permitting a payload of over 14 tons within the legal gross weight limit of 24 tons.

The vehicle has a capacity of just over 1,000 cubic feet and the floor is divided longitudinally into three hopper bays. At the bottom of each of these is a nine inch wide air conveyor leading to two short cross air conveyors at the rear of the body. These - cross air conveyors discharge the Limbux either to an eight inch diameter gravity discharge pipe or to two Simon blowing seals. The function of these seals is to meter the Limbux into the discharge pipe and to ensure an even rate of flow.

The load can be discharged either to ground level or by means of compressed air to a maximum height of 90 ft. The full load of 14 to 15 tons can be discharged to an elevated bunker in about 45 minutes.

The compressed air is supplied by rotary blowers of the Marshall Roots type mounted on the vehicle and driven from a power take-off on the gear box. A single stage rotary blower supplies air at five lb. per sq. inch for the air conveyors and a two stage rotary blower gives 250 cu. ft. per minute at 20 lb. per sq. inch for blowing

The bulk Limbux vehicle discharging its load at the works of L. Dennis and Company Limited, Chemical Manufacturers, Walkden, Manchester. The tall bunkers on the left of the photograph are the Limbux silos with a capacity of 20 tons each.



Rear view of the vehicle showing controls for discharging the 14 ton load

the Limbux up into the customer's bunker. This method of discharging the vehicle eliminates spillage and the emission of dust. The whole operation can be carried out by the driver of the vehicle.

All controls and instruments for the discharging of the load are grouped on an enclosed panel at the rear of the vehicle and from this point the driver can control the engine speed and select any or all of the air conveyors.

This new bulk delivery service offers the customers of lime division advantages which include a reduced delivered price for Limbux, the elimination in many instances of costly handling charges, the elimination of waste caused by burst bags and spillage, and the suppression of dust.

French Atomic Pile

The first industrial atomic pile to be built in France began operation for the first time on 7 January. Known as G1, the pile is part of the atomic centre now being built at Marcoule, in the Gard. There will eventually be two piles, a factory for the extraction of the plutonium that they will produce, and two generators of electricity.

ICI Productivity Up

OUTPUT at ICI Billingham division had doubled since 1946, without much change in the number of men employed, said Mr. E. A. Blench, the division's production director, at a dinner held last month to mark the start-up of the third sulphuric acid kiln and the completion of the first year's running.

Mr. Blench said that the sulphuric acid plant had steadily increased its output year by year and the figures for 1955 were very encouraging, particularly because the demand for sulphuric acid was a reflection of the general prosperity of the country. Not only had production gone up, he said, but productivity had increased all the time. In 1954 the number of man hours per ton of acid produced was 4.02; the number for the third quarter of 1955 was 3.37, which was a very considerable advance indeed from an already efficient plant.

Describing the start-up of the third kiln as deserving the greatest congratulation, Mr. Blench said: 'I bring you a very sincere word of thanks and congratulations from the senior management and the division board.'

When sulphur supplies from America appeared to be running out about two years ago, it was the cue for the development of other methods of acid production. 'Our development of the anhydrite process has been watched by people from all over the world,' said Mr. Blench. 'We have even had visitors from America to see it.'

Norwood Technical College

BEFORE a meeting of the London section of the RIC to be held at the Norwood Technical College at 7 p.m. on Friday 24 February, three exhibitions and demonstrations will be staged. Entitled 'Ten Years' Research at Norwood,' the display will feature numerous working exhibits of microchemical apparatus developed in the college.

During the ten-year period the display will cover, the college has published about 100 books and papers, and some of the apparatus designed there in that time is now being made by three commercial firms. If time permits following Dr. J. B. Firth's lecture 'The Chemist in the Detection of Crime,' the exhibition will be continued after the meeting.

Oil Soluble Organo-Metallic Compounds

by DR. M. A. PHILLIPS, F.R.I.C.

THE higher alkyl and particularly the branched higher alkyl derivatives of succinic acid and also the higher alkylene derivatives of these acids form metal complexes with bismuth, arsenic, antimony, copper, mercury and organo-mercury residues such as phenylmercury; these metal complexes are characterized by bonding between metal and other atoms which are more covalent than ionic and hence these complexes are all very soluble in organic solvents and oils (benzene, ether, xylene, turpentine, mineral oil, white oil, olive oil, linseed oil, ethyl esters of chaulmoogric and hydnocarpic acids and of cocoa-butter acids etc.).

This oil solubility has many advantages, enabling relatively non-toxic forms of the metals to be incorporated into ointments and creams for topical pharmaceutical use, into oil paints as fungicides, as oil-soluble insecticides and microbicides etc.

Related to 'Aerosols'

The formulæ of typical metal derivatives of the above succinic acids are given below: it will be seen that the esters of these acids are related to the so-called 'Aerosols.'

Attention is called to the fact that double bonds near to the carboxylic group have a very profound effect on oil solubility; for example, phenylmercury stearate is far less soluble in olive oil etc. than is phenylmercury oleate. Secondary alkyls also confer higher oil solubility and lower melting point than do the corresponding straight chain alkyls.

However, that double bonds are not essential to oil solubility is shown by the existence of, for example, copper and phenylmercury naphthenates.



$\mathbf{R} = alkyl, usually C_s \text{ or higher, or alkenyl} \\ C_n H_{2n} \text{ with } n = 8 \text{ or higher.}$

Certain oil-soluble arsenic compounds prepared by the author and a colleague some years ago are of interest; they are of the following general constitution and can be seen to be derivatives of acetarsone (3-acetamindo-4-hydroxy phenylarsonic acid) or of the corresponding arsenoxide, of the isomeric 5-acetamido-2-hydroxy phenylarsonic acid and of the isomeric 4-acetamido-2hydroxy phenylarsonic acid:



Acetarsone Oxide

5-acetamido-2-hydroxyphenyl arsenoxide

AsO

NHCOCH₂

4-acetamido-2hydroxyphenyl arsenoxide (2)

The oil-soluble derivatives of these arsenoxides are of the general type

NHCOCH₃ C_6H_3 — OH

in which R is an alkyl group (methyl, ethyl, propyl etc. to octyl and capryl) and are made by condensation of the arsonic acid with excess of the corresponding ester of thiolacetic acid (thioglycollic acid), the excess acting as a reducing agent and two molecules of the ester then reacting with the arsonoxide formed (3):

 $R^{1}AsO_{3}H_{2} + 4HSCH_{2}COOR \rightarrow$

 $R^{1}As(SCH_{2}COOR)_{2} + S-CH_{2}-COOR$

S-CH2-COOR

In all these series, the m.p. of the compound sinks to a minimum at about *n*-hexyl:

RAs(SCH₂COOC₆H₁₃)₂

The solubility in olive oil and in ethyl esters of cocoa-butter rises to a peak at the same point.

Further, it was found that the capryl esters had a much higher solubility than the corresponding straight chain *n*-octyl, and this effect of branched chains has been commented on in the case of the alkyl succinate derivatives of metals.

In the case of the above arsenic compounds it was found possible to obtain oil solutions containing up to 0.5 per cent of arsenic metal in true solution; by addition

of about 10 per cent excess of the ester corresponding to the arsenic compound, the the substance could he solubility of doubled so that, for example, an olive-oil solution of the capryl derivative of 4-acetamido-2-hydroxy phenylarsenoxide containing 1.5 per cent of arsenic metal could be obtained and this solution was stable.

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PCC as Polyester Filler **New All-Plastics Moulded Caravan**

SPECIAL grade of precipitated cal-A cium carbonate—manufactured as a filler for polyesters-has been supplied by John & E. Sturge Ltd., Wheeleys Road, Birmingham, for use in the new glass reinforced polyester resin moulded 'Vista' caravan made by the Willerby Caravan Co. Ltd., Main Street, Willerby, Yorks.

The 17 foot 6 inch caravan has an outer shell moulded in five main sections from Armourplast, as the Willerby glass reinforced resin is known, and an inner shell moulded in similar material. Between the two shells is an insulating layer of aluminium foil. Armourplast is also used for the moulded sink, water tank and roof lockers. The 'Vista,' which is 7 foot 6 inch wide, weighs 19 cwt.

The special grade of PCC, known as Calofil, was used as the filler for the polyester as it is claimed to effect economies in the resin and also to increase the rigidity of the finished product, so that an appreciable saving in weight became possible by reducing the thickness of the panels. As Calofil is non-abrasive it reduces the wear on cutting tools which is often a problem.

Calofil is claimed to help impart a good surface finish, and because of its good colour can be used in pigmented finishes without any colour adulteration. In the new caravan, the colour extends right through the material so that painting is unnecessary.

Calofil is a low oil absorption calcium carbonate coated with one per cent resin and mixed with the polyester to form a smooth paste, which is then used to impregnate the glass reinforcement. Equal quantities, by weight, of Calofil and resin are used in all but the gel coat,

Billingham's Record Year

Further Progress Expected from New Undertakings

DURING 1955 ICI's Billingham Division made and sold more goods than it had done in any other year, and this in spite of rail and dock strikes, sharp increases in the price of coal, and a disastrous explosion in No. 3 LP compressor. In a survey of the year appearing in *The Billingham Post*, Mr. W. J. V. Ward, chairman of the division, said that demand for the division's products had remained as high as ever and that 1956 should be as successful as 1955.

New Processes Introduced

Commenting on the spectacular increase in the US chemical industry, Mr. Ward said new processes had come into use, and new chemical products were being made on an astonishing scale, and in this changing world the Billingham Division would have to keep its place by modernizing old plants and building new ones, by adopting new methods and improved instrumentation, and by intensified training, research and sales. Germany and Japan, said Mr. Ward, had recovered their pre-war positions, and Italy and France possessed expanding industries founded on recent discoveries of natural gas. The Billingham Division, he said, could expect good progress with the many new projects which were being undertaken.

Three works at Billingham, although not included in the division, also reported outstanding results in 1955. They are the nylon works (Dyestuffs Division), plastics works (Plastics Division), and the Cassel works (General Chemicals Division).

In his review of 1955, Dr. G. T. Collin, B.Sc., Ph.D., nylon works manager, said that the works' two customers, British Nylon Spinners and ICI Plastics Division, both took their full quotas of polymer, and in supplying them the nylon works had exceeded its planned production from its resources by three per cent. For 1956 the production target had been raised, and there seemed no doubt that all the good quality polymer that would be produced would be absorbed by customers.

Perspex output of the Plastics Division in 1955 at the Billingham works was a record, and provisions to further increase capacity were being considered. Dr. A. M. Bloch, B.Sc., Ph.D., D.I.C., plastics works manager, said in his review that during the year some effect was felt regarding Diakon from overseas competition, mainly in regard to quality, Considerable effort, he said, was being made through research and plant investigation teams to improve Diakon and there were signs that the research would be successful.

In his report for 1955. Dr. R. N. Kerr, B.Sc., Ph.D., Cassel works manager, said that it was the best year ever and plants had been hard-pressed to meet requirements. The Cassel works had faced many difficulties in the year, notably the hot summer and lack of cooling water. A drive to increase exports had succeeded and 30 per cent of the work's output went overseas. Progress was made with extensions and a chlorobenzene plant and a vinyl chloride plant were expected to be operating by the middle of this year. Dr. Kerr also announced that plans were in preparation for extending the methacrylate and HCN plants.

Science Survey Facts

EOLLOWING its survey of science and engineering in the US the National Science Foundation, a Government organization, announces that the chemical industry far exceeds all other industries in expenditure for basic research. The survey which was recently completed covered the year 1953.

Estimated at \$38,000,000, basic research costs for the US chemical industry in 1953 represented 25 per cent of the combined expenditure for basic research by all industry during the year. The total cost for all chemical industry research and development in 1953 was \$361,100,000.

The National Science Foundation's study also revealed that the chemical industry led all industry in the number of scientists and engineers employed. By January 1954 there were 23,400 scientists and 26,000 engineers engaged in the US chemical industry.

Zirconium in the US

Commercial Production Commenced

PRODUCTION of zirconium in the US, which up to recently was carried out by the Bureau of Mines, is now in the hands of private enterprise. The Bureau is now working on research aimed at increasing zirconium's usefulness.

The process used to make zirconium was developed in the Bureau of Mines laboratories by Dr. William J. Kroll, a metallurgist who escaped from his native-Luxembourg before the Nazi invasion.

Zirconium has several properties that make it a desirable construction material in the field of nuclear energy. It is almost as strong as steel but lighter; it has high corrosion resistance and an extremely high melting point of 3,350°F. Most grades of steel melt below 2,800°F. Because it does not absorb and thus waste neutrons needed to sustain a chain reaction it is used in building atomic ovens. It was also used in the power plant of the first atomic submarine, the Nautilus.

A Decade of Research

Commercial production of zirconium is the result of a decade of research at the Bureau's Northwest Electrodevelopment laboratory at Albany, Oreg. When the research started, zirconium was little more than a laboratory curiosity made in small quantities by a slow and costly iodide process. Few people had ever heard of it and fewer still had seen it.

The modified Kroll process, originally developed for making strong, lightweight titanium metal, seemed to be the most promising method. In this process molten magnesium is used to win the metal from its compounds.

As a result of these investigations, when the Atomic Energy Commission became interested in zirconium as a construction material, the Bureau had a pilot plant ready which was capable of producing about 3,000 lb. of sponge metal a year. The pilot plant was expanded until 280,000 lb. of zirconium sponge were produced in one year.

Bureau metallurgists have also developed a consumable-electrode arc melting process which avoids contamination in melting the sponge into the usable form of ingots.

The bureau also began producing

hafnium, which occurs as an impurity which must be removed before zirconium is suitable for atomic energy use. Important uses for hafnium have been found by the Atomic Energy Commission.

When the Bureau started making zirconium, the iodide-process metal was selling at \$70 a pound. There is still a market for this material as it is pure and can be used for highly specialized jobs in electronics and surgery. However, for defence needs, Kroll-process zirconium is perfectly acceptable, and reactor-grade metal sells for about \$14 a pound.

Business Taken Over

IT is announced by Hercules Powder Company Ltd. that the business, at present operated by The Amber Chemical Company Ltd., for the production and sale of rosin size will be taken over by Hercules Powder Company Ltd. with effect from 1 February 1956. The Amber and Hercules grades of rosin size will be offered for sale by Hercules.

Mr. Peter Bruckman, at present director in charge of sales and production of rosin size for The Amber Chemical Company Ltd., will become associated with Hercules.

Hercules, prior to constructing a new works at Erith, Kent, in 1952, had operated a smaller plant in the same area dating from 1923. Amber Chemical Company first entered the field of rosin size manufacture in 1906.

Production was originally centred at premises in Copperfield Road, east London, but was transferred in 1910 to works at Cubitt Town Wharf, which have been operated, with various extensions, up to the present time.

Both companies have a long tradition of service to the paper industry, and can be considered the pioneers in the supply of prepared rosin size. The management of the two companies concerned confidently expect that this development will result in even better service than has been possible hitherto.

Automation Exhibition

An exhibition of machinery and instruments used in automation is to be held in Oslo from 9 to 22 April.

World Sulphur Trends

Review of Trade & Freights

A N article in the December issue of the British Sulphur Corporation's Quarterly Bulletin reviews the trends in world sulphur trade and sulphur freights. 'The principal new factors', says the article, 'which may further alter the pattern of consumption that has evolved over the past half century are the emergence of Mexico as an assured major source of supply, Italy's decision to terminate a period of ineffective expectancy of a renewed sulphur price boom and the effect of the unprecedented coal supply position in the UK and in Western Europe on sulphur and pyrites shipping space and freight rates.'

Volume Practically Unchanged

Surveying past trends in world trade, the journal points out that in spite of the large increase in total usage the volume of international sulphur trade remained practically unchanged between 1914 and 1934 and since then has risen by just over one-third. 'In view of the decreasing share of pyrites in world sulphur trade the tonnage actually moved, which in 1914 amounted to about 4,000,000 tons increased to only 4,250,000 tons in 1934 and a little over 5,000,000 tons in 1954.'

According to the article, the focus of sulphur movement remains the UK and Western Europe, while the principal source of supply has changed from Europe, notably Spain, to the US. The advent of Mexico as a further transatlantic source of elemental sulphur in quantities far exceeding the expected natural growth of markets in the next two years 'cannot fail to influence the pattern of consumption, as, moreover, the facilities for moving pyrites are at a critical stage '.

Some 85 per cent of the total tonnage of sulphur in pyrites which entered world trade in 1954 originated in the Mediterranean region. More than two-thirds of this were shipped from Portugal and Spain, the latter still being the second largest sulphur exporting country in the world.

Dealing with shipping facilities, the article states that Western Mediterranean trade, which in addition to pyrites is based on the movement of North African phosphate and

iron ore has hitherto been a specialized sector closely linked with the outward movement of coal from the UK and the Continent. Freight rates for this traffic, although influenced by the rise and fall of the freight market in general, have therefore tended to remain moderate.

Freight Rates Explained

'The virtual cessation of coal exports from the UK and from Western Europe and the simultaneous large-scale movement of coal across the North Atlantic are having the dual effect of depriving shipowners of profitable outward voyages to the Western Mediterranean and of attracting many cf the more modern vessels to the lucrative North Atlantic business', continues the journal. 'This development is aggravated by the fact that practically all the vessels left in the pyrites trade, in particular those of 3,000/4,000 tons carrying capacity, were built prior to 1920, and are not only insufficient to maintain the present rate of shipments but are on the point of having to be replaced. Such a replacement by modern large size vessels-possibly specialized ore carriers-would inevitably result in a higher level of freight rates.'

Decline in Pyrites

In conclusion, the article states that although the sulphur crisis of 1951/52 boosted the use of pyrites, present increasing availability of low cost elemental sulphur, coupled with the imminent rise in the cost of shipping pyrites, threatens to cause a serious decline in pyrites usage. In spite of the advantages of brimstone use, it would be unrealistic, says the journal, to expect a rapid displacement of pyrites in the face of industrial tradition and caution in respect of potentially favourable but not absolutely essential projects requiring substantial capital investment. In 1956 an absolute reduction in the world-wide use of non-indigenous pyrites of about 100,000 tons sulphur content is expected. Thereafter, failing a substantial adjustment in the price relation between brimstone and pyrites, the decline of their share of the world market cannot fail to accelerate.

SIMA Exhibition

Space Available Allotted by Ballot

THE interest shown by member firms in the Permanent Exhibition to be opened by the Scientific Instrument Manufacturers' Association at 20 Queen Anne Street, London W1, on 9 February, 1956, has been so great that the space available has been allocated by ballot.

Care has been taken, however, to make the exhibits on view representative of the diversity of products now available from British instrument manufacturers. Many items of interest to the petroleum and chemical industries will be on view. Many more will be represented by photographs, and technical literature will be available.

Atomic Energy Field

A good example is the coverage given to the atomic energy field. Only two firms (Labgear (Cambridge) Ltd. with nucleonic and industrial counting equipment, and Ekco Electronics Ltd. with nucleonic and radioisotope equipment) will be exhibiting because of the restricted space available, but copies will be available of the comprehensive SIMA handbook on radioisotope instrumentation, listing the products of over 40 member firms in this field.

During recent years, the importance of servo-mechanisms and allied equipment in processing and control has grown apace. This trend is evident on three stands. Sperry Gyroscope Co. Ltd. will show miniature servo-mechanical equipment together with servos and tachometers. Muirhead & Co. Ltd. will demonstrate magslips, synchros and servo components while Kelvin & Hughes Ltd. will feature synchros and resolvers, miniature instrument motors and pressure-sensitive devices.

The importance of vacuum in many processes will be underlined by Edwards High Vacuum Ltd. (rotary pump, vapour diffusion pump and vacuum gauges) and by Townson & Mercer Ltd. (vacuum oven and immersion pump).

Instruments for the control of process variables will be shown by Fielden Electronics Ltd. (thermostat holding temperature constant with very close limits), Marconi Instruments Ltd. (portable direct reading pH meters), Evans Electroselenium Ltd. (colorimeters and photometers), and Salford Electrical Instruments Ltd. (SEI exposure

photometer, Selectest universal tester, portable fluxmeter). Equipment for the associated laboratories will be demonstrated by A. Gallenkamp & Co. Ltd. (isothermal bomb calorimeter and sedimentation balance), Griffin & George (general laboratory apparatus and scientific equipment), while various applications of microscopes will be presented by R. & J. Beck Ltd., Cooke Troughton & Simms Ltd., and James Swift & Son Ltd.

Finally, for the production and maintenance shops there will be test gear (Avo meters) by Automatic Coil Winder & Electrical Equipment Co. Ltd., oscillographs, oscilloscopes and ancillary equipment by Cossor Instruments Ltd. and Solartron Electronic Group Ltd., dynamic balancing machines by Dawe Instruments Ltd., precision standards of capacitance, inductance and resistance with the associated bridges by H. W. Sullivan Ltd., and optical measuring equipment (ranging from toolmakers' microscopes to optical flats) by Optical Measuring Tools Ltd.

Exhibitors will be changed at regular intervals, so that interest in the exhibition should be continuous.

Du Pont Undertakings

A RESEARCH laboratory, three new plants and expansion in three existing plants were completed or begun by the Du Pont Co. of Canada Ltd. during 1955. At Kingston, Ontario, staff and equipment have been installed in a new \$1,500,000 basic industrial research laboratory, and at Ajax, Ontario, all exterior work completed on a plant which will make finishes for cars.

Other projects being undertaken are a unit for manufacturing fluorinated hydrocarbons at Maitland, Ontario, and a \$7,000,000 commercial explosives plant near North Bay. At Maitland, design work is also proceeding on a plant for the manufacture of Orlon acrylic fibre.

Benn Brothers Limited

The directors of Benn Brothers Ltd., proprietors of THE CHEMICAL AGE, have declared the following dividends, less tax, payable on 15 February, 1956: 3 per cent on the preference shares for the half year ended 31 December 1955 (same) and 5 per cent interim on the ordinary shares (same).

Exposition of Chemical Industries

Many Innovations at Philadelphia Show

THE increasing demand for chemical products produced a forecast of still further growth at the 25th Exposition of Chemical Industries in Philadelphia, 5-9 December. The economic trend is toward increased outputs, due to the adoption of new and improved facilities, whose rising costs will be more than offset by higher working efficiencies and lower unit costs. Manufacturers of structural materials and processing equipment anticipated the industries' need by offering many innovations.

More than 500 exhibitors showed raw materials, chemicals, laboratory and processing equipment. The scope of products represented in 262 distinct classifications was greater than the variety at any time since the exposition was founded 40 years ago.

Visitors from all over the United States and over 30 foreign countries brought in an estimated total attendance for the week of 25,000 to 30,000. Exhibitors reported a high level of general interest, as well as interest in their own specialities.

Of major interest were the metals and other structural materials such as plastics. A number of them, shown for the first time, have already been incorporated in redesigned equipment and prototypes of entirely new machines. Stainless steel is in almost universal use where its properties are wholly satisfactory. At least one manufacturer has brought forth two new series of steels, having improved properties.

Titanium Takes Over

Where stainless steel leaves off, from the standpoint of corrosion resistance, titanium takes up. Its use in chemical plant and food industries equipment is increasing and 1s expected to become more prevalent as production facilities improve. There was interest also in the titanium chemicals, which are useful as stabilizers and plasticizers for vinyl plastics, as gelling agents, pigments, resin coatings, cleaners and polishes.

Chemical industries also make increasing use of the rare metals, accounting for approximately half of the US annual consumption of platinum; for example, in glass manufacture, petroleum refining, synthetic fibres, chemical and drug products, laboratory and process control devices. Many examples of these uses were on show.

Zirconium, another of the formerly rare metals, is now coming forward as rapidly as production can be increased. Boron carbide, too, is now available in commercial and high purity grades for widely varied uses, such as chlorination, nuclear reactor shielding, also in moulded shapes, refractories and abrasives.

Plastics Uses Multiply

Applications of the plastics and resinous products in general continue to multiply in the chemical industries, as do sources of supply. The exposition marked the advent of one of the largest steel manufacturers into the field of plastic pipe in polythene flexible, and polyvinyl rigid products. At the same booth, a new line of stainless steel pipe had its first showing in sizes up to 26 inches op.

The role of glass in the chemical industries is likewise of growing importance. It has always been the principal structural material for laboratory ware. Latterly, it has entered extensively as a corrosionresistant lining for metal vessels. At the exposition it was shown as a structural material.

One exhibitor has gone into the highly active field of heat exchange equipment with an all-glass shell-and-tube unit for heating or cooling corrosive liquids. In one application, a steel shell was used with a glass core for heating sulphuric acid.

Another innovation was a Pyrex glass centrifugal pump. Unlike the familiar glass working models, such as exhibitors often used to reveal inner parts of machines or demonstrate the flow of materials, this was a commercial development. The structural parts of the pump followed conventional lines as to metallic base and driving parts, but to handle corrosives, or materials the purity of which must be maintained, rotor, shell, and all connections were made of glass.

Glass linings for steel pressure vessels and

processing machines have undergone steady development from year to year. Now a processing machine to operate under very high working pressures has been developed in which the glassed surface of the working element is carried part way through to the lower ring of the stuffing box. The glass is applied over Hastelloy and the glass surface with which the inner ring of the multiplering assembly is in contact, is necessarily ground on the shaft to a fine tolerance.

The bulk of display space was occupied by processing equipment, revealing a great deal of invention in the way of mechanical design. One group of displays was related to methods of product separation, for purposes of purification and grading. Included were such items as screens, strainers, sifters, sieves, sizers, clarifiers, classifiers and others.

A Super Classifier

A super classifier for dry material was shown by one of the leaders in centrifugal machinery. Extraordinary efficiency is claimed for this machine—80 per cent at a 15 micron top on the fine cut, compared with 15 to 30 per cent with conventional equipment. This result is accomplished at high speeds—3,000 rpm for the 10-ton model, largest of four in the series; 7,800 revolutions for the smallest one-ton model.

Several instances of new design and new applications of time-tested operations afforded startling illustrations of the trend toward higher economy. A centrifugal machine no larger than an office desk, is now replacing extraction towers six or more stories in height. This extractor, extensively used previously in the manufacture of antibiotics, has now been adapted to one step in refining petroleum products, where it replaces the typical tower structure.

Despite the elaborate construction and massive layouts often associated with the larger chemical plants, several equipment makers are recognizing the needs of the many small chemical plants, and have given thought to package units. One such on show was an air filter incorporating the familiar blow-ring continuous cleaning principle in an exceedingly compact, self-contained unit. In this design, the filter medium was a stack of circular cells, which were swept by rotating tubular arms in which were the air jets. Another package unit was a combination proportioning pump, with chemical tanks, auxiliaries and automatic controls, all mounted on a single base.

In addition to displays of chemicals, many processing materials were on exhibition, such as acids, alkalis, catalysts, ceramics, emulsions, enamels, gases, lacquers, refractories, resins and oils, silica, solvents, and waxes.

Mr. E. K. Stevens, manager, announced that the 25th Exposition of Chemical industries will be held in the new Coliseum in New York in 1957.

Exemption from KID

THE Treasury has made an Order under Section 10(5) of the Finance Act, 1926, exempting the following articles from Key Industry Duty for the period beginning 31 December 1955 and ending 18 February 1956: molybdenum of a purity of not less than 99.8 per cent in the form of rods of not less than 54 in. and not more than 56 in. in length, and of not less than $1\frac{1}{4}$ in. and not more than $1\frac{3}{4}$ in. in diameter. One chemical product, sebacic acid, is listed.

The Order is the Safeguarding of Industries (Exemption) (No. 9) Order, 1955, and is published as Statutory Instruments 1955 No. 1935. Copies may be obtained, price 2d, by post $3\frac{1}{2}d$, from HM Stationery Office.

ICI Visit to Moscow

A VISIT to Moscow made by a small ICI trade mission last October is described in the January issue of the *ICI-Magazine* by Mr. S. P. Leigh, ICI's overseas controller, who led the mission. Before the visit took place, says Mr. Leigh, there had been some evidence that the Russians were showing an increasing interest in the supply of products and know-how from this country.

In Moscow the mission was given ample opportunities for intensive discussions about the uses of ICI's products with many highly qualified technicians in charge of the factories which might use them. This particularly applied to dyestuffs and pigments, while in the medical field discussions took place with leading neurologists and other senior professional men.

Mr. Leigh adds that he will be surprised if in the near future the Soviet Government does not fulfil its assurances by sending at least substantial trial orders through its trade delegation in London.



LITHIUM ALUMINIUM HYDRIDE IN ORGANIC CHEMISTRY. By V. M. Micovic and M. Lj. Mihailovic. Beograd, 1955. Available from the Serbian Academy of Sciences, Knez Mihailova 35, Beograd, Yugoslavia. Pp. xi + 193. \$3,00.

Lithium aluminium hydride has assumed such importance in organic chemistry that it is difficult to believe that it was discovered only nine years ago. However, it is not hard to see why this versatile reducing agent has so firmly endeared itself to organic chemists. Its range of application is very wide, yields are generally excellent, and most of the reactions proceed smoothly under mild conditions. Furthermore, the reagent is normally without action on olefinic double bonds and this facilitates a large number of otherwise unattainable selective reductions. These unique properties have made lithium aluminium hydride indispensable in organic chemistry, especially in work on complex and sensitive natural products.

This book provides a guide to the very scattered literature on lithium aluminium hydride reductions. It is not the first review on the subject, but it is certainly one of the most comprehensive, the ardour of the compilers being reflected in the number of references (1,732). The text gives a balanced and critical account of the many uses of the reagent, although it should be pointed out that this volume, unlike the review published in 1951 in 'Organic Reactions', does not give experimental details. Special attention is paid to reductions which do not follow the normal course, and the mechanisms of some of the reactions are also discussed. Investigations of the mechanisms of lithium aluminium hydride reductions have lagged somewhat behind its practical application, and this book should do much to stimulate further work in this direction. The volume is strongly recommended to research workers and final year undergraduates.-J.C.P.S.

THE ANALYSIS OF MINERALS AND ORES OF THE RARER ELEMENTS. By W. R. Schoeller & A. R. Powell. Third edition, revised by A. R. Powell. Charles Griffin & Co. Ltd., London. 1955. Pp. xv + 408. 60s.

The marked development of atomic energy projects and the electronics industry has led to increasing use of many of the less common elements whose analytical chemistry is dealt with in this text. Zirconium and titanium have become relatively common, selenium and caesium are in big demand in the electrical industry, and niobium and tantalum, beryllium and indium are also much used.

Owners of the previous editions will find many new features in this revised version. The background of classical chemical analysis has been extensively supplemented by modern analytical techniques. Thus we find details of chromatography for uranium, thorium and the rare-earths; polarography for uranium, europium and ytterbium; solvent partition methods in the separation er isolation of scandium and uranium, and spectrophotometric methods for various elements.

The first four chapters are concerned with general chemistry and various operations. These are followed by separate chapters on the analysis of lithium, rubidium and caesium, beryllium, scandium, gallium, indium, thallium, rare-earths, titanium, zirconium and hafnium, thorium, germanium, vanadium, niobium and tantalum, selenium and tellurium, molybdenum, tungsten, uranium, rhenium and the platinum metals. Much new information is incorporated in the sections dealing with rare-earths, thorium, germanium and niobium.

The chapters on uranium, rhenium, scandium and the platinum metals have been almost completely re-written and brought up to date. The extensive cross references previously used in the chapter on platinum have been eliminated, and the new arrangement of this section follows the simpler, and more logical, plan used in other chapters.

The tables used for the schemes of qualitative, and quantitative analysis have been re-drafted, and though the new system is much more convenient to use, it is still somewhat cumbersome. A more efficient method of arrangement might perhaps have employed a 'family tree' type of flow sheet on pull-out leaves. However, this is a minor point in a book which in all other respects can hardly be called less than excellent. The new edition is as well written and neatly presented as its predecessor, although it is to be regretted that the publishers found it necessary to place an advertisement opposite the title page.-T. S. WEST.

PROGRESS IN ORGANIC CHEMISTRY. Vol. 3. Edited by J. W. Cook. Butterworths Scientific Publications, London. 1955. Pp. 273. 45s.

This is certainly the best of the three volumes produced so far in this series and the editor has increased the difficulties of criticizing such an excellent production by providing a comprehensive review in his preface. There are five contributions, each an authoritative survey of a field in which the author has had considerable influence, and all written with the same care and fluency.

The subject of most general interest is that of the organic compounds of lithium. There is no reliable up-to-date review of information upon these reagents and the chemical practitioner will be indebted to Professor Braude for his able and critical assessment of their potentialities. There can seldom have been a field in which theory and observation have been so readily and fruitfully reconciled as that of aromatic character. Professor Baker has developed this theory to a degree where he finds it possible to predict the behaviour of a ring system from a study of its formula. He provides a characteristically clear and well illustrated exposition of the theory.

Appropriately enough, the following subject in which the application of these ideas is particularly successful is the fulvenes. It is only by considering the tendency of the cyclopentadiene ring to become aromatic in character that the reactivity of the hydrogen atoms in the fulvene molecule becomes explicable. Professor Bergmann's treatment of the subject, which is very full indeed, includes details of the estimated charge distribution for many fulvene structures, together with details of light absorption in addition to the purely preparative work. Many related structures such as the 'open' fulvenes related to hexatriene, the fulvalenes and the heptafulvenes derived from cycloheptatriene, are mentioned.

In the remaining two sections which deal with the total synthesis of steroids and recent advances in the chemistry of the indole alkaloids, interest will centre for many, not so much upon the compounds which have been identified or synthesized, as on the new techniques and synthetic methods which have been devised. Dr. Cornforth has given a critical resumé of the synthetic routes to the steroids describing in detail the difficulties which were encountered and how they were finally solved by the employment of stereospecific reactions.

The substantial amount of evidence which has accumulated about the structure and distribution of the indole alkaloids has made it possible to make profitable speculations about the manner in which they are synthesized by the plant. Professors Boekelheide and Prelog have included a section describing the possible biosynthetic routes starting with two amino-acids.—J. R. MAJER.

Karl Fischer Titrations

AN INSTRUMENT for carrying out Karl Fischer titrations automatically will be produced shortly by Baird & Tatlock (London) The instrument, which was demon-Ltd. strated in an independent television programme, 'The Scientist Replies,' on 5 January, is the first of a series of BTL instruments differing from Analmatic Analmatic automatic laboratories in that an operator is required to place samples in the apparatus, start the process, and take the readings.

Although this apparatus needs an operator, Baird & Tatlock claim that a relatively unskilled person will be able to carry out titrations merely by pressing a button after having inserted the sample to be tested. The titration which proceeds automatically, also stops automatically, and the burettes can be refilled by the press of a button.



New Midland Office

Corrosion Proof Products Ltd., of Brentford, Middlesex, has opened a Midland office in conjunction with Metal Processes Ltd. at 758-786 Kingsbury Road, Erdington, Birmingham 24 (telephone: Erdington 6111).

Dunlop Awards

Dunlop awarded $\pm 2,119$ 10s for 1,250 suggestions made by Fort Dunlop employees last year. No fewer than 549 safety suggestions were received during the year.

Laboratory Contracts

Four contracts have recently been received by Baird & Tatlock for laboratory installations. They are: Northern Region Production Development Board, Kaduna, Nigeria (\pounds 2.400). Veterinary Laboratories, Astrida, Belgian Congo (\pounds 5.000), the laboratories of Thorium Ltd., Ilford, Essex (\pounds 13,000), and the laboratories of the Castle Donnington power station, Leicestershire (\pounds 3,000).

British Hydrocarbon Chemicals Ltd.

British Petroleum Chemicals Ltd. announces that the name of the company has been changed to British Hydrocarbon Chemicals Ltd. This does not imply any alteration in the nature and scope of the company's activities, which remain the production of chemicals from petroleum. The cempany was registered in October 1947 and operates a petroleum chemical factory at Grangemouth, Scotland. It is owned by The British Petroleum Company Limited and The Distillers Company Limited.

ICI Water Needs

Approval in principle has been given to the building of a Balder Valley reservoir in upper Teesdale. ICI have said that they will require almost an unlimited supply of water from the district, and they have intimated that by the time the proposed reservoir is ready the firm would require its total output in addition to the amount it was already consuming. The chairman of the Tees Valley Water Board, Alderman C. W. Allison, paid tribute to the progressiveness of ICI who had sufficient confidence in the future to tell the board they could absorb whatever supplies became available and were willing to meet their share of the cost.

UK Low Pressure Polythene

Owing to the intense interest being shown in low pressure polythene, Petrochemicals Ltd. (which is owned by Shell Chemical Co. Ltd.) have now officially admitted that more than one pilot plant at their works at Partington Industrial Estate, Manchester, are engaged in investigations based upon the Karl Ziegler patents.

Chemical Capital

The oil, colour chemical and chemical category of promotions received £59,650 of new capital in the company registrations in Scotland in 1955, a summary of new companies discloses. In 1954 £2,063,650 was subscribed for the same grouping which included the considerable expansions at Grangemouth.

Change of Title

The Board of Trade has informed the Monopolies & Restrictive Practices Commission that the title of the requirement under Section 15 of the Monopolies & Restrictive Practices (Inquiry & Control) Act, 1948, which was announced on 2 November 1955, is to be changed from 'Common Prices & Collusive Tendering' to 'Common Prices & Agreed Tendering' to avoid any misconception that might arise from the meaning sometimes attached to the word 'collusive'. The change now announced is solely in the title. There is no change in the terms of reference.

Organic Boron Association

Borax Consolidated Ltd. and A. Boake, Roberts & Co. Ltd. announce a joint association in the production and marketing of organic boron compounds. All communications regarding samples and prices should be addressed to Borax Consolidated Ltd., Borax House, Carlisle Place, London SW1.

Fernhurst Lecture

Dr. V. B. Wigglesworth, C.B.E., M.D., F.R.S., Quick Professor of Biology at the University of Cambridge, will deliver the Fernhurst Lecture 'Insect Physiology in Relation to Insecticides' at the Royal Society of Arts, John Adam Street, Adelphi, Strand, London WC2, at 2.30 p.m. on 25 January. Dr. E. Holmes, M.Sc., Ph.D., technical director of Plant Protection Ltd., will preside.

· OVERSEAS ·

Government Withdraws

The Commonwealth Government of Australia has decided to withdraw from the management and financing of both the importation of ammonium sulphate and its distribution.

Industrial Waste Conference

About 50 papers on subjects dealing with industrial wastes and their treatment will be presented at the 11th Purdue Industrial Waste Conference to be held on 15, 16 and 17 May at the Purdue Memorial Union, Lafayette, Indiana.

New Titanium Company

Atlas Titanium has been formed by Atlas Steels in association with the Mallory Sharon Titanium Corporation of Niles (Ohio). Atlas Steels will have the controlling interest.

Bagdad Atomic Centre

The Economic Committee of the Bagdad Pact announces that Britain has agreed to assist in establishing an atomic energy training centre in Bagdad for members of the pact—Turkey, Pakistan, Iraq and Persia. It is reported that Britain will finance the scheme, expected to cost £200,000, and provide instructors from Harwell. The plan must be passed by the council of the pact before construction begins.

Belgian Fertilizers

Nitrogenous fertilizer production is growing steadily in Belgium and plans are under way to modernize the industry and lower production costs. Total production in terms of nitrogen content has risen from 166.000.000.000 tons in 1950-51 to 235,000,000,000 tons in 1953-54, and is believed to have reached record proportions in the year ended July 1, 1955.

Netherlands Chemical Industry

The 1954 report of the Association of Chemical Industries states that the year was a satisfactory one for the Netherlands chemical industry and that 1955 is expected to show further expansion. Competition is likely to become keener in various markets but it is believed that Dutch factories will in time adapt themselves to changing market conditions. Exports of chemicals are rising very slowly because of high foreign import duties.

Three-Company Refinery

Standard Vacuum, Shell and Caltex are to establish a joint oil refinery in Ceylon. The Ceylon Government has said it will allow the import of crude oil for refining, but would levy an excise duty at the refinery.

Uranium Security Chief Dismissed

M. Pierre Humblet, chief of security at the uranium mines in the Congo, has been dismissed by the Belgian Ministry of Colonies. The dismissal is effective from 15 October. No reason was given for the Government's decision.

US Plywood Veneers

Research co-ordinated by the Fine Hardwoods' Association of Chicago has resulted in a new simple process for making hardwood plywoods almost completely resistant to cigarette burns and other abuses. A layer of aluminium foil placed below a hardwood veneer to dissipate surface heat is said to permit hardwood plywood to compete with the expensive, high-pressure plastic laminates.

Synthetic Rubber Need

A plant may be built in Alberta to produce one of the components of synthetic rubber for the Government-owned Polymer Corporation. Announcing this recently, Mr. Howe, Canadian Trade Minister, said that the corporation must find a new source of supply for butadiene to meet growth in rubber demand and for that it needed butane, one of the materials in natural gas as it comes from the well.

US to Buy Belgian Shares

The shares of the Belgian copper enterprise Union Minière du Haut-Katanga are to be made available to American investors, it is announced. Katanga, the third largest copper producer in the world, and a substantial producer of uranium, also acounts for 70 per cent of the free world's output of cobalt. The Belgian-American Bank & Trust Co. of New York, which released the news, is issuing the first American depository receipts representing Katanga shares to make possible open buying and selling of the shares.



The chairman of the Kestner group of companies, MR. J. ARTHUR REAVELL, M.I.Mech.E., M.I.Chem.E., F.Inst.F., F.I.M., has left for a visit to South Africa. He will be spending some weeks at the headquarters of Kestners (South Africa) (Pty.) Ltd. in Johannesburg and will also visit the principal towns in the Union during his stay.

MR. RALPH H. ATKINSON, M.A., has retired as head of the platinum metals section of the International Nickel Company's research laboratory at Bayonne, New Jersev. after more than 30 years' service with the Mond Nickel Co. Ltd. in the UK and its Inco affiliates in the US and Canada. Born in 1890 at Sedgfield, County Durham, Mr. Atkinson graduated at Cambridge University and, after serving as a lecturer in chemistry and metallurgy there, joined the Mond Nickel Co. in 1923 as assistant manager of its platinum metals refinery in London. In 1930 research and development activities were started at the refinery under Mr. Atkinson's direction, and his work in this field led to his recognition by the Society of Chemical Industry in 1939, as one of its Jubilee memorial lecturers. In 1940 Mr. Atkinson went to Canada where he worked as a research chemist and finally as chief research chemist for the International Nickel Co. of Canada Ltd., at Copper Cliff, Ontario. In 1941 he went to the US to work on platinum and palladium catalysts for Merck & Co., at Rahway, N.J., returning to Inco in 1943 as a research metallurgist at the Bayonne research laboratory.

MR. HERMAN HIRST, buying manager of the chemical section of the central purchasing department of Imperial Chemical Industries Ltd., retired on 31 December, 1955, after 40 years' service. His career with the company and its predecessors began 'at Huddersfield in 1916 when he joined what is now ICI Dyestuffs Division.

DR. BERNARD C. BARTON, Ph.D., has been appointed director of research and development of the Texas-US Chemical Co. which is jointly owned by the Texas Co. and the US Rubber Co. Dr. Barton will direct the Texas-US Chemical Company's research and development work on the production of improved synthetic rubbers and the expanded use of petrochemicals. His headquarters will be in the company's New York offices at 260 Madison Avenue. Dr. Barton was formerly head of the rubber applications and synthetic rubber research department of the General laboratories of the US Rubber Co.

SIR HARRY PILKINGTON and MR. ARTHUR PILKINGTON have joined the board of the Triplex Safety Glass Co. following the acquisition by Triplex of the entire interest in Triplex (Northern) of St. Helens, Lancs. Sir Harry Pilkington and Mr. Arthur Pilkington are managing directors of Pilkington Brothers, glass manufacturers of St. Helens. Triplex (Northern) was formerly jointlyowned by both companies. Pilkington's have simultaneously increased their holding in Triplex.

As briefly mentioned in last weeks' issue DR. F. J. WILKINS, M.Sc., Ph.D., F.R.I.C., an executive director, has been appointed a director of Glaxo Laboratories Ltd. Dr Wilkins joined Glaxo Laboratories in August 1949 when he was appointed an executive director in charge of the company's fermentation plants at Barnard Castle and Ulverston. Born at Cardiff, he was educated at the Universities of Wales, London and Cambridge. In 1933 Dr. Wilkins joined ICI, and in 1945 accepted an appointment in the Scientific Civil Service as deputy chief superintendent of armaments research, becoming director of chemical research and development in the Ministry of Supply in 1946, and principal director of scientific research (Defence) in 1948.

MR. ERNEST NIGHTINGALE, chief chemist of the Stork Margarine works at Bromborough for the past 30 years, has retired. At a farewell ceremony, MR. J. D. BUXTON, the general works manager and a director of Van den Berghs and Jurgens Ltd., presented him with a refrigerator. Mr. Nightingale joined the company in Godley, Cheshire, in 1909, and worked in the laboratory until being transferred to Bromborough in 1921. During the mid-twenties he played a notable part in the resolving of the problem of vitaminizing margarine and he was joint-author, with MR. A. ANDERSON, of a paper. 'The Estimation of Vitamin "A" in Margarine'.

LORD STRATHALMOND. C.B.E., LL.D., better known as Sir William Fraser, chairman of The British Petroleum Co., has announced his intention to retire on 31 March. Lord Strathalmond has spent 33 years with BP-28 of them as chairman. He will be succeeded by the present deputy chairman, MR. BASIL JACKSON. The new deputy chairman will be MR. NEVILLE GASS, C.B.E., M.C. To fill the vacancy on the board when Lord Strathalmond retires, MR. R. BRIDGEMAN has been appointed a member. All three new appointments are effective from 1 April.

MR. WILLIAM PANTON, B.Eng., A.M.I.Mech.E., of Norton, Stockton-on-Tees, engineering works manager at ICI Billingham Division for the past 10 years, has retired. Mr. Panton, who had been with ICI for more than 30 years, has left England for South America.

The next vice-chancellor of the University of Hull will be PROFESSOR BRYNMOR JONES, B.Sc., Ph.D., Sc.D. Although born in Denbighshire, Wales, Professor Jones has spent almost half of his life in Yorkshire. In 1932, at the age of 28, he was appointed lecturer in organic chemistry at the University of Sheffield, a position he held for 15 years until he was appointed G. F. Grant Professor of Chemistry at Hull.

MR. J. E. C. BAILEY, C.B.E., chairman of the Baird and Tatlock group of companies begins a tour of Africa on 27 January. The tour, which will last to 9 March, will take him to Salisbury, Southern Rhodesia, where he will discuss plans for extending the group's showrooms and warehouses, Uganda, Nairobi, Ndola (Northern Rhodesia), Durban and Johannesburg.

Israeli Ammonia Plant

A plant for the synthesis of ammonia has been completed at the complex chemical factories owned by Fertilizers & Chemicals in Tel Aviv. The plant, which will produce ammonia by converting nitrogen, took two years to build and covers 25 acres. Equipment was supplied by the US, and West Germany under the Israel-German reparations agreement.

Revolutionary ' Wafer Cell'

A MAJOR step in the application of automation to the manufacture of dry batteries has been achieved with the development of a revolutionary 'wafer cell' by the Burgess Battery Co. of America, which makes possible a 30 per cent increase in battery power and life and eliminates traditional hand operations from cell manufacturing. The cell consists of a sandwich of artificial manganese dioxide mix between tiny discs of flat zinc and carbon electrodes; the old carbon rod of round cell batteries being supplanted by a small piece of conductive carbon.

Welded or soldered wire connections between cells are eliminated by the use of silver wax, a new conductive wax intercell connection developed by Burgess engineers. A dab of silver wax on the positive and negative sides of the cell permits the cells to be connected in series merely by being stacked in a column, and a multiple cell battery results from the electrical contact established between cells by the wax in pressure contact. Rigid inter-cell connections are maintained even under rugged handling since the silver wax yields and moulds itself to any necessary configuration between the cells required to hold perfect electrical contact.

When completed, a cell is so small that it barely covers a fingertip; yet the cell develops so much power that a small two inch battery made from 15 cells in a single column develops 22¹/₂ volts. Mr. F. J. Kirkman, executive vice-president of the Burgess Battery Co., reports that the new cell is the culmination of three years of and engineering development. research Special features of the 'wafer cell,' on which four patents have just been granted, include elimination of leakage between cells, rugged yet highly conductive inter-cell connections, and the ability to age and test each cell individually before it is incorporated into completed batteries.

Petroleum Films

The Petroleum Films Bureau of 29 New Bond Street, London, reports that during 1955 the number of showings of films borrowed from its library totalled 64,873, compared with 59,950 in 1954.

Publications & Announcements

'ELECTRIC Motors and Controls', the latest publication in the electricity and productivity series of books issued by the British Electrical Development Association, has been written to serve the needs of management in industry. It describes and discusses, in clear language, the various types of electric motor and explains why a particular type is chosen for a particular job when maximum productivity, with economy, is required. The electric motor, correctly used, is one of the greatest aids to productivity. The book reviews the applications of electric power in a wide range of industries, and points the way to the best use of the electric motor and its associated control gear. The control gear, its functions and its applications are also described. Copies of the book, price 8s 6d (postage 6d extra) can be obtained from the British Electrical Development Association at 2 Savoy Hill, London WC2.

A MOTORIZED, battery operated, portable psychrometer for obtaining accurate relative humidity measurements is being made by the GM Manufacturing Company, 50 West Third Street, New York, NY. This instrument, No. 16W-923 Gemware Portable Psychrometer, consists of a housing with an air intake tube connected to a special duct system with exhaust slots, a high speed $4\frac{1}{2}$ volt electric motor with a nylon fan blade, three standard flashlight batteries for power supply, a pair of matched thermometers, a water reservoir and wick connected to the wet bulb thermometer, and an on-off switch. The water reservoir eliminates the need for wetting the thermometer wick before each measurement. It contains enough water for a week's use under normal conditions. Operation is claimed to be quick and with the motor and fan on the thermometers will stabilize in 20 to 30 seconds. Fahrenheit provided thermometers are normally fitted if although centigrade will be required. A special slide rule is provided with each instrument and a de luxe model with a light bulb for use at night is also available. Dimensions of the psychrometer are $7\frac{1}{2}$ in. by $3\frac{1}{4}$ in. by $1\frac{1}{2}$ in. and it weighs $1\frac{1}{2}$ lb. with batteries.

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review is devoted to two topics: pH, and Modern Trends in Printing, Dyeing and Finishing. The historical development of the concept of pH is described and methods of pH measurement are reviewed in the first two articles. The series then continues with articles on the importance of pH control in various industrial processes; scouring and bleaching, dyeing, textile finishing, manufacture and leather papermaking. Altogether this series of articles gives a concise but fairly complete picture of the pH situation in industry today. The second and very much shorter section of this journal contains brief articles on 'The Pad-Roll Dyeing Technique', 'Pyrogene Dyes in High Temperature Pressure Dyeing', 'Dyestuff Selection from the Spinner's Point of View', 'Continuous Dyeing of Loose Wool'. 'A New Type of Levelling and Dyeing Assistant for Leather', and 'New CIBA Dyes for Textile Chemicals'. The CIBA review is published by CIBA Ltd., Basle, Switzerland.

WHEN the featherweight hose was introduced less than nine months ago by the Compoflex Co. Ltd., 26 Grosvenor Gardens, London SW1, it was claimed to be the lightest full bore suction and delivery hose in the world for the flexible transportation of oils and chemicals etc. It showed an appreciable saving in weight over other types of flexible hoses, often as high as two thirds. In practice, however, it was found that the ease of handling of the featherweight hose might be offset to some extent by the continued use of heavy standard brass couplings. Realising this, the flexibles advisory service of Compoflex have now introduced a range of aluminium alloy couplings which are less than one third the weight of comparable brass fittings. Hoses equipped with the new experimental couplings have been issued to various oil companies and chemical companies who have agreed to subject them to field trials under operating conditions. No definite results are expected for some months but it is hoped that the trials will yield valuable information. Initial tests established that the particular aluminium alloy used for the couplings was comparable in strength to brass. There remained, however, the problem of obtaining

a thread which would be able to stand up to rough usage, and if used in conjunction with a fixed coupling of brass would not cause a bi-metallic action. The problem was solved in an unusual manner, with the co-operation of the Cross Manufacturing Co. (1938) Ltd. (Bath, Somerset). In the case of a female coupling, the thread is made larger than standard size and a high tensile steel wire helical spring-diamond shaped in cross section-is threaded in. The steel spring thus forms a standard sized thread and remains permanently locked in position. As the thread inserts are of steel the risk of bi-metallic action is greatly reduced. In production it is claimed that the price of the aluminium couplings will be comparable with that of brass.

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THE chemical division of Armour & Co. Ltd. have published an eight page booklet on 'Armeens' which is their registered trade mark for long chain aliphatic amines. The booklet covers both primary amines RNH₂ and secondary amines R₂NH. There are two tables which give the chemical composition and principal physical and chemical characteristics of these amines. Being cationic, the Armeens are substantive to many common materials, *i.e.* they plate out in the form of a mono-molecular film on metals, stones, ores and masonry, pigments, textiles, paper etc., and impart new characteristics to the surface of these substances. For instance they prevent corrosion of metals, they cause bitumen tar or paint to adhere better to stones or masonry. They coat pigment particles thus acting as softening or dispersing agents. The uses of the Armeens in the petroleum, rubber, plastics and many other industries are described. Aliphatic amines are also used in the manufacture of more complex organic compounds used in the petroleum, textile, medical, photographic and other fields. One of their main applications in organic synthesis is in the preparation of quaternary ammonium Of special interest are the compounds. secondary amines because they lead to the formation of oil soluble quaternary ammonium salts. Copies of the booklet are available from the chemical division of Armour & Co. Ltd., Lindsey Street, London EC1.

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A NEW edition of the 'BCAS Handbook of Pneumatic Equipment' (price 20s post free by surface mail) has just been published by the British Compressed Air Society, 32 Victoria Street, London SW1. The handbook, which comprises some 210 pages, explains the characteristics, features and uses of a wide variety of compressed air equipment-such as air and gas compressors, paint spraying equipment, pneumatic tools etc. It should be valuable to buyers and purchasing agents as well as for use for The training and reference purposes. present edition incorporates a completely revised 16 page buyers' guide, containing a full list of names and addresses of members and associate members, and a classified list of products from which the manufacturers of over 250 separate items of compressed air equipment can easily be ascertained.

A CIRCULAR (No. 539, Vol V, price 45 cents) containing 45 standard X-ray diffraction patterns has been prepared by the National Bureau of Standards, US Department of Commerce, Washington 25, This revises 74 corresponding pat-DC. terns filed with the American Society for Testing Materials. Using exceptionally high purity samples, patterns were made with a / Geiger counter X-ray diffractometer. The d-spacings were assigned Miller indices by comparison with calculated interplanar spacings. Patterns for five compounds not previously represented in the ASTM file are also included in this publication. X-ray data for the following 45 substances are given: $(NH_4)_2 PtCl_4$, $(NH_4)_2 SnCl_6$, $(NH_1)_2 SiF_4$ (stibnite), BaZrO₃, (cryptohalite), Sb₂S₃ 3CaO.Al₂O₃, Cs₂PtCl₆, Cs₂SnCl₆, Cs₂GeF₆. Cs2SiF6, Cr, Cr2O3, CuF2, Gel4, In-O3, HIO3, a-PbF2, β -PbF₂, FeS. (pyrite) PbI₂, PbTiO₃, Pb(NO₃)₂, PbSe (clausthalite), Mg₂Sn, MgTiO₃ (geikielite), MnO, MoS₂ (molybdenite), K_2PtCl_6 , K_2SiF_6 (hieratite), PrF₃, Rb.PtCl₆, Se, KZnF₃, Ag₃As₄. AgBrO₃, AgNO₃, AgNO₃, Ag₃PO₄, NaHF₂, NaBrO₃, SrF₂, SrO, Tl₂PtCl₆, SnI₄ and Zn (CN)2.

Record Output

Canada's crude petroleum output was a record in the first nine months of 1955, being one-third greater than in the corresponding period in 1954. The Bureau of Statistics reports that production rose in the first nine months of 1955 to 92.005,157 barrels from 69,423,647 in the January-September period, 1954.

Next Week's Events

MONDAY 23 JANUARY

Pharmaceutical Society of Gt. Britain

London: 17 Bloomsbury Square WC1, 7.30 p.m. 'Essential Oils & Their Pharmaceutical Applications' by G. R. A. Short, F.P.S., F.L.S.

RIC (London Section)

Enfield: Enfield Technical College, Ponders End, 7 p.m. Film Display: 'Waters of Coweeta'; 'Extraction of Precious Metals from Nickel-Copper Ores'; 'Chromatography'; 'The Woodpecker'; 'A Miniature Chemical Laboratory'.

TUESDAY 24 JANUARY

SCI (N. Ireland Section)

Belfast: Agriculture Lecture Theatre, The University, 7.15 p.m. 'Some Applications of Science in the Detection of Crime' by J. B. Firth, M.Sc., D.Sc., M.I.Chem.E., F.R.I.C.

Society for Analytical Chemistry

Birmingham: Regent House, 7 p.m. Midlands section annual general meeting.

WEDNESDAY 25 JANUARY

Institution of Chemical Engineers

London: Large Lecture Theatre, King's College, Strand WC2, 6.30 p.m. 'Control of Corrosion in the Heavy Chemical Industry' by Dr. F. R. Himsworth and W. D. Clark, M.A., M.Sc., A.I.M.

Society of Instrument Technology

Chester: Board Room, Chester & District Hospital, 7 p.m. 'Pneutronics' by J. E. Fielden, M.Sc. (Fielden Electronics Ltd.).

Huddersfield: Technical College, 7 p.m. 'Production Problems in Instrument Manufacture' by C. H. Offord (Honeywell-Brown Ltd.).

Cardiff: Physics Lecture Theatre, College of Technology, 6.45 p.m. 'Photo-Electric Cells & Their Application' by L. Battyl (GEC).

SCI (Food Group)

London: Rooms of The Chemical Society, Burlington House, Piccadilly W1, 6.30 p.m. 'Nutritional Requirements & Food Fortification—3. Iron & Calcium' by D. F. Hollingsworth, B.Sc., and E. M. Widdowson, D.Sc.

THURSDAY 26 JANUARY

Society of Instrument Technology Glasgow: Royal Technical College, 7.15

p.m. Film show provided by Kelvin & Hughes Ltd.

The Royal Society

London: Burlington House, Piccadilly W1, 4.30 p.m. The Wilkins Lecture 'Benjamin Franklin: Natural Philosopher' by B. F. J. Schonland, F.R.S.

SCI (Bristol Section)

Bristol: Chemical Department, The University, Woodland Road 8, 7 p.m. 'Industrial Applications of Sequestering Agents' by R. L. Smith, B.Sc., Ph.D., A.R.I.C., and P. Womersley,

Incorporated Plant Engineers

Sheffield: Grand Hotel, 7.30 p.m. 'Work Study' by F. R. Curry (ICI).

FRIDAY 27 JANUARY

Royal Institution

London: 21 Albemarle Street W1, 9 p.m. 'World Needs & World Resources' by Brig.-Gen. Sir Harold Hartley, K.C.V.O., C.B.E., M.C., M.A., F.R.S.

SCI (Food Group)

London: May Fair Hotel, Berkeley Street, W1, 7 p.m. Dinner & Dance.

Institute of Metal Finishing

Sheffield: Grand Hotel, 6.30 p.m. 'Barrel Polishing & Burnishing', technicolour film (sound).

The Chemical Society

Birmingham: Chemistry Department, The University, 4.30 p.m. 'Some Chemical Aspects of Plant Growth Regulation' by Professor R. L. Wain, D.Sc., Ph.D., F.R.I.C.

Newcastle-on-Tyne: Chemistry Building, King's College, 5.30 p.m. 'The Chemistry of Insulin' by Dr. F. Sanger. A Bedson Club Lecture.

Southampton: Chemistry Department, The University, 5 p.m. 'Recent Advances in the Chemistry of the Adrenal Cortex' by Professor C. W. Shoppee, Ph.D., D.Sc., F.R.I.C.

Society for Analytical Chemistry

London: Meeting Room of The Chemical Society, Burlington House, Piccadilly W1, 6.45 p.m., annual general meeting of the microchemistry group followed by an ordinary meeting of the society at 7.15 p.m. & Papers, 'Microchemical Methods in the Art Gallery & Museum' by A. E. Werner, M.A., M.Sc., D.Phil., A.R.I.C.; 'The Ring-Oven Technique & Its Applications in Archaeology' by H. Weisz, Dr. techn., Dipl.-Ing.

SATURDAY 28 JANUARY

Institution of Chemical Engineers

Manchester: Grand Hotel, 2.30 p.m. Annual general meeting of North-western branch; 2.45 p.m. Address by Sir Ewart Smith, M.A., M.I.Mech.E., M.I.Chem.E., deputy chairman of ICI; 7 p.m. dinner.

World Power Conference

Vienna, 17-23 June, 1956

MORE than 100 British delegates are expected to attend the fifth World Power Conference to be held at Vienna from 17 to 23 June 1956. The theme of the conference will be 'World Energy Resources in the Light of Recent Technical and Economic Developments.'

According to the general programme of the conference, which has just been published, papers submitted to the conference will not be read at the technical sessions. This is to keep all the available time free for discussions. The general reports will be printed in the three working languages and preprints of them will be forwarded to participants in good time together with the individual papers.

Preprints of the papers submitted to the conference and preprints of the general reports can only be forwarded to those participants whose applications reach the Austrian National Committee of the World Power Conference, Vienna 1, Schwarzenbergplatz 1, Austria, by 15 April in the case of those living outside Europe, and by 30 April in the case of those living in European countries.

Arrangements have been made for a number of tours to the various hydroelectric plants, thermal plants and industrial establishments in Austria and to hydroelectric plants situated in the frontier areas of Germany, Italy and Yugoslavia. During the conference week there will be wholeday and half-day excursions to the power plants located in Vienna and its neighbourhood. Trips through the immediate and more distant surroundings of Vienna, as well as conducted sightseeing tours of the city and visits to other places of interest, have been specially arranged for the ladies.

Membership of the conference is open to

all persons possessing appropriate professional qualifications or occupying responsible posts in the British fuel and power and related industries (including 'user' industries). Copies of the general programme are obtainable from the secretary, British National Committee, World Power Conference, 201 Grand Buildings, Trafalgar Square, London WC2.

ICI Transfers Glass Co.

ICI Ltd. Nobel Division has transferred the Portland Glass Co. Ltd., to Rockware Glass Ltd. and so severs its connection with the glass industry. Announcing this change Dr. James Craik, chairman of the Nobel Division, told staff of Portland this month that ICI had entered the glass field originally because of the large deposits of sand available and the existence of by-products from their chemical works nearby.

Portland had since developed its own sand resources and the chemical link had also lapsed. The main economic reason for ICI being in the glass industry had thus lapsed and ICI had accepted an offer by Rockware, one of the leading glass companies for their majority shareholding. Other shareholders had also accepted and control of Portland would shortly pass to Rockware.

This move had been taken realistically. Even the largest and most powerful companies had to maintain close financing of their developments. ICI with limited interest in glass manufacturing would not be likely to prominently feature proposals to expand Portland. Rockware on the other hand, with its wide interests in glass would be better able to do so. Dr. Craik was speaking at the presentation of long service awards to Portland staff and paid a special tribute to the managing director, Mr. Millar, for his success in building up a modern factory in a highly competitive field.

Oil Drilling in Israel

The Israel-American Oil Corporation has begun to drill at Halutza, in the south of Israel, 50 ft. from a site which, for technical reasons, was recently abandoned at a depth of 1,670 ft. The company will also start drilling shortly at the Gan Yavne site, about 800 metres from the spot where some months ago a former drilling erupted with flaming gas.

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.)

E. C. ByLe & Co. LTD., Hyde (Ches.), paint manufacturers—15 December, £6,000 charge, to E. Byle, Hyde; charged on 8, 10, 12 and 14 Church St. Hyde. *Nil. 31 December, 1954.

RICHARD GENT LTD., Wellingborough, glass manufacturers—19 December, £1,900 mortgage (sec. 97, 1948 Act), to Northampton Wellingborough & Higham Ferrers District A.O.F. Friendly Society; charged on 19 Park Rd, with workshops etc. on land at Park Rd. Wellingborough. *——. 24 August, 1955.

W. TABOR & SON (GLASS) LTD., London, EC-13 December, £1,500 debentured to Branch Nominees Ltd.; general charge. *Nil. 31 December, 1947.

Satisfactions

BOWMANS CHEMICALS LTD. Widnes— Satisfactions 17 December, of debentured stock registered 22 July, 1952, to the extent of $\pounds1,500$ and $\pounds1,700$.

BRITISH CELANESE LTD. London, W.— Satisfaction 21 December, of debentured stock registered 2 October, 1943 and 8 November, 1944, to the extent of £2,185.

LANGLEY SHAW & Co. LTD. Yeadon, manufacturers of textile detergent compositions etc.—Satisfaction 24 December, of mortgage registered 7 July, 1941.

LUMEX (GREAT BRITAIN) LTD. Tolworth, luminous paint manufacturers.—Satisfaction 22 December, of charge registered 13 January, 1954,

Company News

Greeff-Chemicals Holdings Ltd.

The directors of Greeff - Chemicals Holdings Ltd., announce that, subject to the passing of a resolution for the necessary increase of the authorized capital of the company, they have decided to issue 400,000 shares of 5s each at the price of 10s per share and to offer the shares in the first place to ordinary stockholders registered at the close of business on 11 January 1956, in the proportion of one new share for every four 5s units of ordinary stock held, and to give ordinary stockholders the opportunity of applying for excess shares. The proceeds of the issue will be utilized to finance the expansion of the business of its whollyowned subsidiary, R. W. Greeff & Co. Ltd., including the increase in its investments in associated companies. If trade conditions continue to be favourable and no adverse circumstances occur the directors hope to recommend the payment of a final dividend on the ordinary capital as increased by the proposed issue of not less than 10 per cent for the year ended 31 December 1955, which, with the interim dividend of five per cent declared in November 1955, will be equivalent to $17\frac{1}{2}$ per cent on the issued ordinary capital prior to the increase.

McKechnie Brothers Ltd.

Subject to necessary resolutions being passed to increase the capital and create new ordinary and 'A' ordinary shares, it is expected to make an offer for sale early in February of 'A' ordinary shares of McKechnie Brothers Ltd., manufacturers of nonferrous metals and chemicals.

Goodlake & Nutter

On 1 January 1956, Goodlake & Nutter, oil brokers, of London, was formed into a limited company. The directors are Mr. George Harper (chairman), Mr. Jack Hugh Saggers, Mr. W. E. Drummond Smith, Mr. Hugh Flint and Mr. B. L. Hunt, who will represent Jardine, Matheson & Co. Ltd., of Hong Kong, and Matheson & Co. Ltd., of London, who are the principal shareholders.

Laporte Titanium's Expansion

Laporte Titanium is to increase the capacity of its Stallingborough, Lincs, titanium oxide production plant by a further 12,000 tons a year, bringing total annual output to 30,000 tons of oxide. The company is at present employing about £3,200.000 on the plant, which was built in 1953.

Fuel Elements Plan

A PLAN to encourage private industry to build and operate plants for chemically processing irradiated fuel elements from research and power reactors was approved on 5 January by the United States Atomic Energy Commission. The plan, said the AEC, was a further step toward private ownership of atomic energy facilities for peaceful uses.

Processing plants recover for re-use the fissionable and fertile materials present in irradiated fuel elements, and leave the radioactive fission products in disposable or usable forms. In the US these operations are now being carried on by governmentowned plants.

Information and materials will be made available by the AEC to ensure that commercial plants will be in operation when it becomes necessary to process fuel elements from privately owned power reactors.

The AEC will evalute proposals received from industry and will select those which it considers will do most to advance the chemical processing technology.

Market Reports

LONDON.—The demand from the home consuming industries has shown no sign of easing during the past week and chemical prices are generally unchanged with a firm undertone. Export trade continues to be maintained at a good level despite increasing competition from the Continent. Higher prices for the lead and zinc compounds were reported last week following the upward trend in the price of the metals. Since that time lead prices on the London Metal Exchange have reacted, resulting in reduced quotations as from 17 January, with white lead at £146 5s per ton, red lead at £141 per ton and litharge £143 per ton. Glycerine is in good request at the lower levels now ruling while there is a steady home and export demand for sulphate of alumina, borax and boric acid, and the solvents are also in active request. Among the coal-tar products pitch is in steady call on home and export account and the cresylic acids are meeting with a steady demand.

MANCHESTER.—The quotation for sulphate of copper on the Manchester market during the past week has been reduced to £116 15s per ton, f.o.b., but otherwise prices generally have continued on a steady to firm basis. Contract deliveries of the alkalis and other leading heavy chemicals are coming through satisfactorily and a fair number of new inquiries from home users and from shippers have been in the market. Except in basic slag and one or two other lines business in fertilizers has been moderate. Creosote oil, carbolic acid and most of the light materials are active sections of the byproducts market.

GLASGOW.—The Scottish market has now settled after the New Year holidays and business during the past week has been very brisk. Both spot and contract deliveries are being well maintained and covered quite a wide range of chemicals. Prices have remained fairly steady although some have shown slight increases. Export still continues satisfactorily and a good volume of inquiries are being received.

Walker Extract & Chemical Co. Ltd., of Moncrieffe Street, Bolton, Lancs, are reported to be planning extensions to their premises.





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A Vacancy exists for a WORKS CHEMIST

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Further particulars and forms of application may be obtained from the Principal, College of Technology, Belfast, with whom completed applications must be lodged not later than Wednesday, February 22nd, 1956.

J. STUART HAWNT,

Director of Education.

MINISTRY OF SUPPLY requires PHYSICAL CHEMIST or PHYSICIST at Armament Research and Development Establishment, near Sevenoaks, Kent, for research on initiation of explosive systems and in application to Service stores. Qualifications : 1st or 2nd class Honours Degree or equivalent qualification in Physical Chemistry or Physics. Knowledge of electronic equipment and modern laboratory instrumentation techniques desirable, and armitisms in handling of avalosities an advantage modern laboratory instrumentation techniques desirable, and experience in handling of explosives an advantage. Salaries within range: SCIENTIFIC OFFICER (min age 21), £488 10s.£885; SENIOR SCIENTIFIC OFFICER (min. age 26), £1,030-£1,185 (Superannuable) Equal Pay Scheme. Application forms from M.L.N.S., Technical and Scientific Register (K), 26, King Street, London, S.W.1, quoting F.963/5A/BZ. Closing date, February 4, 1956.

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DUTIES—Toxicology, Forensic Science Investigations, Foods, Drugs and Water Examinations, Customs Revenue Foods, Drugs and Water Examinations, Customs Revenue and Protection Analysis, Miscellaneous Chemical work including ship inspections for toxic and inflammable vapour, petroleum inspections, general analytical and consultation work. Making reports, giving evidence in court and assisting in training of staff. **TERMS OF APPOINTMENT**—Contract for three years, emoluments from £1,290 to £2,340 per annum and temporary cost-of-living allowance. Gratuity payable on satisfactory completion of contract; free passages; quarters provided, if available, at rental; free medical attention; generous leave; income tay at local rates.

attention; generous leave; income tax at local rates.

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QUALIFICATIONS AND EXPERIENCE: Candidates should have an honours degree in Chemistry or Chemical Engineering of the Local Content of the Cont

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promotion to the next grade which carries a salary range of £1,130 to £1,435 per annum. There are housing schemes for married officers. Successful candidates under 55 will be required to join the Authority's Contributory Pension Scheme, which includes widows and dependants' benefits. Suitably qualified persons are invited to send a postcard quoting reference 1223 for form of application to the Recruitment Officer, U.K.A.E.A., Industrial Group Headquarters, Risley, near Warrington, Lancs. Closing date : 27th January, 1956.

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