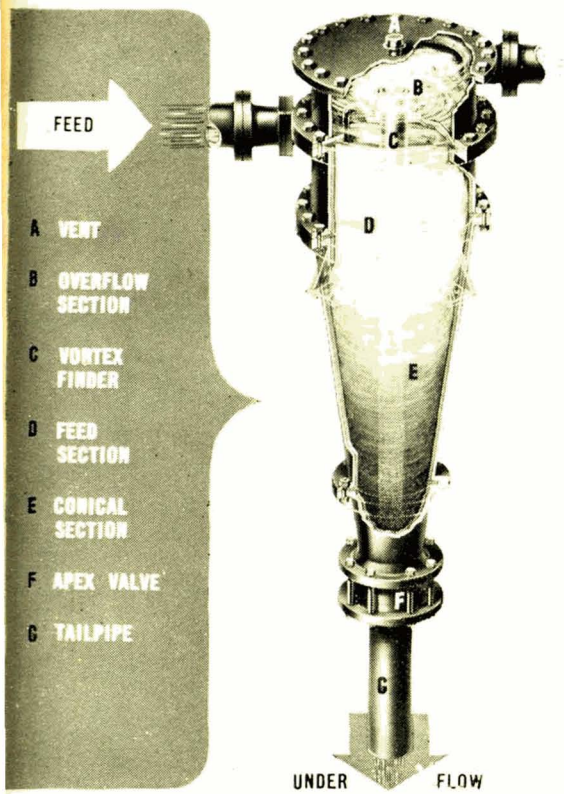
The Chemical Age

VOL LXIX 12 SEPTEMBER 1953 No 1783

THE DORRCLONE (Dutch State Mines Cyclone)



The DorrClone is a compact cylindro-conical classification unit utilizing centrifugal force in place of gravity. It provides a modern method of separating finely divided solids in liquid suspensions and constitutes an important new tool with which to supplement current practices in the *Desliming* of phosphate rock and *Classification* of crystalline and other granular suspensions.

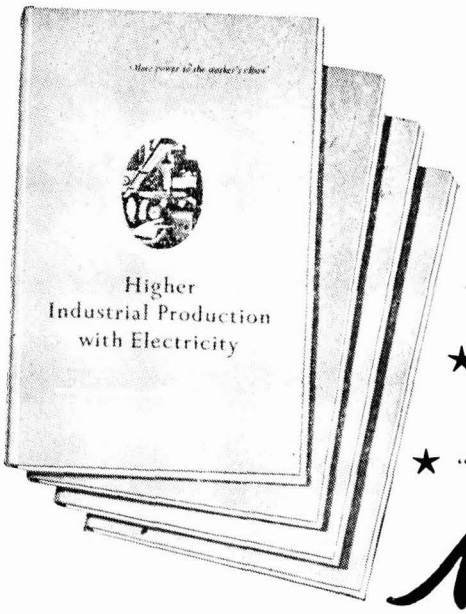
The new TM3 15 mm. diam. Rubber and 10 mm. diam. Bakelite multi-DorrClones are now firmly established in the Starch field and are finding use in the *Classification* of Whiting, Clay, Pigment and Pharmaceutical particles in the Submicron size range.

DorrClones are also available singly or in multiple arrangements in 3 in., 6 in., 12 in. and 24 in. diameters.

DORRCO

DORR-OLIVER

Dorr-Oliver Company, Ltd., Abford House, Wilton Road (Victoria), London, S.W.1



★ "HIGHER INDUSTRIAL PRODUCTION WITH ELECTRICITY"

★ "LIGHTING IN INDUSTRY"

★ "MATERIALS HANDLING IN INDUSTRY"

★ "ELECTRIC RESISTANCE HEATING"

New BOOKS ON Industrial Productivity

PRODUCTIVITY is one of the vital problems affecting Britain today. One way to increase productivity is to put POWER at a man's disposal; and the best way to do this is with electricity.

As a contribution to the solution of this problem, the British Electrical Development Association is now publishing a new series of books for management and executives in Industry. The first four are now available: "Higher Industrial Production with Electricity" describes a wide variety of modern production methods; "Lighting in Industry" shows how lighting can affect individual output, how its effectiveness can be assessed, and how improvements can be made; "Materials Handling in Industry" shows the way to increased productivity by improved handling; and "Electric Resistance Heating" indicates where, and how, this unique method of producing heat without combustion can be applied.

The post-free price of each of the books is 9/- and copies can be obtained from the British Electrical Development Association, 2 Savoy Hill, London, W.C.2, or from your Electricity Board.

The Association has produced a film called "A Case for Handling" which illustrates by practical demonstration the vital part that improved materials handling can play in all industries. It runs for 32 minutes, and is available on free loan.

Electricity for PRODUCTIVITY

Volume LXIX
Number 1783

The Chemical Age

Established 1919

The Weekly Journal of Chemical Engineering and Industrial Chemistry

BOUVERIE HOUSE · 154 FLEET STREET · LONDON · EC4

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

CONTENTS · 12 SEPTEMBER 1953

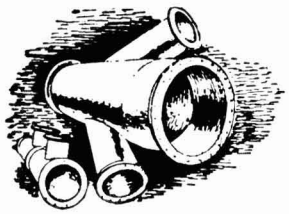
Editor : E. A. Running *Publisher & Manager : John Vestey*

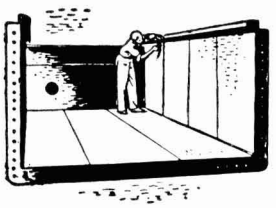
MIDLANDS OFFICE :
Daimler House, Paradise Street, Birmingham
Phone : Midlands 0784/5

SCOTTISH OFFICE:
116, Hope Street, Glasgow, C.2.
Phone : Central 3954/5

LEEDS OFFICE :
Martins Bank Chambers, Park Row, Leeds, 1
Phone : Leeds 22601

SINGLE COPY 1/- (BY POST 1/3) ANNUAL SUBSCRIPTION 42/-





DUNLOP

Technical research facilities outstanding in British industry place Dunlop in a strong position to solve corrosion problems. The lining and covering of plant with rubber, synthetic rubber and plasticised P.V.C., is a sphere of activity in which the Company is particularly expert.

In addition to this service a range of accessories for use in industries using chemicals, is available including ebonite pipes, tees, bends, cocks and valves, "Nerflex" buckets, jugs and ladles, protective gloves and aprons.

Your enquiries for any of these products or services may be sent to any of the addresses shown below.

ANTI-CORROSION SERVICE

Dunlop Rubber Co. Ltd., (G.R.G. Division)
Cambridge Street, Manchester, 1

Telephone: Central 2131

Clerkenwell House, Clerkenwell Green, London, E.C.1
Phone: Clerkenwell 3871
Buckton's Chambers, 57 Meadow Road, Leeds, 11 *Phone: Leeds 34091*
Dunlop House, Livery Street, Birmingham, 3 *Phone: Central 8585*
Dunlop Rubber Company (Scotland) Ltd., North Wallace St., Glasgow, C.4
Phone: Bell 3411

3G GMI B

CHEMICAL PLANT EXHIBITION
OLYMPIA . SEPT. 3—17
STAND D.11.

Technical Education

REPORTS from Select Committees on estimates are seldom devoted to scientific topics. The publication of one on the subject of 'Technical Education' (HMSO, 1953, 7s.6d., 173 pp.) can be regarded as a rare event and a valuable opportunity for constructive criticism. Such Committees are traditionally practical—their direct methods of examination and study keep both feet and ears close to the ground. The subject is treated with utmost respect and gravity. 'Apart from the undoubted value of technical education to the individual, the economic survival of the nation is largely dependent upon the imagination, skill, and ingenuity with which the programme of further education in this vital field is planned.' This statement in the introduction to the Report removes any misgivings about the Select Committee's attitude; their economic concern is that we obtain full value for what is spent, not that we spend less for the sheer sake of economy. The expenditure involved is by no means small. For 1952-53 the Ministry of Education's estimate of technical education costs in England and Wales was £18,000,000; for the current year, 1953-54, it is £20,000,000. Roughly, about 6 per cent of the country's expenditure upon education is allocated to technical education. However, some definition of education is required. According to the Ministry's 1944 Act 'full-time and part-time education for persons over compulsory school age' and education in people's leisure-time is defined as 'further education' and this very general field embraces technical education. It is the duty of a local authority to ensure that facilities for further education exist in its area. There need be no doubt that a vigorous demand exists. In 1937/38 young people in the 15-21 age-groups receiving part-time day education numbered 40,000; by 1949/50 this number had risen to 240,000. The six-fold increase covers a wide variety of subjects, not all of them technical, but, in fact, the proportional emphasis upon scientific subjects has itself increased. It can be assumed, therefore, that the demand for technical education has risen by more than six times since before the war.

One of the major conclusions of the Select Committee is that many of the buildings 'fall short of the requirements necessary for good educational instruction'. The over-crowded condition of Birmingham's College of Technology 'cannot be over-emphasised'—there, we are told, teaching takes place in the corridors, and with high-powered machinery the congested conditions endanger life and limb! Improvisation seems the general order of the day and week and year in most technological centres, and while the Select Committee praises the determined efforts of all who are concerned with the task of teaching it draws the inescapable conclusion that under such conditions a full return for the money spent annually cannot be ensured. The new building plans of as recent a date as 1949 have not been fulfilled. These plans were regarded then as minimum requirements for technical education. A total cost of £50,000,000 was estimated, but today £75,000,000 would be needed to obtain the same physical resources. In fact, only about £1,500,000 per year has been spent over the 1949-53 period. Obviously this is a rate of progress far too slow. Moreover, the costs of building are being significantly increased by building in instalments, a process criticised in the Report as 'expensive in money, labour, and materials'. The main cause of this wastage is the inability of local authorities to obtain

sanctions for spending more than so much money per year, and the Select Committee recommends that money for technical colleges should be allotted on at least a five-years basis. It is certainly stupid to allow restrictive measures not only to limit the fulfilment of necessary purposes, but also to increase the bills for what can be achieved. If the same road is still followed, less and less will inevitably cost the country more and more and when the original allotment of capital has been spent the resources and facilities created will be bitterly smaller than those envisaged as a minimum in 1949. Yet our actual needs for the training of technicians and technologists must be considerably greater by, say, 1960 or 1965! We are competing not with each other at home, but with other countries, and pace in this matter is not set by United Kingdom standards. In the words of a memorandum printed in the Report (from the Association of Education Committees), 'the development of technical education in this country has undoubtedly lagged behind that obtaining both in America and in certain European countries'. Lost laps in a competitive race are not recovered by taking one step backwards for every two steps forward. Even before the war a sum of £12,000,000 was voted for technical education development. The war came and nothing could be done. Yet it is fair enough to say that actual post-war expenditure up to 1953 (making due allowance for the reduced value of the £) has not approached the equivalent of that modest pre-war sum. From whatever angle the subject is considered, it is the old, old British story of too little and too late.

Almost all these comments apply to England and Wales. As is not unusual when educational matters are involved, the position in Scotland differs. In England and Wales the local authorities have pressed for grants and permissions to spend money on technical centres and the main obstacle has been government refusal. In Scotland the Education Department has always been ready to give both permissions and grants, but there has been little demand from local authorities. The Select Committee obviously assumes that Scottish authorities are pre-occupied with building schools, for they make the suggestion that grants for educational building should be specifically designated, i.e., a part of the grant to a local authority should be ear-marked for building new premises for technical education. The Scots have a flair for education that is outstanding in Europe and unique in the whole British family. So much in the past has been achieved with so little that one wonders whether even the most practical Select Committee is qualified to offer guidance now. However, there is definite evidence that facilities for technical education in Glasgow and in rural Scotland are falling appreciably short of the genuine demand.

One type considered by the Committee —and in relation to both sides of the Tweed—is the question of day releases for young employees of industry. For at least one very practical reason employers should encourage this system—the existing facilities for technical training could provide more places per year if the demand for day and evening classes were better balanced. Whether or not this circumstantial argument applied, there is always the basic argument—that young people will learn more readily when fresh than by attending classes at the end of a day's work. It is clear that a large section of industry is already prepared to encourage the day-release system. Since 1937-38, the number (in England and Wales) of students attending day-release classes has risen from 40,000 to 290,000 in 1951-52. Industry can afford to take a long-term view here. Technical education probably means the difference between an unskilled and a skilled worker. To forego one day's work a week from youth is not a serious loss when set against the proportional gain of a working lifetime's skill.

This Report is one of the most valuable and efficient documents on education that has emerged since the war. It is to be hoped that our comments here, limited though they must be, will encourage a first-hand reading. Our national future rests upon scientific and technical resources, and it is the duty of all who fully realise this fact to help in forming public opinion. Much more could be done—and with better economy—if it were vigorously demanded.

Notes & Comments

Chlorophyll Tested

THE chlorophyll controversy—does it or does it not reduce odours?—has received an Indian contribution. H. Ghosh and K. B. Dutt of the Calcutta Chemical Company (*Science and Culture*, 1953, **19**, 1, 25) recently reported tests the results of which convinced them that chlorophyll is a markedly selective deodorising agent. With twelve different odorous chemicals or substances they decided that chlorophyll was effective for only two of them. It is suggested that it is a deodorant for acids, protein-type substances and their degradation products, and even in these cases the deodorising effect is dependent upon actual contact between chlorophyll and odorous molecules. Natural chlorophyll, being insoluble in water, cannot achieve such contacts and it is therefore ineffective: but chlorophyll derivatives like sodium magnesium chlorophyllin can display the selective property, the authors believe. The deodorising mechanism is assumed to be the formation of co-ordinated compounds with the malodorous acid or protein molecules.

A Possible Explanation

THIS view that the odour-reducing property of certain chlorophyll-derived chemicals is selective would certainly explain much of the current conflict of evidence and claims. After all, it is a somewhat sweeping expectation to believe that every unpleasant smell can be banished or inhibited by a little chlorophyll. Selectivity in action accounts for tests which seem successful and for those other tests that seem to discredit the chlorophyll claims. The suggested inability of natural chlorophyll to act as a contact deodorant would account, too, for the failure of green vegetable diets as odour-quelling operations. This new Indian contribution is certainly timely, for the chlorophyll debate has been assuming a somewhat embittered shape in recent months. The selective theory may lead to a truce in the verbal warfare between chlorophyll's enthusiasts and the scornful critics.

British Association & Teaching

PRESIDENTS of two sections—Professor Clemo (chemistry) and Dr. W. Swinton—at last week's B.A. meeting expressed alarm at the intensifying scarcity of science masters in schools. Of 482 honours graduates from Oxford University in a recent year (1951-52) only 17 became science masters, all of them in public schools. We are glad to see that Professor Clemo attributed much of the blame to the economic factor, the glaring disparity between incomes from teaching and industrial posts. There have been too many woolly-minded statements suggesting that this is not a critical influence. Professor Clemo gave these comparisons. At 32 a grammar school science teacher would be paid £651, while the average salary in industry for a science graduate at that age would be £1,004. Thus at 32 the sacrifice for the honour of teaching is £350 or seven pounds a week. At 35 the sacrifice is over £500 per annum and at 46 it rises to more than £900! The science graduate as schoolmaster starts lower and progresses much more slowly. Over a career of, say, 38 years he may in electing to teach lose as much as £20,000 to £25,000 in total earnings, a fact whose hardness is relieved only by the greater income tax liabilities incurred by the graduate who has chosen industry instead. The economic differences are far too great.

Something Must be Done

OUR concern—and we regret the monotony of returning again and again to this topic—is that something should be done to encourage science teaching. The situation, nationally disastrous though it may well become, is being accepted as something that is mildly unfortunate but, like bad weather, uncontrollable. We appreciate that any practical remedies will be difficult to

introduce and may well seem invidious within the teaching profession itself. But a country whose schools cannot provide groundwork training in the major branches of science must inevitably face many far worse difficulties within one or two generations. The choice is between minor problems today and major problems tomorrow, and it is a choice that cannot be delayed. The whole subject deserves examination by a Royal Commission or 'working party' committee, preferably not composed of too many academic persons.

Sweets of Victory

NO wave of panic will sweep the West Indies at the news of the final complete chemical synthesis of sucrose, announced by Drs. R. Lemieux and G. Huber of the National Research Council of Canada, at the annual meeting of the American Chemical Society. Practical details are not yet available, but the condensation of glucose and fructose, the last step which had so far eluded all researchers, gives a yield of no more than 5 per cent. Sugar is one of the cheapest of natural products, and there is no possibility that this synthetic method could represent a threat to the cane grower. The interest of the discovery, apart from its importance as another chemical milestone, lies in the probability of incorporating radioactive tracers at any point in the molecule, and thus providing another tool of physiological research. For over half a century, workers have attempted this synthesis and various unsubstantiated claims to it have been made—enzymatic synthesis from condensation of the potassium salt of D-glucose-1-phosphate by bacterial phophorylase did not count—and it is possible that this new method may lead to the synthesis of other polysaccharides, and incidentally elucidate more of the secrets of biochemistry.

Post-Advanced Chemistry

Courses in Manchester District

ON the recommendation of the Post-Advanced Chemistry Advisory Committee of the Manchester and District Advisory Council for Further Education, courses are to be provided during the 1953-54 session as follows:—

'The Molecular Orbital Approach to Organic Chemistry,' three lectures, 18-19 September, Robinson Lecture Theatre, Department of Chemistry, University of Manchester.

'Design of Experiments—I,' twelve lectures, Mondays, beginning 28 September, Royal Technical College, Salford.

'Design of Experiments—II," twelve lectures, Monday, beginning 11 January next, Royal Technical College, Salford.

'Recent Advances in the Structure and Properties of Polymers,' twelve lectures, Thursdays, beginning 24 September, Royal Technical College, Salford.

'Fundamentals in the Design of Reactors for Continuous Processes,' ten or twelve lectures, Tuesday, beginning 12 January next, Royal Technical College, Salford.

'Chromatography,' a week's lectures, practical work and works visits, 13-17 September, Royal Technical College, Salford.

'Recent Advances in Inorganic Chemistry,' eleven lectures, Tuesdays, beginning 6 October, Chemistry Lecture Theatre, Manchester University.

'Enzyme Chemistry,' fourteen lectures, Fridays, beginning 16 October, Manchester University.

'Materials of Construction for Chemical Plant,' nine lectures, Fridays, beginning 16 October, College of Technology, Manchester.

Full details of these courses, and of post-advanced courses in chemistry which form part of the normal provision at technical colleges in the area for the session 1953-54, are given in a booklet obtainable on application to the Hon. Secretary, Manchester and District Advisory Council for Further Education, Education Offices, Deansgate, Manchester 3.

Atomic Energy in India

A uranium-cum-thorium factory at Trombay, about 10 miles north-west of Bombay, is expected to be ready within 15 months. It will be operated by Indian personnel specially trained for the purpose. Uranium ore has been discovered in several new localities in Bihar.

Technology & Everyman

by WILLIAM C. PECK, M.Sc., M.I.Chem.E., F.R.I.C., A.M.I.Mech.E.

DURING the House of Commons debate on science, technology and industry, Mr. Molson, the Parliamentary Secretary of the Ministry of Works, stated that the findings of the advisory council on scientific policy were startling: the volume of investment in manufacturing industry was too small, there was inadequate interest in scientific development and there was an inadequate supply of scientists and technologists. He further stated that the United States with only double our labour force was spending five to six times as much on equipment. In consequence the gap between British and American productivity, instead of getting less, was increasing every year.

The inadequate appreciation in general of the need for applying science and technology to achieve higher production, and so raise the standard of living, was stressed. There are many reasons why the general public should be made aware of the close relationship between the application of technology and science and a higher standard of living, but two are worthy of mention here. One is that unless the worker sees the virtue or the necessity of producing more, more would not be produced. The resistance which might be aroused among the workers by the rapid introduction of new and more efficient processes is an ever-present problem.

The second reason is that the training of increased numbers of scientists and technologists calls for increasing expenditure on such education. Now that the universities are having to receive a much larger financial contribution from the State, the need for an enlightened electorate on this matter is essential.

Rationalisation Demonstrated

The exhibition, 'A Higher Standard of Living,' at Dusseldorf recently, was of particular interest. It was designed to show its visitors possible ways of rationalising industry and to provide comprehensive information on this matter. It strove to show that, far from being a theoretical matter, rationalisation has a highly practical influence on all things concerned with our daily life.

The exhibition was divided into a 'basic exhibition' and a 'main exhibition.' The basic exhibition dealt with the fundamental principles and requirements which must be observed by any rationalisation. These included not only the science and technological but the wider and more complex labour and social relationships. The whole range of national and even international economy was surveyed and the relationship between national income and household economy brought out.

Applied Technology

Examples of the application of science and technology from all branches of industry were shown in the main exhibition. What is particularly of interest is that in the main exhibition, with halls allocated to various heavy and basic industries such as mining, textiles, electricity, iron and steel, there was a hall for chemical engineering—the only primary technology thus exhibited. The main exhibition included sections for public health, town planning, building, agriculture and food supply as well as others concerned with aspects of national life. The emphasis, however, was on the relationship between the engineering industry—using this term in its most comprehensive way—and the people, or rather individuals as they comprise the people.

The chemical engineering section was associated with the basic industries of mining, metal manufacture and energy generation. Thus one section showed modern mining equipment, coal cutting machines and conveying equipment for other minerals. The emphasis was not, however, on the finished machine, but the way in which the machine is used to achieve higher production. Exhibits showing metal production, such as iron and steel, stainless steel, lead and zinc, were staged to emphasise the modern industrial structure and in these exhibits, although final products were shown, there was just as much emphasis on the process.

The coal and oil industry were of course well represented and a considerable space was allocated to energy production—electric power plants being shown in diagrammatic form. Moreover, considerable propaganda was devoted to making the visitors aware of the need for increased energy production.

The extending use of aluminium as a constructional machine was well displayed, particularly in view of the newer welding techniques now available for that metal.

The multiple uses of stainless steel in all its forms of casting, forgings, rolled sheets and tubes were well exhibited in a range of chemical plant items, such as pressure vessels showing the newer methods of construction, coils in form of condensers and heat exchangers, and impregnation vessels showing various fabrication methods of reinforcement of flat sides—particularly by means of channel sections. A heat exchanger was shown in section illustrating the three methods of fitting tubes into the tube plate; namely by use of ferrules, welding and expanding—the shell having a fabricated expansion ring.

A number of process techniques were demonstrated by models, some of which were working. These included mineral separation by elutriation, and the unit processes, washing, fractionation, etc., involved in petroleum and benzole refining. Small pilot plant distillation plants for multi-purpose operation attracted considerable interest.

The process technique of the newer plastics such as PVC was illustrated by plant showing the technology of fabrication of thermoplastics. Cutting, welding and shaping by pressing were all exemplified, the last by totally enclosed hydraulic presses. The use of the substance as a material of construction was shown in various chemical engineering plant items, such as PVC-lined acid pumps and fans for handling corrosive gases and vapours built entirely of the material, one fan, a good example of design in this substance, handling 3,500 cu. m. per hour.

The development of standardised joint fittings for use with PVC in the form of pipes was illustrated by compression joint fittings of cast iron suitable for easy assembly and dismantling.

This section of the exhibition included examples of synthetic materials and of modern machine tools. Tungsten carbide in the form of tool tips, drawing dies and press tools was shown, together with performance figures compared with older materials; and a forging machine, electrically heated and hydraulically operated for the fabrication of forged bolts and studs used, for example, in the attachment of ball mill linings to the shell.

Throughout the exhibition, the idea that techniques and technologies are not static was brought out by illustrating not only the present-day methods and plant, but by showing comparisons with techniques and technologies of the past.

Fish Meal Plants

ADOPTION of portable cheaper fish meal plants, capable of following the fleets around the coast, is to be commended to the Government by the Highlands and Islands Advisory Committee as an alternative to the permanent plants earlier proposed. The committee has in mind plants of the type which have been used with success in Canada.

Meantime there has been a proposal from private interests in Ross-shire for the erection of a fish meal and oil plant at Alcaig on the Black Isle. The plan is to use a 100 ft. by 100 ft. factory with additional storage space for a minimum of 1,000 tons of meal and 100 gallons of oil. The County Planning Committee has approved the erection of the factory and while not opposed to the site — which the sponsors regard as most suitable — have suggested that alternatives such as Stornoway, Kyle, Gairloch and Ardgay might be considered. These moves are of particular interest in view of the present acute shortage of fish meal, and its value as a feedstuff ingredient.

Applications Sought

THE Board of Trade have given notice that they are considering applications for the addition to the Free List, under the Import Duties Act of 1932, of bitumen in hot liquid form and basic slag, whether ground or not. These materials are at present liable, under the Act, to the general *ad valorem* duty of 10 per cent. Any representations which interested parties may wish to make in regard to either application should be addressed to the Board of Trade, Industries and Manufactures Department, Division 1, Horse Guards Avenue, Whitehall, London, S.W.1, not later than 3 October 1953.

New Chemical Plant Exhibited

But Electricians' Strike a Threat to Business

SECRETS, closely kept until the day, were revealed at the opening of the Engineering Exhibition at Olympia on Thursday, 3 September. Many of the new developments had been rumoured for some months, others were almost unheralded.

One of the most interesting of these was a steam jacketed mixing pan made by Cannon (CP) Ltd., which uses the low pressure steam already raised for heating the pan to drive a three-cylinder radial steam engine mounted on the cover.

In addition to the economies of installation and maintenance, the new development is said to give several technical advantages. The steam drive gives widely variable speeds from 1 rpm; the unit is flame-proof and unaffected by chemical fumes; and it works normally under any climatic conditions. The engine has a big reserve of power, and will virtually never wear out.

F. W. Berk & Co., Ltd., were showing a new development in spray-drying equipment, the Ring-Jet spray drier. In the atomiser, a low-speed disc with hollow shaft feed is combined with a low-pressure nozzle. The liquor is first broken up by the disc into coarse drops, which are then converted into fine spray by an annular air nozzle round the edge of the disc, and the spray spreads out in a flat cone which is easily penetrated by the drying air. By this means, a spray of easily controlled fineness is produced at low-power consumption and without complicated high-speed or high-pressure equipment.

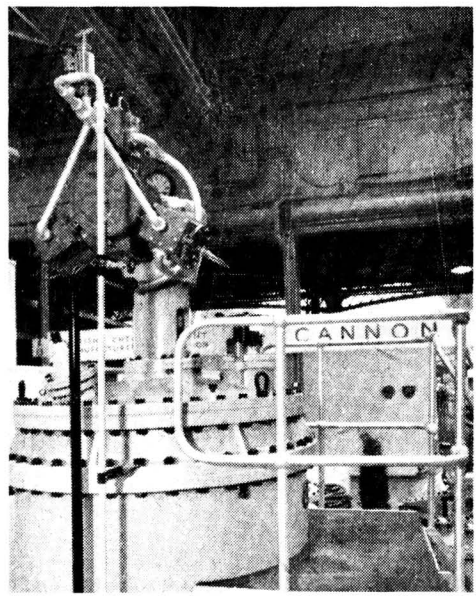
The dried product passes straight down into an axial flow powder collector, which is designed as a multiple cyclone with a number of small tubes between two tube plates. Each cyclone tube has a side outlet for the spent air between an axial top inlet and the bottom outlet for dried product.

The top inlet of the powder collector is flush with the bottom of the drying chamber, while the atomiser and distributor are flush with the roof. Thus there are no lodging places for deposits of powder, and the danger of superheating is eliminated.

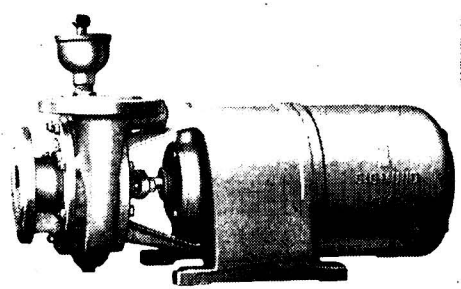
On the stand of the A.P.V. Co., Ltd., was a four-inch version of the A.P.V.-West distillation plate. A 40-ft. column is to be constructed with these plates at 12-in. intervals, for the distillation of ammonia.

Two new Sigmund Pumps which have been promised were on show for the first time. The 'SR' pump is of the integral type with single shaft, and the self-contained construction eliminates the need for baseplates, couplings, belts or pulleys. The pump operates smoothly in any position, and the

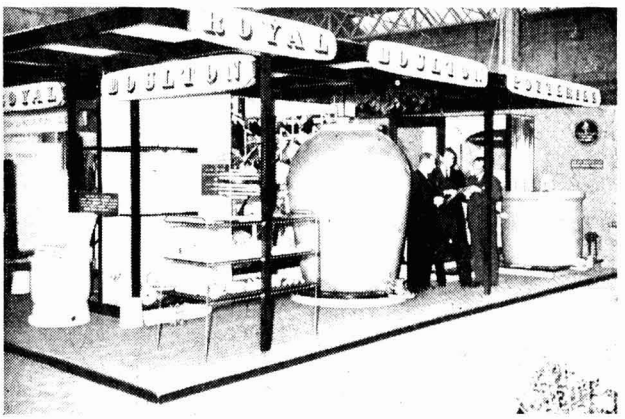
[concluded on p. 542



A view of the steam-driven mixing vessel on the stand of Cannon (CP) Ltd.

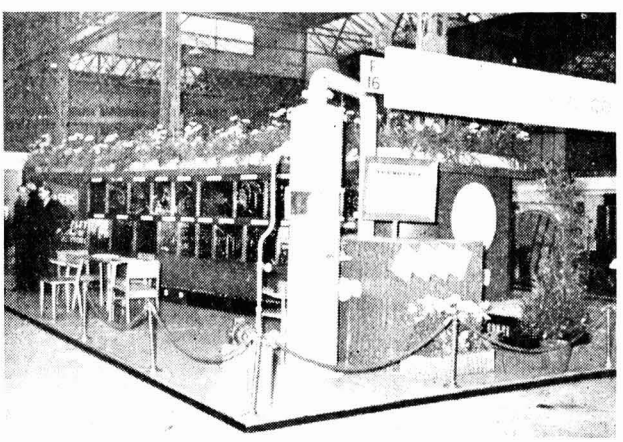


The Sigmund 'SR' stator-rotor pump

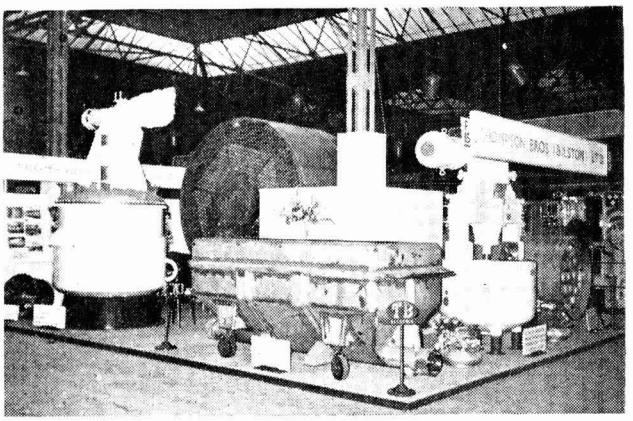


Examples of large stoneware vessels are to be seen on the attractive stand of Doulton & Co. Ltd.

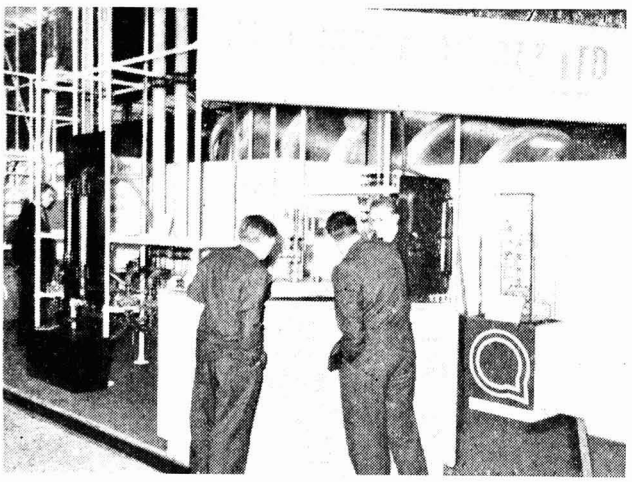
F. W. Berk & Co. Ltd. are exhibiting a pneumatic ring dryer (foreground) and the new ring jet spray drier



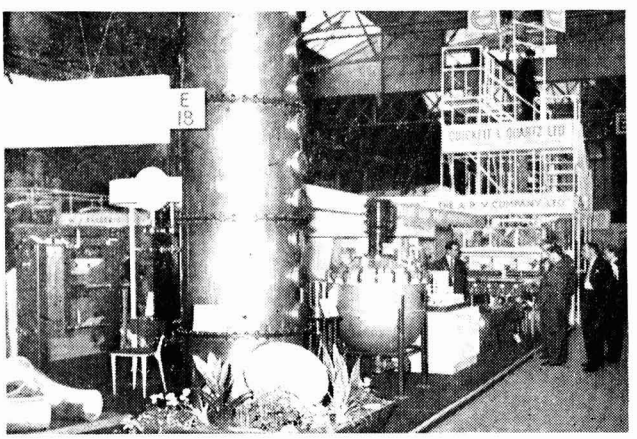
The major part of the stand of W. J. Fraser & Co. Ltd. is taken up with a cinema. In the foreground is an example of a Shell Turbogrid



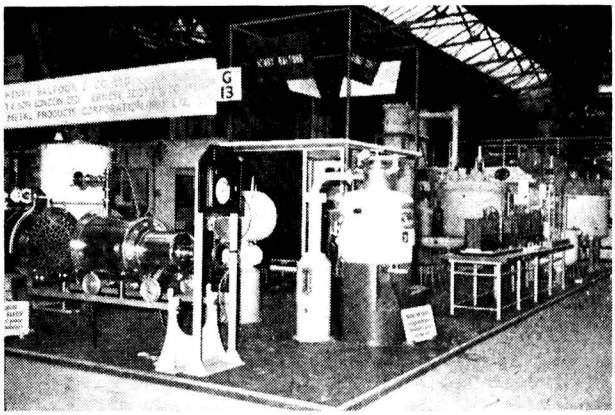
On the stand of Thompson Bros. (Bilston) Ltd., a hopper-bottomed stainless steel powder wagon is visible in the foreground, and behind it a 10 ft. 7 in. diameter calandria



An interested group studies a piece of apparatus exhibited by Quickfit & Quartz Ltd.



Part of a high-efficiency distillation tower, and a reaction vessel, on the stand of the A.P.V. Co. Ltd.



A forced-circulation heater and a vacuum drying stove exhibited by George Scott & Son (London) Ltd., in association with Henry Balfour & Co. Ltd. and Enamelled Metal Products Corporation (1933) Ltd.

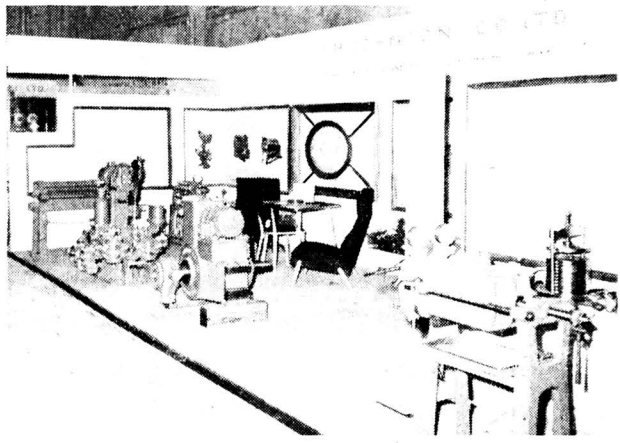
complete stator unit may be replaced with ease in the event of breakdown.

The other model is a vertical two-stage centrifugal pump of robust construction, intended primarily for marine work.

The Scott-Reitz laboratory angle disintegrator is capable of handling wet, moist or dry materials without clogging, and gives continuous separation of disintegrator-resistant material from the primary product. It has a 360° screen, and ranges in power consumption from ½ to 400 h.p. This was on the stand of George Scott & Son (London) Ltd., who were also exhibiting, among others, drying plant such as was used in the drying of essential foodstuffs for the Everest expedition.

The electricians' strike, of course, seriously affected the exhibition: for the first two or three days there were few working models, and as evening approached the gloom deepened over the centre of the hall. Many unorthodox sources of power were introduced, and by the fourth day most of the exhibits were complete. Arrangements had been made for a third of the electric load to be taken by a 1,000 kW gas turbine on the stand of Rushton & Hornsby Ltd., but although the generator is running, many of the exhibitors are not connected to the mains and cannot profit from it.

At the time of going to press it is too early to make any estimate of the commercial success of the exhibition, since orders are generally placed in the last few days, but attendance so far is above that at the previous exhibition, official parties from the engineering societies and institutions, and groups of buyers from all the principal foreign countries, arrive each day. How much damage the strike has done to British engineering it is impossible to determine, but exhibitors on the whole seem pleased with the interest shown by visitors.



Some examples of the variety of filters manufactured by S. H. Johnson & Co. Ltd.

The 1953 Cambridge Summer School in Physical Chemistry

by J. V. Westwood, M.Sc., F.R.I.C.

TO a professional man a visit to Cambridge inevitably brings back memories of undergraduate days, with their high hopes and ideals and freedom from the cares and responsibilities of later life. This feeling is heightened if one attends a summer school there, listens to the dons lecturing and lives, albeit temporarily, in one of the colleges.

The Summer School in Physical Chemistry at Cambridge is a triennial affair held in the Department of Physical Chemistry under the *aegis* of Professor R. G. W. Norrish. This year it was held from 15-22 August inclusive and it was styled 'The Physical Chemistry of Reactions in Solution'. It was a memorable and instructive experience to attend, and one felt that it was well worth while.

The membership of the course numbered some 92 people, of whom only two were ladies. Forty-one members were housed in Corpus Christi College, and 46 in Pembroke College. The rest attended on a non-residential basis.

Meals were served in the respective halls, on the famous oak tables with the dons of yesteryear looking down on the scene from their gilded picture frames.

A Happy Blend

A large cross-section of chemical research was represented here. Research chemists from I.C.I., Courtaulds and Shell, from the M.o.S., Distillers and A.E.R.E. were housed with members of the Universities of London, St. Andrews, Manchester, Dublin and Leicester and the Polytechnics of London. In addition, there were members from overseas, including two from Shell of Amsterdam, the Universities of Utrecht and Berne and an American from the Dow Chemical Co., who was combining the course with a business trip and a sightseeing tour.

The inaugural lecture was delivered at 8.30 p.m. by Professor Norrish, who gave an anecdotal account of the development of the Physical Chemistry Department, starting from the Old School founded by Stephen Perse in 1615 in Free School Lane to the present extensive buildings stretching along Pembroke Street. The old oak beams of the Perse Room had survived from the early times. Chemistry, however, was regarded by many, and until comparatively recently, with some suspicion, and allied to the powers of evil. Its experiments were regarded as noxious and dangerous, which they often were. With the Industrial Revolution and the great resurgence of scientific knowledge, it had come into its own. In many ways Cambridge represented the spear-head of that increasing knowledge.

Full Programme

The course consisted of lectures only, but the programme was a very full one and began in earnest on Monday morning. There were three lectures a day from Monday to Thursday at 9.15 a.m., 11.15 a.m. and at 5 p.m., each of an hour's duration followed by about half an hour's discussion, with a break for coffee at 10.45 a.m. On Friday and Saturday lectures were held only in the morning.

Professor Norrish on Monday discussed the photochemical aspects of reaction kinetics. After dealing with the primary processes involved in the absorption of light, examples were given of pre-dissociation, quenching of fluorescence and photosensitisation which had been studied at Cambridge. The different mechanisms involved with aldehydes and ketones in gaseous and solvent phases, and possible free radical mechanisms for the decompositions of amines and peroxides, were critically discussed. Some striking practical demonstrations were given of chemiluminescence by Siloxane and $KMnO_4$, a uranine dye with ozone, and particularly by orthoaminophthalic *cyclic* hydrazide with hydrogen peroxide. Also some fluorescent indicators such as β naphthol and quinine sulphate, which give startling colour changes, enabled some titrations to be carried out in the dark, and brought acclamations from the audience.

At a later lecture on Saturday morning, Professor Norrish dealt with polymerisation reactions involving vinyl compounds. After discussing the parallel between swelling properties and cross-linking, the nature of initiation was considered and appropriate rate equations involving initiation, transfer, propagation and termination processes were developed. The problem of evaluating these quantities was a difficult one. Polymerisation at high pressures showed peculiar effects, but in general the termination processes tended to be replaced by transfer processes which prevented the aggregates from becoming so large.

Purely Physical Side

Dr. E. A. Moelwyn-Hughes delivered three lectures, on Monday, Tuesday and Wednesday respectively, which dealt with the purely physical side of reaction kinetics. In the first lecture he described the equilibrium properties of solutions, particularly non-electrolytes of appreciable concentration. The most satisfactory treatment was that based on von Laar's work. This gave a fairly satisfactory explanation of vapour pressure curves for two component systems where the solute and solvent molecules were of comparable size. Hildebrand had dealt with the more complicated case of unequal sizes and had shown that the interaction energy depends more on the volume fraction than the molar fraction and Scatchard had later shown, on the basis of cluster theory, that with little interaction between solute and solvent, as shown by many high molecular weight compounds, the solution approaches ideality.

The second lecture was devoted to development of rate equations for bimolecular reactions between molecules from the classical and the activated complex standpoints. Eyring's rate equation was in fact very similar to one advanced by Herzfeld as early as 1919. Modern developments, however, were concerned with the nature of the electrical forces between molecules or ions and coulombic forces must be allowed for when the latter are encountered. With molecules alone, dispersion and repulsive forces must be calculated and Mie's formula was still the most convenient for this. Using Sutherland's treatment it was possible to evaluate the constants and hence to derive a potential energy equation similar in form to the Morse equation and from this the activation energy could be evaluated.

In the last lecture the effect of solvent was discussed. The effects of dielectric constant and viscosity on rate were outlined and the connection between the available square terms and latent heat. The differences in rate in gas and liquid phases could be ascribed to interaction between solvent and reactant or product. In some cases, however, reaction rates in water could be interpreted in terms of the steric hindrance effect of water, as in the case of alkyl halides.

The kinetics of electrochemical processes were dealt with by Dr. J. N. Agar in two lectures, delivered on Monday and on Thursday. The diffusion, migration and convection effects were dealt with in the first lecture, and the effects on the current flow clearly shown. Convection effects were difficult to deal with, but the problem could be dealt with by dimensional analysis and followed a similar course to that of the convection of heat. Information on the nature of the electrode double-layer potential had been obtained from studies of electrocapillary curves or capacity determinations using a CR tube. The overpotential of hydrogen was dealt with in the second lecture in some detail. The work of Tafel, and Bowden and Rideal was reviewed and Gurney's theory critically considered. It seemed probable that the primary process was the adsorption of an H_3O^+ ion on the surface of the metal and certainly in the case of Hg this was the rate controlling process.

Charge-transfer Reactions

Charge-transfer reactions were dealt with by Professor F. S. Dainton on Thursday. Reactions involving the spontaneous transfer type were illustrated by the Fenton reaction. It was possible to calculate the activation energy from potential energy curves and a knowledge of ionisation potentials for metal ions in reactions involving Fe^{++} and Cr^{++}. In photochemical reactions involving Fe^{++} in aqueous solutions, there was evidence of H atom formation, as shown by polymerisation reactions using heavy water when deuterium was found in the polymer fragments.

On Friday he spoke on radiation chemistry. After describing the various particulate and non-particulate radiations used, and their modes of attack, it became apparent that the primary chemical process involved the liberation of electrons. In the case of water ions and free radicals were produced

and this was supported by the evidence of the mass spectrometer. Free radical reactions could subsequently occur with ions or organic solutes and many of these had been studied. Unlike photochemical processes, where quantum yields were easily calculable, a different basis was necessary for radiation studies, and the radiation yield, based on incipient energy and amount of chemical reaction, was employed. Studies of hydrogen peroxide decomposition by photochemical and radiation methods showed that the rate equations were of identical form.

Organic Chemist's Approach

The approach of the organic chemist was made by Dr. W. A. Waters, who spoke on stereochemical considerations on Wednesday. Reactions involving carbonium ion formation were discussed and aplanar configuration for this ion considered essential. Reaction rates, however, depended as much on steric factors as on purely electronic considerations, as was illustrated by the very rapid rate of hydrolysis of substituted *tert*-butyl chloride. The participation of neighbouring groups in the reaction of bromopropionic acid by weak alkali indicated a complex type of double Walden inversion with the retention of optical activity and similar effects were observed in Ingold's work on the brominated ethers.

On Thursday, Dr. Waters dealt with oxidation reactions, which were difficult to classify. Oxidation of polymers and unsaturated compounds by oxygen had given much insight into the process of autoxidation where mesomeric radicals were supposed to occur and involved a chain sequence. Such types of reaction occurred, too, in biological systems. Oxidation reactions by OH radicals indicated that chain processes could occur in the presence of Fe^{++} and oxidation by other inorganic agents, such as CrO_3, involved similar free radical mechanisms.

A completely different approach was that of Professor F. J. W. Roughton who spoke on Wednesday on high-speed reactions. He illustrated the techniques developed by himself and his co-workers for such determinations and indicated the optical, thermal, chemical and electrochemical devices for studying reactions with half-change periods down to 0.005 sec., using very high flow rates. Stopped flow methods had also been developed and gave good agreement with the former methods for the calculation of velocity coefficients. The carbonate-CO_2 system had been fully studied and had given very valuable information on biological processes, particularly the enzyme processes related to respiration and the elimination of CO_2.

The oxidation and corrosion of metals was dealt with by Dr. U. R. Evans on Tuesday morning and provided a complete contrast to many of the previous lectures. The oxidation of metals in air involving film formation was contrasted with that in aqueous solutions. Peculiar effects arising from differential aeration, shielding and vertical pitting in Zn rods, were shown to have an electrochemical basis. Some interesting contour diagrams showing equipotential current lines again illustrated the essential electrochemical nature of corrosion. Some models were shown of corrosion by drops of electrolyte solutions on Zn and Fe surfaces.

On Tuesday, Dr. P. G. Ashmore dealt with catalysed reactions in solution. Ionic, non-chain processes were illustrated by the general acid-base catalysis. Modern trends involved the calculation of activation energy values for such reactions from potential energy curves. Catalysis involving chain reactions showed that a 0.5 power of catalyst concentration governed the rate equation. From rates of reaction and initiation, as determined by inhibitors, it was possible to calculate the chain length and this was illustrated by the oxidation of sulphite, catalysed by Cu^{++}.

Isotopes Used

The use of isotopes for studying reactions was described by Dr. C. Kemball on Friday morning. Dealing with radioactive isotopes first, the obvious method was the Geiger counter which was extremely sensitive. However, the range of suitable half-life periods was restricted by considerations of safety and of disposal. With non-radioactive isotopes, density measurements using a magnetic hydrometer or mass spectrometer measurements enabled the mechanisms of reactions to be deduced, as illustrated by the hydrolysis of esters using ^{18}O, the Fischer-Indole reaction using ^{15}N and exchange reactions between branched chain hydrocarbons and H_2SO_4. In the latter, using deuterium, exchange occurs rapidly from the tertiary position, if present.

Dr. P. George dealt with enzyme reactions on Saturday morning. After a brief review of the chief characteristics of such reactions, the Michaelis-Menten and the Briggs-Haldane theories were examined, and the former shown to be a special case of the latter. The work of Emil and Smith on carboxypeptidase indicated that the essential groups were a COOH group, a ring structure and a peptide. The binding of the ring to the enzyme surface was the rate determining factor. It was necessary also for the other groups to reach the enzyme surface, probably by some stepwise process. However, with some enzymes, such as urease, the usual theories did not apply and a more complicated mechanism had now been advanced by Laidler and Hoar.

The discussions which followed the lectures were very full and indicated that the subject matter was such as to touch on the work of members at some point. As further proof of the interest aroused, little groups of people foregathered in each other's rooms, at various times, where over appropriate refreshment and a few pipes the information of the day was dissected afresh. Such meetings were useful for airing one's own problems.

Laboratory Visits

Visits to the laboratories were organised on Monday, Tuesday and Wednesday afternoons, and members had an opportunity to see the research projects in hand and to chat with the actual research workers. These included flash photolysis, high pressure polymerisation, low temperature flames, gas chromatography and many others. Members were invited to return later if particularly interested in some of these projects.

Social functions were not, of course, neglected. A reception was held in the Guildhall on Tuesday evening. Members were honoured by the attendance of Professors Sir William Bragg, J. R. Partington, A. R. Todd and the lecturers of the course and their ladies. The evening was informal and dancing commenced at a later stage.

A dinner was held in the hall of Pembroke College on Friday evening. The meal was one to remember. Starting with hors d'oeuvre and a Niersteiner Domtal white wine and finishing with Scotch woodcock and coffee and liqueurs, it was a great success. Sir Hugh S. Taylor was present and delivered a few words of welcome to all. He reminded us of the tough days ahead and indicated that the future lay very much in the hands of the scientist and research worker. Later, at the invitation of the secretary, members retired in a body to the buttery where a further quantity of refreshment was available. In addition, members were invited to the homes of Professor Norrish and Dr. Sugden on other evenings during the week.

Finally a word of appreciation must be extended to Dr. A. J. Harding and Dr. P. G. Ashmore who, as secretary and treasurer, must have had an arduous task preparing and organising this course. Nevertheless, they were at all times ready to give help and assistance to those requiring it.

Science Teachers Wanted

THE shortage of science teachers in the schools is 'so serious that it is quite futile to talk of the development of the scientific strength of this country, or to plan institutes of technology or anything else of this kind, until it is remedied.'

Mr. Robert Birley, head master of Eton, asserted this at one of the meetings of the British Association for the Advancement of Science at Liverpool last week. He was speaking as president of the Educaton Section, on 'Greek or Chemistry or Both?'

He said the country as a whole was apparently unable to appreciate the fact that there was a disastrous shortage of able teachers of science. The reasons for the shortage were no doubt largely economic and it would be blindly foolish of the nation not to ensure that the salaries of masters in the grammar schools were raised to a figure high enough to attract able scientists into the teaching profession.

Another cause was the education provided for future scientists; it had been too technical and too narrow.

Dagenham Works Closing

W. J. Fraser & Company Ltd., chemical engineers, are closing their Dagenham factory before the end of the year and in future will concentrate production at their Monk Bretton factory, Yorkshire. It is understood that most of the Dagenham staff and workpeople will be given the opportunity of transferring to Monk Bretton.

Resinous Adhesives for Bookbinding

Some PVA Formulations

FORMULAE of a number of resinous adhesives suitable for bookbinding purposes, together with instructions for their preparation, are given in a report issued jointly by the US Government Printing Office and the Printing Industry of America, Inc.,* which is one of a series of pamphlets making available the results of the co-operative research and operations programme now being carried out by these two bodies.

This investigation originated as a result of wartime restrictions on the quantities of animal glue available for use in the production of adhesives in the Government Printing Office. Various synthetic resins were studied to determine whether any of them might prove satisfactory alternatives to the animal glue compositions normally employed in the bindery. This work led to the development of several resinous adhesive formulas based on a water emulsion of polyvinyl acetate.

Like Liquid Glue

As manufactured commercially, this compound is a heavy milky white emulsion similar in consistency to liquid glue. It exhibits excellent adhesive qualities, drying out into a hard but brittle film. Because of its brittle nature when dry, it was unsuitable in its manufactured form for the flexible glue compounds used in bookbinding operations.

Experiments showed that the addition of a plasticiser to the PVA emulsion, in an amount equivalent to 8 per cent of the total weight of emulsion, produced dry resinous films which were permanently flexible and ideally suitable for padding and notebook work. In the course of this research it was observed that the addition of varying amounts of a dibutyl phthalate plasticiser to the emulsion increased the viscosity or thickened the padding compound in proportion to the quantity added. When 10 per cent of this plasticiser was added, the increase in viscosity was so pronounced that the compound became too thick for easy application. Preliminary tests made with a padding compound of low viscosity showed that a thin compound of uniform viscosity could be more readily applied. Small amounts of water were therefore added to the plasticised PVA emulsion in order to bring the adhesive to the optimum condition for application. A viscosity range lying between 5 and 7 poises was found to be the best for padding work.

Other Experiments

Experiments were also carried out with other plasticisers, but only a few compounds were found which had suitable properties and could be produced at a reasonable cost. Those which best met the requirements were dibutyl phthalate, glycerol triacetate ('triacetin') and 2-methyl-2,4-pentanediol ('hexylene glycol'). The incorporation of small amounts of any of these chemicals into PVA emulsion produces a very good bookbinding adhesive, which remains flexible when the adhesive film dries out.

The advantages of polyvinyl acetate emulsion over other resinous adhesives are that it is readily diluted with water as required, is easy to apply, and is safe to use since it contains no inflammable solvents. It is easily washed out of brushes and containers with water while still moist, but once set it becomes water-resistant.

Preservatives Not Needed

The ordinary bindery glues and pastes are not satisfactory for adhering pyroxylin treated fabrics in some binding operations, since in many instances binders or cases glued with these adhesives pull loose or fail to remain glued after they have dried. A white resinous adhesive (95 per cent PVA, 5 per cent plasticiser) is excellent for pyroxylin treated fabrics. There is no need to use preservatives with this adhesive, since it does not deteriorate on ageing and is not subject to moulds or fungus growths. However, freezing destroys the emulsion and precautions must therefore be taken to avoid exposing this adhesive to freezing temperatures before use.

Formula No. B27 produces an adhesive which will firmly fasten paper, leather or such fabrics as pyroxylin treated, starch-filled, rubberised or plain muslin cloths to cellulose acetate surfaces. Its composition is as shown overleaf:

* Government Printing Office (US) PIA Joint Research Bulletin. Bindery Series No. 4 (PB 107619).

PVA emulsion	78.0 per cent
Dibutyl phthalate	6.3
γ-Valerolactone	7.8
Water	7.9

This adhesive has been used in the production of transparent cellulose acetate envelopes for the protection of maps and photographs in exhibitions. Either hexylene glycol or triacetin may be substituted for dibutyl phthalate as the plasticiser.

Formula No. B-48, comprising 90 per cent PVA emulsion and 10 per cent γ-valerolactone, is also intended for use on cellulose acetate, where the work is of such a nature that an adhesive with less plasticiser offering a quicker drying rate is desirable. It has been used extensively in the production of transparent envelopes made of two sheets of cellulose acetate, bound together on three sides with vellum and hinged on the back. The quick drying nature of the formula overcomes the penetration of adhesive through the vellum of the open hinged end and prevents the cloth surfaces of the two parts of the hinge from sticking together.

Formula No. B-31 covers a special adhesive employed in the production of snap-out forms and comprise the following ingredients:—

PVA emulsion	...	32.0 per cent
iso-Propyl alcohol	...	39.0 ,,
Plasticiser ...	...	4.0 ,,
Water ...	...	25.0 ,,

Experiments indicated that an adhesive for snap-out forms must have good penetration into the carbon tissues, must possess enough adhesive power to hold the forms together while in use, and must remain flexible or in a semi-wet condition for a sufficient time to permit easy separation of the carbon sheets from the forms after typing. These requirements are met by an adhesive prepared according to the formula given above. The plasticiser is added to the emulsion, followed by the isopropyl alcohol and the water, with constant stirring. Dibutyl phthalate or hexalene glycol may be used as the plasticising agent.

A fast drying resinous adhesive for Brackett stripping has the following composition (Formula No. B-32):

PVA emulsion	...	89.0 per cent
Hexylene Glycol	...	7.0 ,,
*Iso*propyl alcohol	...	2.0 ,,
Water ...	...	2.0 ,,

This adhesive was developed for the purpose of adhering strips of pyroxylin impregnated fabric to pieces of board, the surfaces of which had been printed by the silk screen process. Pastes and hot glues failed to adhere to this printed surface, but the fast-drying resinous adhesive held securely and was successfully applied by means of a Brackett stripping machine. This adhesive compound also possesses good flexibility after drying and is well suited for hinges and similar applications.

This report is obtainable from the Technical Information and Documents Unit of DSIR.

Radio-active Waste Disposal

IN the course of the 1953 Sir Alfred Herbert paper to the Institution of Production Engineers at Oxford recently, Sir John Cockcroft, director of the atomic energy research station at Harwell, described industrial applications of radio-active materials. Foremost among the uses is the detection of hidden flaws in castings and weldings by the radiation, akin to X-rays, emitted by such materials as radio iridium and radio cobalt.

Research was now being directed, said Sir John, to the utilisation of radio-active waste material, the safe disposal of which is at present a major problem. Within two or three years it would be possible to prepare from waste sources radio caesium 100,000 times more active than a gram of radium. Such high intensity sources might make possible substantial fuel economies in certain industrial chemical processes.

Methyl Alcohol Unloaded Midstream

For the first time in St. Lawrence river shipping history, a tanker recently discharged a cargo to shore while out in midstream. The MV Otco New York unloaded more than 3,500 tons of methyl alcohol while lying 700 ft. offshore near Varennes, Quebec, through a hose line connection with the pipeline to the new $3,000,000 plant of St. Maurice Chemicals, Limited. This is also contributing to another 'first.' The chemical will be converted to formaldehyde and from that to pentærythritol for the first commercial shipment of that product in Canada. It is used in the manufacture of paints and varnishes.

Markets for Tanning Materials

Interim Report of Chemical Products Committee to OEEC

THE following Interim Report on Tanning Materials, presented to the Organisation for European Economic Co-operation by the Chemical Products Committee, is based on data provided by eight countries and Trieste.

An introduction states that as the countries concerned accounted for 87 per cent of the average production and 83 per cent of the average consumption of vegetable tannins for 1948 and 1949, and 80 per cent of the synthetic tannin production of all member-countries in 1950, it is felt that the figures given in this report are sufficiently representative to enable conclusions to be drawn from them.

Figures for the production of vegetable tanning extracts are available for only four countries; French and Italian production is of capital importance owing to the use of home-produced tanniferous substances (chestnut and oak). There has been a considerable increase in production which, in 1952, exceeded the average figures for 1948-1949 by 11 per cent in France and 60 per cent in Italy.

TABLE 1

In metric tons of pure tannin (shake method)

Production

	1948-49	1950	1951	1952
Germany ..	6,300*	5,973	6,728	5,760
Austria ..	2,850	1,250	1,590	830
France ..	24,479	22,700	25,500	26,100
Italy	25,920	31,552	33,798	41,225

* 1949.

Imports (see Table 2) fell steeply in 1952 as compared with 1950 and 1951. Contrary to expectations, the decline in imports from member-countries and their overseas territories was greater (46 per cent) than the fall in imports from non-member-countries (25 per cent). In some cases tannin imports from other countries even increased, although tannins were available in member-countries; for example, in certain member-countries chestnut imports from Yugoslavia, facilitated by substantial bonuses to exporters, doubled between 1951 and 1952.

Exports from member-countries increased between 1950 and 1952 by about 30 per cent (see Table 3). This increase is, however, due solely to the extraordinary expansion of exports to the United States; exports to other destinations fell very considerably, except in the case of the overseas territories

TABLE 2

In metric tons of pure tannin (shake method)

Source of Imports

	1950	1951	1952
United States	16	100	49
Other Western Hemisphere countries	23,942	37,206	16,258
Other non-member countries	46,209	40,617	36,019
Member countries and their overseas territories	21,200	26,446	11,162
Overseas territories of reporting countries ..	2,256	2,586	1,605
	93,623	106,955	65,093

of member-countries, which are not a large item. Owing to the temporary nature of part of the exports to the United States, which doubtless rose primarily as a result of stockpiling, this development is bound to arouse some concern in producing countries. It should be emphasised that since the beginning of 1953 French and Italian exports to the United States have practically stopped, whereas in 1952 they amounted to 4,500 tons and 17,600 tons respectively.

TABLE 3

In metric tons of pure tannin (shake method)

Destination of Exports

	1950	1951	1952
United States	1,164	5,991	22,103
Other Western Hemisphere countries	1,975	2,331	1,919
Others	4,503	5,620.5	2,320
Member countries and their overseas territories	18,111	16,810.5	7,457
Overseas territories of reporting country ..	610	752	857
	26,363	31,505	34,656

Table 4 shows the quantities available for countries' domestic consumption on the basis of the figures in Table 3. In general, it may be said that the position was fairly stable between 1948 and 1950. An increase in the quantities available in 1951 was followed by a decrease in 1952 and this trend

TABLE 4

In metric tons of pure tannin (shake method)

Quantities Available for Domestic Consumption

	1948-49	1950	1951	1952
Germany ..	22,928*	27,037	25,453	18,933
Austria ..	5,919	1,983	4,712	2,100
France ..	22,593	23,508	25,997	25,469
Italy	20,929	22,363	19,004	21,582
Netherlands ..	6,711	6,852	7,370	3,921
Portugal ..	2,345	2,509	3,251	4,189
United Kingdom	40,601	44,483	57,606	29,171
	122,026	128,735	143,393	105,365

* 1949.

is not surprising as it was observed in many other sectors.

The following table shows the trend of the position in the synthetic tanning sector for the countries under review taken together:

TABLE 5
Metric tons (filter method)

	Production	Imports	Exports	Available for domestic consumption
1950 ..	10,967	529	552	10,944
1951 ..	12,880	623	1,619	11,884
1952 ..	11,400	587	1,781	10,206

In general, it may be seen that, despite economic fluctuations in the last few years, there has been a steady increase in the proportion of synthetic tannins consumed by member-countries.

The position changed considerably between 1951 and 1952, which explains the downward trend in 1952 as compared with 1951. Generally speaking, the upward trend observed between 1949 and 1950 did nevertheless continue. A comparison between the figures for 1950 and the average production figures for 1951 and 1952 confirms this fact.

Production in 1950: 10,967 tons.

Average production for 1951-52: 12,140 tons.

A comparison between the production figures for integral synthetic and substitute tannins only makes this particularly clear:

Production of integral synthetic and substitute tannins in 1950: 7,805 tons.

Average production in 1951-52: 9,375 tons

In conclusion, it may be seen that the appeal made for an increase in the production of vegetable tannins based on chestnut and oak has been followed by France and Italy, the producing countries; but this development is not certain to be maintained if the present trend in domestic and foreign markets continues.

Apart from the slight general slump which is at present being felt in many countries, the preference shown on domestic markets for tannins imported from non-member countries may well jeopardise European production. It would, therefore, be desirable to draw the attention of consumer-countries once again to this question, particularly as there is a possibility of increasing trade between member-countries, which in this sector has been almost entirely liberalised.

The problem of finding markets outside member-countries is particularly urgent. In view of the present commercial relations with the Eastern countries which formerly purchased large quantities of tanning extracts from member-countries, it is increasingly difficult to dispose of production. Pending an improvement in the general position, no effort should be spared to find alternative outlets for at least some of these markets.

A Canadian Occasion

Cone of Textile Yarn Creates History

A FOUR-POUND cone of finely textured acetate yarn, rich in historic significance, presented to Premier E. C. Manning in a brief ceremony at the new $70,000,000 plant of the Canadian Chemical Company, near Edmonton, is the first cone of commercial man-made textile yarn produced in western North America.

Mr. Robinson Ord, vice-president and general manager of the company, declared that the Canadian textile industry consumed more acetate filament yarn than the combined total of all other man-made filaments. Last year the amount of acetate used in Canada was more than double the quantity of all the new and other so-called 'miracle' fibres combined. Since 1945, the amount of acetate used by Canadian weavers has increased two and one-half times.

Mr. Ord disclosed that the company has received delivery of 106 tank cars which will be used exclusively to carry liquid chemicals between the plant and points across Canada. It will also require more than 1,000 box-cars each year to move the packaged material to be produced.

Premier Manning emphasised that the acetate filament yarn and staple fibre being produced in the Canadian Chemical Company's plant is created by combining cellulose and acetic acid. The cellulose supply will come from the operations of a sister company, Columbia Cellulose Company, Prince Rupert, BC. The acetic acid will be manufactured in the chemical unit which derives its raw materials—butane and propane — from the great Alberta oil fields. 'Here we have the wedding of two important natural resources of Canada's most westerly provinces, the forests of British Columbia and the petroleum of Alberta,' he added. 'Here we have a textile fibre that is 100 per cent Canadian.'

I.G. Farben Successor

Satisfactory Results Revealed in First Annual Accounts

ONE of the three large I.G. Farben-industrie successors, Farbwerke Hoechst AG vormals Meister Lucius & Brüning, has now published its first annual accounts. This company, with its large interests in the dyestuffs and pharmaceuticals field, has been hit severely by the recession last year which lowered production in some departments to less than half the previous year's level, but nevertheless pays a dividend of four per cent out of a net profit of DM.12,120,000. Wages and salaries absorbed DM.90,020,000 out of the trading surplus of DM.156,640,000, depreciation DM.32,770,000, and taxation and social insurance contributions DM.26,240,000. These figures compare with total sales of DM.736,100,000, to which exports contributed 21 per cent. In the first half of the current year sales rose to DM.424,400,000, of which 25 per cent were shipped abroad.

Fixed assets, which the opening balance-sheet at the beginning of 1952 showed at DM.327,310,000, in the course of last year rose to DM.354,410,000, and the rate of new plant investment is to be kept at an average of DM.50,000,000 in the next three years. Plant modernisation is described as one of the most urgent tasks facing this as well as other West German chemical enterprises; little was done before and during the war, according to the management board, to keep plant at Hoechst up to date because I. G. Farbenindustrie had concentrated its investment expenditure since 1935 on works in Central and Eastern Germany. Research expenditure, which other German chemical firms intend to step up, has reached 'a satisfactory level' at Hoechst and is to be maintained at the present rate.

Higher Dividend Forecast

In assessing the financial results of Farbwerke Hoechst in its first year of independent operations it must be borne in mind that profits accrued to subsidiaries do not yet appear in the accounts. Holdings in subsidiaries account for over one-tenth of the fixed assets shown in the balance-sheets, and the profit is likely to be swollen by contributions from subsidiaries to a corresponding extent in future. A higher dividend is already foreshadowed for 1953. The high level of new investments does not appear to cause any financial difficulties; bills of exchange, banking accounts, etc., increased from DM.48,320,000 to DM.56,660,000 last year while stocks and debtors remained unchanged.

Fertiliser Expansion

Higher prices affected sales of chemical fertilisers in West Germany this year, but total sales of nitrogen compounds in the fertiliser year ended in May show a further substantial expansion—from 530,000 metric tons (as nitrogen) in 1951/52 to 621,000 tons in 1952/53. Sales of nitrogen fertilisers in April were the highest on record, and there has been only a slight seasonal decline since. Sales of phosphate fertilisers, on the other hand, have been disappointing. In the year ended in May they amounted to 402,400 metric tons (as P_2O_5), compared with 424,600 tons in 1951/52; the decline is entirely due to the disappointing course of demand during winter and early spring, especially for basic slag. Sales of potash fertiliser salts show an increase from 1,184,000 metric tons (as K_2O) in 1951/52 to 1,297,000 tons in the year ended in May last, due to larger sales before January; this spring demand for potash salts was disappointing, exports in particular suffering from increased competition. An intensification of competition is also reported by German phosphate fertiliser manufacturers.

Special efforts are being made by West German manufacturers of photographic films to increase their foreign sales since the wartime damage and dismantling losses have been made good and production capacity has reached, and in some products exceeded, the pre-war level. With the exception of film base, which is still being imported from Belgium, all raw materials are again freely available, and the domestic market can be covered entirely by German manufacturers. Exports to Western Europe are hampered by trade restrictions while local competitors challenge German firms in some other pre-war markets. Nevertheless, West German exports of photographic film, etc., are expected to reach DM.30,000,000 this year.

compared with the DM.24,000,000 last year.

The production of pearl catalysts made by Kali-Chemie AG at Nienburg under licence from Socony Vacuum Oil Co. of New York, referred to earlier (p. 279), now amounts to 6,500 tons a year, and will reach 10,000 tons when extensions now under way are completed at the end of this year. Pearl catalysts from Nienburg are to be supplied to a number of European refineries using the Socony TTC Airlift process or the Houdry cracking process, including two oil refineries at Heide and Bremen-Oslebshausen, cracking plants at Lingen and Gelsenkirchen, and several installations in France, Italy, Belgium, Portugal and one in Great Britain.

Among a number of East German factories transferred from direct control by the Soviet occupation authorities to the Soviet zone Government are several of the most important chemical works in the region, including the world-famous Leuna works which are now believed to employ between 24,000 and 25,000 workers, the chemical works based on the utilisation of lignite at Zeitz and Schwarzheide, the nitrogen plant at Piesteritz and the important Buna rubber factory at Schkopau which is reported to employ a labour force of 18,000. While the Soviet zone Government will in future be responsible for the day-to-day operation of these chemical works, the range and disposal of production is not likely to be greatly influenced by the transfer. Some of the plants, especially those concerned with the synthetic production of motor fuel and rubber, will continue to work chiefly for Russian and occupation needs.

New Glass Institute

AT a meeting recently organised by the Italian Ministry for Industry and Commerce in the premises of the Venetian Chamber of Commerce with the participation of the principal glass makers, the creation of a local experimental Glass Institute was discussed.

For the expenses of installation and the scientific and technical equipment, besides a first sum of 30,000,000 lire granted by the Ministry for Industry and Commerce, a positive assurance has been given by local organisations and representatives of the glass industry.

So far, 3,000,000 lire have been collected from Venetian industrialists as a voluntary contribution to the expenses of installation and it is generally believed that other Italian industrialists will contribute an additional sum of 7,000,000 lire. This figure will be added to the 30,000,000 lire already granted.

As the technicians forecast the necessity of larger sums for the scientific and technical equipment, it has been decided to employ for this purpose funds which will be collected during the first year by means of a compulsory levy on the sales of glass products in Italy. A further 30,000,000 lire will be collected in this manner.

Heriot-Watt College

THE prospectus of the Heriot-Watt College, Edinburgh, for 1953-4, includes a very full coverage of chemical industry interests. The courses starting on 13 October cover an associateship course in applied chemistry; inorganic chemistry; a laboratory course for applied chemistry; chemistry for engineers; a laboratory course for engineers; organic, physical and inorganic chemistry courses; mechanical engineering for chemical and mining students; fuels and their application; and technical German. Fourth year courses cover metallurgy; biochemistry; oil technology and fuel technology. Courses are also being arranged in metallurgy and assaying, and special training will be available for mining students in metallurgical chemistry and fuels. The College is recognised as a training centre by the Royal Institute of Chemistry and the Associateship of the College permits the holder to seek Associateship of the R.I.C. Special attention is being given to the training of students for industrial posts through completion of the applied chemistry scheme, while full facilities are provided in the curriculum for the B.Sc. degree in association with the University of Edinburgh.

Graphite in Scotland

The Highlands and Islands Advisory Committee of the Scottish Board for Industry has received a favourable report on the vein of graphite uncovered recently in Loch Lochy district of Lochaber and has submitted the report to the Scottish Home Department for consideration. Further veins have been uncovered in recent landslides.

Demineralisation of Salt Water

Findings of OEEC Working Party

IN many parts of the world the fresh water supply is a serious problem. This is the case both in countries where there is a serious shortage of water and in areas in which, owing to the increasing population and industrialisation, the drinking-water supply is endangered by changes in the quantity and in the composition of the water brought down by the rivers. In the technical literature on the subject, various methods for the demineralisation of all sorts of liquids have been described. Increased attention has been paid recently to the question of which of these methods is the most suitable one to be applied to brackish water and to seawater.

In 1952, under the auspices of the OEEC, a working party for the study of these demineralisation methods and the co-ordination of research in this field in the various countries was set up. The countries represented in this working group are Belgium, Denmark, England, France, Germany, the Netherlands and Sweden, and at the sessions of this group observers have been present on behalf of Australia, South Africa, the United States and the Rockefeller Foundation. The working party first set up a group of experts with the task of gathering data concerning the various processes which would enable the members to decide which would have the best chances of succeeding.

Principal Processes

The principal processes studied by this group of experts and included in their report to the working party were the following: high pressure distillation, vapour compression distillation, distillation with solar energy, separation by freezing out, ion-exchange, and electrodialysis.

It soon became clear that it would be difficult to find a universal basis for comparison, as any such basis carries with it the assumption of a number of premises which, although fully justified in some cases, may be quite unacceptable in others. This is due to the fact that the economic aspect of all these processes is influenced by factors which, in fact, vary from place to place. Among these factors are:

(a) The climate; the use of solar energy is only conceivable in countries having abundant sunshine.

(b) The availability of skilled labour; it seems undesirable to install a distilling or electrodialysing plant in places where no skilled labour is available.

(c) The availability and price of energy; the low temperature in winter in some parts of the United States, for example, may make it possible for fresh water for irrigation to be stored in large natural basins during the cold season in the form of ice which will melt in summer.

When back-pressure steam is available, for instance at power stations, it may even be possible to obtain normal distillation.

Vapour Pressure Distillation

Consequently only four of the six processes mentioned above need to be studied profoundly. The first process—vapour pressure distillation—is still in its infancy. This process can only be carried out on a technical scale in a non-corrosive construction material which must, moreover, be resistant to the high pressures required. For the time being only gold seems to be suitable.

The estimated cost of the fourth process, the separation by freezing out, is so high that, at least for general purposes, this method cannot be considered.

For the four remaining processes as exact an estimate as possible has been made of the cost per cu. metre of demineralised water and of the necessary investment in plants of two different capacities, viz., for 10 cu. m. and for 100 cu. m. per day. These calculations have been made for various desalting ranges, as in many cases the desalting range has a great influence on the ultimate cost price of the water. Naturally these calculations have been made starting with a number of fixed assumptions: wages per man, the depreciation term, the cost price of the electricity, fuel oil and raw water.

In the light of these figures the following conclusions can be drawn: for the desalting of water with 1,000 or 5,000 ppm. Cl the electrodialytic method seems to be the most economical. For the treatment of seawater the distillation and the electrodialytic method

are more or less competitive. The same applies to both large and small quantities.

The cost price of the distillation method is scarcely affected by the initial salt content. On the other hand the cost price of both electrodialysis and the ion-exchange systems is very much affected by it. For high salt contents (seawater), the cost of demineralisation by means of ion-exchange is prohibitive.

On the other hand, for low salt contents (below 300 ppm. Cl) this method can be cheaper than the electrodialytic one, as in the case of the preparation of boiler water from fresh water. For the preparation of boiler water from salt water or fresh water one could apply successively electrodialysis and ion exchange. Distillation by means of solar energy is costly as a result in consequence of the heavy investment which this method requires.

Difference Between Processes

There is still another difference between the processes treated here. Distillation and ion-exchange are processes applied on a technical or an industrial scale, so that the figures for these methods are based more or less on practice. The other figures, however, are based partly on estimates formed in the light of laboratory experiments or pilot plant work, and are thus somewhat less reliable.

This difference can best be seen by considering the possibilities of further research into the development of each of the four processes described. For the distillation and the ion-exchange method only marginal improvements may be expected. Electrodialysis, however, is a very 'young' process in which great improvements are conceivable. Distillation by means of solar energy occupies an intermediate position. For the most part the relative figures have been derived from the results obtained with various types of apparatus of a very low capacity (20 cu. m. per year). The extrapolation to higher capacities, however, is quite justifiable as for this process an all-round increase in costs in proportion to capacity is to be expected.

The working party, at its last meeting, came to the following conclusions:

1. It seems desirable to proceed with co-operative research in the field of each of the four processes above-mentioned, viz.: distillation by vapour compression (with special reference to descaling); distillation by solar energy; ion-exchange; and electrodialysis. Attention must be paid to the fact that for each of these processes research must extend both to the desalting of brackish water and the desalting of sea water.

2. Four separate working groups will be established with the task of finding the right basis for co-operation between the various countries in each of these four fields.

3. The establishment of such working groups must be initiated by the countries which have made most progress in their respective fields.

The following countries have been entrusted with this task: United Kingdom—distillation with vapour compression; France, after consultation with Germany—ion-exchange; France (Morocco)—distillation by solar energy; and Netherlands—electrodialysis.

The co-operative research groups thus constituted will try to work out agreements outlining the financial and material contribution of each party to the co-operative research programme, and defining the procedure for sharing the results or revenues. These agreements will have to allow for the possibility that other countries may eventually be admitted.

It is expected that the development of the processes described above will be accelerated by co-operation of this kind within the OEEC.

New Plant for Refineries

A PLATFORMER with a capacity of 250,000 tons a year is shortly to be erected at Lavera Refinery, owned by the Anglo-Iranian Oil Company's French associate, Societe Generale des Huiles de Petrole BP.

New plant is also being installed at three more of the Continental refineries owned by the Anglo-Iranian Oil Company and its associates. A catalytic cracking plant and a catalytic polymerisation unit, which will produce high-grade motor spirit, are being built at Antwerp Refinery, which is jointly owned by the Anglo-Iranian Oil Company and Petrofina. At BP Hamburg Refinery a new distillation unit, which will increase capacity to approximately 1,250,000 tons a year, is being installed, also a platformer. At the nearby Schindler Refinery the output of high quality lubricating oils will be increased by the introduction of a new furfural treating plant.

Sulphurous Raw Materials

Committee Report to OEEC on Position in 1952

IN order to be able to assess the progress made and to estimate the consequences of the shortage of sulphur, the report on the sulphurous raw materials position in 1952, made by the Chemical Products Committee of the Organisation for European Economic Co-operation, has been divided into two parts. It must be stressed that no valid comparison can be made between the percentages calculated in the two parts, since the basis of calculation is different. Turkey has not forwarded a reply either for the year 1949-50, or for the year 1952, and this country has accordingly been left out of consideration.

The Position in 1952

Production of sulphurous raw materials as a whole was 2 per cent higher in the second half of 1952 than in the first, the increase differing with the various materials:—

Native sulphur	+ 24.0 per cent	Sulphur as such:	+ 16 per cent
Recovered sulphur	+ 7.0 ,,		
Pyrites	— 0.2 ,,		
Blendes ..	+ 7.0 ,,		
Sulphur in all other forms	— 3.0 ,,	(of which production of anhydrite has decreased by 8 per cent, and production of spent oxide increased by 5 per cent.)	

The most noteworthy increase is in production of both sulphur and pyrites in Italy where overall output of sulphurous materials increased by 13 per cent in the second half of 1952 compared with production during the first six months of the year. The increase in recovery of sulphur in the United Kingdom (partly through the cracking of petrol) should also be noticed.

Consumption of sulphurous materials as a whole decreased by 14 per cent during the second half of the year, the decline in the consumption of sulphur as such (33 per cent) and of pyrites (12 per cent) being partly compensated by stable consumption of sulphur in the other forms.

A comparison of figures of consumption of sulphur as such during the two periods is partly invalidated by the seasonal nature of agricultural use. If the agricultural consumption figure is omitted, however, the decline is still 20 per cent and, in general, all end uses are equally affected. It should be noted that in certain countries the decline in sulphur consumption has been very great (Belgium 50 per cent, Italy—excluding agricultural consumption—56 per cent, Sweden 25 per cent).

The only noteworthy feature of the import figures is the considerable decrease in imports of sulphur as such, both from the United States and from other countries.

Total deliveries of sulphur as such in 1952 were approximately equal to allocations, but it should be noted that several countries did not receive part of their 1951 allocation until early in 1952. Although two member countries have renounced some of their last year's allocations, it may be assumed that part of the supplies allocated for 1952 were not delivered until the beginning of 1953.

Exports declined by over 7 per cent during the second half of the year but the percentage going to member countries (84 per cent) has remained almost identical. The decrease in exports of sulphur as such was about 45 per cent, while there was an increase of 7 per cent in exports of pyrites.

Sulphuric Acid

The sulphuric acid trend during 1952 is shown in the following table (in 1,000 tons of 100 per cent acid):

Production		Consumption	
1st half ..	4,311	1st half ..	4,344
2nd half ..	4,058	2nd half ..	3,977
Difference	6 per cent	Difference	— 8 per cent

It will be noted that the tendency for consumption to exceed production, notable throughout 1951, has now been reversed.

The following table shows the percentage of total consumption of sulphuric acid put to the various uses during the first and second six months of 1952:

	1st half 1952	2nd half 1952
Fertilisers	57 per cent	61 per cent
Textiles	10 ,,	10 ,,
Metallurgy	4 ,,	4 ,,
Others	29 ,,	25 ,,

Although the tonnage consumed shows a decline in each sector, an increase in the percentage of total sulphuric acid used for the manufacture of fertilisers will be noticed. For two countries (Italy and the United King-

dom) the quantity used for this purpose has increased by 8 per cent, but many others show a decline. In Belgium consumption in the second six months of 1952 was less than three-quarters of that of the first half of the year.

The characteristic features of the situation in the sulphurous materials field in the second half of 1952 compared with the first half were as follows:—

(1) Production of sulphurous raw materials increased slightly.

(2) Consumption, on the other hand, decreased considerably.

(3) Both production and consumption of sulphuric acid decreased, though the decline in consumption for fertiliser use was less than the decline in consumption for other purposes.

Trends Since 1948

Part II of the report is devoted to an analysis of the trend of the position of the various sulphurous raw materials during the last few years. The tables give figures for 1948-49 and 1949-50 (years in which European countries did not encounter any difficulty in obtaining supplies of American sulphur) and for the calendar years 1951 and 1952.

The following table shows the trend of production for native and recovered sulphur during the above reference years:

(In 1,000 tons of pure sulphur)

	1948-49	1949-50	1951	1952
Native sulphur	189	229	224.8	251.9
Recovered sulphur	134	163	178.8	208.8
Total	323	392	403.6	460.7

Since 1948-49 the production of sulphur as such has increased by 43 per cent. The ratio of recovered sulphur to total production rose from 41 per cent in 1948-49 to 45 per cent in 1952.

(In 1,000 tons of pure sulphur)

	1949-50	1951	1952
Imports of USA sulphur	752	537	575
Consumption of sulphur as such	1,026	996	735
American sulphur as a percentage of consumption	per cent 73.3	per cent 53.9	per cent 78.2

Despite a decrease in consumption there has been a slight increase in imports from the United States. Stocks of Italian sulphur have, at the same time, apparently increased considerably.

Exports of sulphur as such decreased considerably in 1952, and were 17 per cent lower than in 1951 and 47 per cent lower than in 1949-50. The Italian figure shows the largest decline, exports of sulphur being over a quarter less than in 1951. Compared with 1949-50 the decline in Italian sulphur exports is even more remarkable, only 38 per cent of the 1949-50 total being exported in 1952.

The following table shows the trend of consumption of sulphur as such during the three periods:

(In 1,000 tons of pure sulphur)

	1949-50	1951	1952
Consumption	1,003.3	996.3	735
Difference as percentage of 1949-50 consumption		per cent 0.7	per cent −26.7
Difference as percentage of 1951 consumption			26.3

The net sulphur deficit of member countries in 1952 was as follows:

	Metric Tons
Consumption	735,000
Exports to non-member countries ..	40,900
	775,900
Production	460,700
Net deficit	315,200

This figure can be compared with the net sulphur deficit of 638,600 metric tons in 1951 and of 730,000 metric tons in 1949-50.

Against this net deficit must be set the figure of imports from the United States of 575,000 tons of sulphur. It would seem, therefore, that considerable stocks of sulphur have been built up.

For member countries as a whole, uses of sulphur as such showed the following trend:

	1948-49 per cent	1949-50 per cent	1951 per cent	1952 per cent
Sulphuric acid ..	48	47.5	36.6	37.0
SO_2	11	11.6	14.9	14.3
CS_2	18	19.1	24.9	21.2
Agriculture ..	12	12.5	13.3	16.8
Other uses ..	11	9.3	10.3	10.7

It will be seen that the pattern for the last two years has remained relatively stable.

The following table shows the trend of production and consumption during the last few years (in 1,000 tons sulphur content):

Years	Production	Increase on 1948-49	Consumption	Increase on 1948 49
1948-49	1,336	per cent	1,862	per cent
1949-50	1,430	7	1,997	7.4
1951	1,521	14	2,378	27.7
1952	1,638	23	2,232	19.9

Increased production in Italy accounts for the considerable rise in output of pyrites. Elsewhere production has remained relatively stable.

Imports of pyrites have risen by 5 per cent

during the past year, about 50 per cent coming from non-member countries compared with 45 per cent in 1951.

A decrease of 12 per cent occurred in exports of pyrites. Portuguese exports, though considerably higher than in 1949-50 have, however, fallen off by over 30 per cent compared with 1951.

A decline of 50 per cent in Portuguese and 25 per cent in French consumption of pyrites largely accounts for the falling off in the total figure. Other countries, notably Germany and Ireland, have increased their consumption.

The trend of the position for blendes during the last few years is shown in the following table (in 1,000 tons of sulphur content):

Years	Production	Increase on 1948-49	Consumption	Increase on 1948-49
1948-49	96	per cent	272	per cent
1949-50	128	33	313	15
1951	122	27	336	23
1952	129	34	358	31

Production of sulphur in all other forms shows a very slight decline, but consumption has increased by nearly 10 per cent. The considerable increase in both production and consumption of spent oxide in Germany should be noted.

Production of sulphuric acid developed as follows (100 per cent acid):

1948-49	6,965,000 tons
1949-50	7,540,000 ,,
1951	8,762,800 ,,
1952	8,368,300 ,,

Output in 1952 is thus about 5 per cent lower than in 1951 thought it is 20 per cent higher than in 1948-49.

It should be noted that while production of sulphuric acid declined by only 5 per cent in 1952 compared with 1951 the use of sulphur for its manufacture fell off to a much greater extent and less than three-quarters of the tonnage used in 1951 was consumed for this purpose in 1952. The results of the conversion drive undertaken by member countries can clearly be seen.

As the following table shows, consumption of sulphuric acid has risen considerably compared with 1948-49, though the tonnage used in 1952 was lower than that consumed during the previous year:

	(In 1,000 metric tons) 1948-49	1949-50	1951	1952
Consumption ..	7,008	7,568	8,812	8,319
Increase or decrease compared with previous period ..		8 per cent	16 per cent	-6 per cent

For member countries as a whole, the percentage for the various uses developed as follows:

	1948-49 per cent	1949-50 per cent	1951 per cent	1952 per cent
Fertilisers ..	58.5	57.3	53.8	59.1
Textiles	10.0	11.8	13.5	9.5
Metallurgy ..	4.5	4.7	4.0	4.3
Others	27.0	26.2	28.7	27.1

It will thus be seen that the tendency in recent years for the percentage of sulphuric acid used in the fertiliser industry to diminish has been reversed, though this is mainly due to the decrease in consumption in some other sectors.

In the report on the sulphurous raw materials situation in 1951 (CP[52]5) it is stated that to make ends meet in 1951 countries had to draw substantially upon their stocks, the overall deficit then being about 360,000 tons.

In 1952 total consumption of sulphur in all its forms amounted to 3,810,700 tons and exports to non-member countries to 111,700 tons. Total production was 2,702,500 tons, and thus the net deficit of sulphurous raw materials in European countries works out at 1,219,900 tons. Imports from non-member countries amounted to 1,576,400 tons. The total amount put down to stock was therefore rather less than 360,000 tons.

Conclusions

From 1951 to 1952 the situation in regard to sulphurous raw materials altered considerably and last year member countries had a surplus available of approximately the same volume as the previous year's deficit. This surplus was entirely in the form of sulphur as such (about 260,000 tons) and pyrites (about 130,000 tons). For blendes and sulphurous raw materials in all other forms on the other hand consumption and exports slightly exceeded production and imports.

The cessation of allocations indicates the great improvement in the situation during the last year, but even though there has been a radical change since 1950 the improvement can partly be accounted for by a falling off of demand which the 5 per cent decline in production and consumption of sulphuric acid reflects. It is not at all certain that should demand increase rapidly once again, the critical supply will not recur. It therefore behoves member countries to pursue their efforts to increase production, to economise in the use of sulphur, and to substitute other materials wherever possible.

Prices of Unrefined & Refined Oils

Minister of Food Announces Reductions

REDUCTIONS in the prices of both unrefined and refined oils allocated to the trade during the current allocation periods have been announced by the Minister of Food, Major the Rt. Hon. Gwilym Lloyd-George, as follows:—

PRICES OF UNREFINED OILS TO PRIMARY WHOLESALERS AND LARGE TRADE USERS DURING THE FOUR WEEKS WHICH BEGAN 6 SEPTEMBER

Coconut oil	Crude and crude oleine	from £123	to £118	
Palm kernel oil	Crude and crude oleine	„ £121	£116	
Cottonseed oil	Crude	„ £132	„ £128	
	Washed	„ £140	„ £136	
Groundnut oil	Crude	„ £143	„ £139	Per ton naked ex-works
Sunflower oil				
Sesame/Beniseed oil	Crude	„ £140	„ £136	
Maize oil				
Soya bean oil				
		„ £71 10	„ £67 10	Per ton c.i.f. in casks to be returned
Palm oil		„ £71	„ £67	Per ton c.i.f. in loan drums
		„ £70	„ £66	Per ton c.i.f. in bulk
Acid oils, etc.	Coconut and/or palm kernel	„ £90	„ £87	
	Cotton—Black grease	„ £30	„ £25	
	Ex-washed oil	„ £68	„ £60	
	Groundnut	„ £70	„ £62	
	Sesame/Beniseed, Sunflower, Soya, Maize	„ £68	„ £60	Per ton naked ex-works
	Palm oil	„ £60	„ £54	
	Mixed soft	„ £64	„ £60	
Imported tallows	The entries in the price list are deleted because the Ministry has no further supplies available			

PRICES OF REFINED OILS TO PRIMARY WHOLESALERS AND LARGE TRADE USERS DURING THE EIGHT WEEKS WHICH BEGAN 6 SEPTEMBER

Coconut oil	Refined deodorised	from £133	to £128	
	Refined hardened deodorised	„ £139	„ £135	
Palm kernel oil	Refined deodorised	„ £130	„ £125	
	Refined hardened deodorised	„ £136	„ £132	
Cottonseed oil, Sunflower oil, Sesame/Beniseed oil, Soya bean oil, Maize oil	Refined deodorised	„ £154	„ £152	Per ton naked ex-works
Groundnut oil	Refined deodorised	„ £159	„ £157	
	Refined hardened deodorised to 40	„ £171	„ £169	
	Refined hardened deodorised 50 to 52	„ £172	„ £170	
Palm oil	Refined deodorised	„ £87	„ £83	
	Refined hardened deodorised	„ £98	„ £95	

Cobalt Needs of Plants

UNIVERSITY of Wisconsin scientists studying the nutritional requirements of blue-green algae have added cobalt to the list of known trace elements required for proper plant growth and metabolism.

It has been recognised for some time that cobalt is required for proper nutrition of animals, and that a lack of cobalt is the cause of a deficiency disease in sheep and cattle in some areas of the world. It has not been demonstrated previously that cobalt is an essential element for plants.

The Wisconsin experiments on the nitrogen-fixing blue-green algae show that when these organisms are cultured repeatedly on media without the addition of cobalt, growth is reduced, the total nitrogen content of the cultures and the percentage of nitrogen in the algae cells is decreased, and the cells finally lose chlorophyll and fail to grow normally.

The cobalt requirement for growth of plants does not seem to be restricted to the nitrogen-fixing organisms because P. R. Stout, T. C. Broyer, and C. M. Johnson, of the University of California, recently found an effect of cobalt on the growth of tomato plants, indicating that the cobalt requirement may be a general one throughout the plant kingdom.

Nitrourea in Organic Synthesis

Old & Recent Applications

NITROUREA, by virtue of its unique dearrangement in aqueous solution, has been used for the synthesis of both simple and complex mono-substituted alkyl ureas. It may be easily prepared by the dehydration of urea nitrate, either with concentrated sulphuric acid at temperatures below 0° (Thiele and Lachman, *Ann*, **288**, 281 [1895]) or by means of acetic anhydride and acetic acid at 60-63°, the solution being cooled to 27 (BP. 567,422). The dearrangement of nitrourea in aqueous media to cyanic acid is shown in the following equation:—

$$NH_2.CO.NH.NO_2 \rightarrow NH:CO + NH_2.NO_2$$

the reaction being demonstrated practically, by the formation of the lilac coloured precipitate of copper pyridine nitrourea in fresh solutions containing copper sulphate and pyridine, the aged or boiled solutions yielding no such precipitates, their blue chloroform extracts, however, affording copper pyridine cyanate.

Nitrourea has been employed as a nitrating agent, this use of the compound depending on the hydration of the nitroamide formed when the urea derivative is dissolved in concentrated H_2SO_4. Davis and Blanchard (*J. Amer. Chem. Soc.*, **51**, 1790 [1929]) used such solutions for the nitration of aniline, cinnamic acid, acetyl-*p*-toluidide and phenol respectively. The production of alkyl urea derivatives is of value in the synthesis of the N-alkylbarbituric acids, where the hypnotic properties of the molecule may be modified by the variation of the length of the alkyl radicle.

The synthesis of the appropriate alkyl urea again depends upon the dearrangement of the nitrourea to the corresponding cyanic acid, the latter then reacting with appropriate primary and secondary amino groups to afford the corresponding alkyl urea.

$$NH_2.CO.NH.NO_2 \rightarrow NH:CO + NH_2.NO_2$$
$$HN:CO + R.NH_2 \rightarrow NH_2.CO.NHR$$

Utilising such dearrangements Davis and Blanchard (*loc. cit.*) prepared α alkyl, α aryl and α,α dialkylureas respectively. On the other hand carbamic esters may be obtained by refluxing nitrourea with moist alcohols. Semicarbazide has also been prepared by the electrolytic reduction of nitrourea.

Nitrourea is used in the synthesis of sedatives, anaesthetics and hypnotics based on such structures as $R,R'.CO.NH_2$ where R is an alkyl of two to four carbon atoms and R′ is an halogenated benzyl radicle. BP. 573,509 describes the preparation of N-*n*-propyl-N-(4-bromo-2-methylphenyl) urea by the action of nitrourea on *n*-propyl-4-bromo-2-methylaniline, the reactants being warmed in an ethanolic solution with excess nitrourea. The possible action of nitrourea on such bifunctional compounds as the aminoalkanols appears uncited in patent literature, such substances probably affording derivatives based on $NH_2.CO.NH.C_nH_{2n}.OH$.

The more complex molecules consisting of monoaminoalyklol substituted ureas have been utilised as diuretics, such complex substituted propyl mercury compounds as $NH_2.CO.NH.CH_2.CH(OH).CH_2.Hg.S.CH_3$ having featured in this respect (USP. 2,635,983). Allophanic acid is produced along with urethane when nitrourea reacts with moist alcohol.

$$NH:CO + H_2O \rightarrow NH_2.COOH$$
$$NH_2COOH + EtOH \rightarrow NH_2.COOEt + H_2O$$
$$HN:CO + NH_2.COOEt \rightarrow NH_2.CO.NH.COOEt.$$

Complex guanidine derivatives such as dicyandiamidine react with nitrourea to afford *bis* ureylguanidine, the reaction with nitrourea being again based on the formation of cyanic acid.

$$NH:C(NH_2).CO.NH_2 + HCNO \rightarrow NH:C(NH.CO.NH_2)_2.$$

The resulting *bis* ureylguanidine reacts with formaldehyde to give good aminoplasts.

New Lead Ore Deposit

Claimed to be the most important find of the century in the Derbyshire lead-mining field, a virgin deposit of lead has been discovered below Riber Hillside, Matlock. Prospecting started in the district in 1949 and when diamond drilling revealed the presence of lead in a bed of limestone a new company—Matlock Lead Mines Ltd.—was formed.

Delivering Carbon Black

New Vehicles Bring Ease of Handling

SPECIALLY designed for the bulk handling of carbon black, a fleet of road vehicles is now running from the new plants at Ellesmere Port and Avonmouth to Dunlop's tyre factories at Fort Dunlop and Speke. These plants, set up to cut out the considerable dollar cost of buying carbon blacks from the United States of America, are making the furnace blacks known as Vulcan 3 and Philblack 0.

A totally enclosed system has been devised for delivering the blacks, by suitably designed conveyors and elevators, to the rubber mixing Banbury machines in the factories from these new trailer-tank vehicles, which have been constructed for ease in filling at one end and discharge at the other.

Vehicles Described

Each vehicle carries 11-12 tons of the pellatised powder. The hopper portion is of mild steel, treated on the inside with a Valspar varnish which gives a good gloss finish, is heat resisting and helps the flow of the black from the hoppers into the automatic powder handling system. Along the top of each vehicle suitable inlets permit easy filling; there are also manholes for inspection and temperature tests; and an ample number of vents. The lower portion of the hopper has four outlets, with sides at a minimum angle of 60° to ensure the easy flow of powder, and each outlet is fitted with a butterfly valve and a bolted hinge cap to keep powder from escaping during transport.

When a vehicle arrives at the factory it is placed over one of the underground intake conveyors of the Redler type; the hinged caps on the bottom of each outlet are swung open; and a flexible sleeve from the top of the intake conveyor is then connected to each hopper outlet by a suitable strap or clip.

The Banbury mixers, equipped with automatic weigh hoppers of stainless steel, receive from the system a pre-determined batch of black which when so required may be a blend of two varieties from a two-compartment storage silo. The units have an efficient dust collection system to recover and return any dust into the storage silos.

New Coarse Soda Ash

A DEVELOPMENT by Mathieson Chemical Corporation of the USA is said to make available for the first time a new coarse light soda ash product suitable for glass making. The new product, in the opinion of Mathieson officials, could eventually supersede 'dense' soda ash heretofore generally used by glass plants. To produce coarse light soda ash, Mathieson is completing a 50,000 tons per year plant at its Saltville, Va., location, with operation expected to start about 1 October. Material from this plant will be offered in bulk carload lots, at $28 (approximately £10) per ton f.o.b. Saltville.

In the interest of furthering the development and making the product available to all glass makers, Mathieson has revealed that the new ash is prepared with a machine which has been used by the milling industry for a number of years to sift flour.

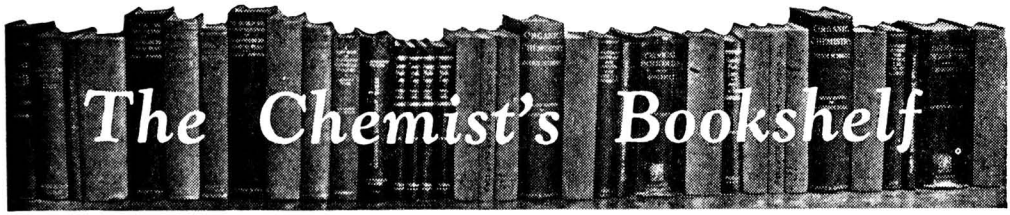
The new coarse light ash has been used in the commercial production of glass, and large-scale tests in glass plants are said to show it to have all the necessary physical properties to make good glass. As operating experience from the plant becomes available, it is expected that additional facilities for producing the new coarse ash will be installed.

Canadian Progress

AN improvement in the business of Shawinigan Chemicals Limited during the first six months of the current year is noted in a bulletin to shareholders of Shawinigan Water & Power Company from Mr. J. A. Fuller, president.

The new plants of Shawinigan's associated companies, BA-Shawinigan Limited, at Montreal East and St. Maurice Chemicals Limited, at Varennes, Quebec, have both gone into production, Mr. Fuller stated. The domestic business of Canadian Resins and Chemicals Ltd., another associated company, has shown a substantial increase for the first half year as compared with the first half of 1952. In the export market, there has been considerable reduction in sales volume.

The new calendar at Shawinigan Falls, Quebec, has started production and will shortly be operating at full capacity, and the new resin plant is scheduled to start operation before the end of the year.



MANUFACTURE OF COMPRESSED YEAST. 2nd Edition. By F. G. Walters. Chapman and Hall, London. 1953. Pp. 318. 37s. 6d.

The revised edition of this book, which was first published in 1940, follows the same general plan as the original work. The first chapter deals in general terms with the different kinds of yeast, cell structure, cell reproduction and effect of variables such as alcohol concentration during fermentation, temperature and carbon dioxide. The types of yeast are described, as are enzymes, bacteria, malt and sources of brewing materials, such as cereals.

Chapter II covers the preparation of nutrient media, staining agents and seed yeast culture. The latter process is described in detail, together with equipment used and operating conditions. Mashing for a differential brew—that is a non-alcoholic fermentation—follows in Chapter III, as well as a description of the filtration and division of the work. The differential fermentation of a grain brew is described in great detail in Chapter IV, while Chapter V is devoted to compressed yeast production from molasses.

Process improvements in yeast manufacture are briefly outlined in Chapter VI, including the reversed aeration process. Complete details of the author's patents relating to yeast production are given, and the reader is offered full use of these gratis.

Chapters VII and VIII deal briefly with yeast production from spirit fermentations and the production of dried yeast respectively, following which a detailed description is given in Chapter IX of a yeast factory including methods of analysis. An admirable appendix comprising some 50 pages deals with the manufacture of malt extract.

This book is well written, and suitably illustrated. It contains a wealth of information which must be indispensable to anyone who is intimately connected with the production and utilisation of yeast.—E.J.C.

CHEMICAL PROCESS MACHINERY. 2nd Edition. By E. Raymond Riegel. Reinhold Publishing Corp., New York; Chapman & Hall Ltd., London. 1953. Pp. 735. £5.

In this present book, the organisation of the subject matter which was adopted in the first edition, entitled 'Chemical Machinery,' remains unchanged. Only plant now available on the (American) market is described, and in many cases an indication of the price is given. But this is not a dull catalogue of manufacturers' descriptions; the author patently knows his subject, and the book has been arranged with care.

Each of the 27 sections takes the general form: definition of the process involved; consideration of the problems of the process; classification of the machinery in a 'family tree,' showing the relation of one type to another; description of selected examples of plant; numerical examples and reading references. Much new material is included in this second edition, and obsolete machinery has been omitted.

As always in a book of this comprehensive nature, it is the items which are not included which are drawn to one's notice. It is, for instance, surprising to find no mention of that branch of technology which the Americans have named 'bio-engineering'; such modern pieces of chemical plant as the fermenter or the bacterial filter (whether for gas or liquid) are not described; and even the autoclave, for so long an essential in chemical synthesis and now an essential in sterilisation, is regarded only as an adjunct to the catalytic hydrogenation of oils.

However, no fewer than three chapters are devoted to a survey of instrumentation by D. M. Considine, and there are nearly 600 illustrations. Although the price of this book places it beyond the reach of any student, it is thoroughly recommended to those who can afford it as a comprehensive survey of the most up-to-date aspects of chemical technology.—B.I.

HOME

Iron & Steel Board

The telephone number of the Iron & Steel Board, Norfolk House, St. James's Square, London, S.W.1, has been changed to TRAfalgar 8833. Access to the Board's offices in Norfolk House will temporarily be through the entrance at 30 Charles II Street (off Lower Regent Street).

Steel Industry Opportunities

At the invitation of the United Steel Companies Ltd., 34 students from 13 universities spent this week in Sheffield as guests of the company. In addition to taking part in a short course designed to indicate the opportunities available in the steel industry they visited a number of works, including those of the United Coke and Chemicals Company Ltd., Rotherham.

Midlands Analysts to Meet

The first meeting of the 1953/54 session of the Midlands Society for Analytical Chemistry is to be held on Wednesday, 16 September, at 7 p.m. in the Mason Theatre of the University, Edmund Street, Birmingham. The subject chosen, 'R.F. Titration Technique', will be introduced by L. Tarrant of the Dunlop Research and Development Laboratories, Birmingham.

Coke Works Extension

The Monkton coke works of the National Coal Board at Hebburn, Co. Durham, are to be extended at a cost of £2,000,000. An order has been placed for a battery of 33 compound ovens and additional coal and coke handling and by-product plant. The extended plant, which is expected to be completed in about two years, will employ 180 men and use more than 500,000 tons of washed coal a year.

New Drugs Forecast

Sir Cecil Wakeley, president of the Royal College of Surgeons, speaking at the British Pharmaceutical Conference banquet in London last week, said: 'I am confident that in the future your conference is going to produce drugs which will rob the surgeons of many of their operations and effect a cure of many diseases of the lungs and heart, including cancer. It will not come in my time, but I am confident it is not far off.'

Scottish Plant Extensions

Extensions are proposed at Grangemouth by I.C.I. (Dyestuffs) Ltd., and British Petroleum Chemicals Ltd. The former are to erect a two-storey laboratory and office block at a cost of £22,110 and the latter are to build an extension to their plant offices at a cost of £4,500.

Dutch Visitors

The Dyestuffs Division of Imperial Chemical Industries, Limited, was host to 25 Dutch dyers and finishers this week. During their four-day stay the party visited Courtaulds' Droylesden works; Hexagon House, B'ackley, Manchester, the headquarters of I.C.I.'s Dyestuffs Division; and the Division's works at Huddersfield.

Linoleum Inquiry

The Monopolies and Restrictive Practices Commission has been asked by the Board of Trade to inquire into the supply of linoleum and to report both on the facts and the bearing of the facts on the public interest. Any person or organisation wishing to offer evidence should write to the Secretary, Monopolies and Restrictive Practices Commission, 3 Cornwall Terrace, Regent's Park, London, N.W.1.

Terylene Council Research Station

Work is going ahead on the Imperial Chemical Industries' Terylene Council Research Station on the Crimple House Estate, Harrogate, and the Regional Board for Industry have now issued a licence for the second phase covering technical service and research laboratories. This, it is stated, will require £295,000 of the estimated total cost of £650,000. The work now proceeding is the erection of buildings to form permanent headquarters of the centre.

Manufacturers Praised

Speaking on behalf of the exhibitors at the opening of the British Veterinary Association Exhibition at Aberdeen on Monday, 7 September, Mr. Neil Mathieson, M.R.C.V.S., referred to the contribution made by the pharmaceutical houses to the advance of veterinary medicine. Such advances, said Mr. Mathieson, could only be made by the fullest co-operation between the worker in the laboratory and the practitioner in the field.

• OVERSEAS •

Uranium Mine Profit

The Blyvooruitzicht gold mine which started producing uranium in April, and is among the first South African mines to undertake this production, declared a maiden profit of £21,710 from uranium production during the quarter ended 30 June.

Cement Consumption in Brazil

Brazilian cement consumption is increasing every year. According to the Finance Ministry, almost 812,000 tons were imported in 1952, as compared with 638,000 tons in 1951. Prices increased from an average of Cr.$654 per ton in 1951 to Cr.$728 in 1952.

Wood Impregnator

Boliden salt, developed by the Swedish Boliden concern for wood impregnating, has now been officially approved as a standard product in the United States. Approval has been given after several years of experimental and field work in America, and it is hoped that considerable export to the United States and other countries will result.

Canadian Coal By-products

Canadian coal men are watching with interest an experiment in the Crow's Nest Pass that is benefiting handsomely both miners and operators alike. At Miche, BC, a new multi-million dollar plant for manufacturing coal by-products is turning out the coal tar base for over 2,000 manufactured items that bulk large in the Canadian market.

Probable New Colombian Oil Refinery

The increasing consumption of refined products, estimated at 9.2 per cent a year, coupled with the fact that Colombia exports quantities of crude oil while importing the refined products, has given rise to serious consideration of the construction of more refineries. The Ministry of Mines and Petroleum is reported to have under study the construction of a new refinery on the Atlantic Coast, probably at Barranquilla or Cartagena, with a capacity of 25,000 barrels daily, to serve the northern and western areas, and also to export any excess over domestic needs.

Natural Gas in Turkey

Prospectors of the Mineral Research Institute, Ankara, who, with American engineers were seeking oil in Thrace, found natural gas near Murefte, about 165 kilometres west of Istanbul. Supplies of the gas are thought to be sufficient to justify the expenditure of £T20,000,000 for a pipeline to Istanbul.

USA Rubber Record ?

Consumption of new rubber in the United States of America this year will total about 1,375,000 long tons, an increase of 9 per cent over the 1952 record, according to an estimate made by Mr. John L. Collyer, president of the B. F. Goodrich Company. He added that USA synthetic rubber, which accounted for 64 per cent of the 1952 total, is currently accounting for 56 per cent of the 1953 total.

South African Chemicals

South Africa will have a great source of organic materials which it could never have had in any other way when the oil-from-coal project (SASOL) comes into production, according to Dr. S. Israelstam, a senior lecturer in chemistry and chemical engineering at the Witwatersrand University. In a recent address at Brakpan he said chemicals from the plant would enable South Africa to produce certain drugs, plastics and insecticides now being imported.

A Celanese Corporation Move

The application laboratory of the Chemical Division of Celanese Corporation of America is being transferred from Newark to Summit, New Jersey, in a move designed to broaden the scope of its activities. The laboratory, which operates as a function of the Product Development Department, assists in the development of new products through technical service and performs complete customer service for all Celanese chemicals. The expansion of facilities will permit intensification of work directed toward the application of the most recent Celanese development chemicals—vinyl acetate, pentaerythritol, paraformaldehyde, vinyl plasticisers, lacquer solvents and TCP as a gasoline additive.

• PERSONAL •

MR. G. H. DUNCAN and MR. E. J. FARRAR have been appointed to the Board of Directors of Commercial Solvents (Great Britain) Limited.

MR. FRANK SAMUEL, deputy-chairman of the United Africa Company (a Unilever subsidiary), has been elected chairman of the company in succession to LORD TRENCHARD, who has resigned that post but remains on the board. Mr. Samuel is also on the boards of Unilever Limited and Unilever NV.

MR. G. O. MITCHELL, who was appointed Chief Colourist of the Dyestuffs Division of Imperial Chemical Industries Ltd., from 1 September 1953, in succession to MR. G. S. J. WHITE, who became Division Director in charge of Technical Service Departments, is a Yorkshireman. He joined British Dyestuffs Corporation Ltd. in 1919 as a colourist at their Huddersfield Works. It was not long before he was transferred to the headquarters at Blackley, where he was employed in the textile section of the dyehouse department. In 1934 he became head of that section and five years later assistant chief colourist.

DR. E. D. ADRIAN, O.M., P.R.S., Master of Trinity College, Cambridge, has been elected president of the British Association for the Advancement of Science for 1954. He will take up office on 1 January next and will preside at the annual meeting in Oxford from 1-8 September next. The British Association will thus be honoured by having as its president a man who is also president of the Royal Society. The only other presidents of the Association who have been presidents of the Royal Society in the same year were Lord Lister (1896) and Sir Charles Sherrington (1922). Dr. Adrian, one of the most outstanding British physiologists, was educated at Westminster School, Trinity College, Cambridge, and St. Bartholomew's Hospital, London. His research career began when he was made a Fellow of his College in 1913. In 1929 the Royal Society elected him to a Foulerton Research Fellowship and this he held till he was elected to the Professorship of Physiology at Cambridge. In 1932 he received the Nobel Prize for Medicine, in 1934 the Royal Medal of the Royal Society, in 1942 the Order of Merit, and in 1946 the Copley Medal of the Royal Society. He was Foreign Secretary for some time before his election to the presidency of the Society. Dr. Adrian has worked all his life in neurophysiology and has had a profound effect on the course of the biological sciences in the last two decades.

DR. HAROLD DAVIS, chief pharmacist to the Ministry of Health, has been elected chairman of the British Pharmaceutical Conference to be held at Oxford next year.

CAPTAIN R. C. KELLY, chairman of the company, presented watches to three employees who had completed 25 years' service at the annual dinner of The Crookes Laboratories Ltd., in London last week—E. HOPKINS, S. BURBIDGE and A. DAVIS. Seven others present had over a quarter of a century's service. Captain Kelly paid tribute to the outside representatives for having done so well and announced amid applause that MR. J. R. BOWDEN (sales manager) had been appointed deputy general manager. Captain Kelly also paid a tribute to the whole sales staff, behind whom were the advertising department led by MR. R. H. H. SYMONDS. His reference to a veteran executive, MR. J. F. WARD, head of the Bulk Oils Department, was warmly applauded. Captain Kelly was replying to the toast of 'The Directors and Company,' proposed by MR. C. B. CHAPMAN, an outside representative, who had been elected president for the year. 'The Representative Staff' was proposed by MR. J. A. LOCK of the Research Department, and replied to by MR. T. W. WEBSTER. Proposing 'The Inside Staff,' MR. R. S. MILLER referred to the abilities of MR. G. E. WATSON, general manager, as a general planner and co-ordinator of policy, and to MR. BOWDEN as 'Captain of the salesmen-ship who, unlike other captains, had no time for passengers!' He also praised the work of MR. SYMONDS, DR. A. R. H. HICKS, MR. A. H. HERD, MR. F. R. THORNE, DR. JONES, MR. M. J. BIZERAY, and MR. R. T. M. HAINES.

Publications & Announcements

PLASTICS in many different forms are used in the aircraft industry, and the exhibit by Bakelite Limited at the SBAC Flying Display, Farnborough, demonstrates some of these applications. Among new developments in moulding materials are a nylon-filled grade with superior electrical characteristics in humid conditions; glass-filled silicone materials with an outstanding combination of heat resistance and impact strength; and rubber-modified compounds with greatly improved shock resistance. Bakelite resins make insulating varnishes and weather-resisting adhesives; polyesters are used in the construction of radomes and cowlings, and for the 'potting' of miniature radio components; and Vybak PVC finds many applications. Laminated sheet has been developed for the making of jigs and press tools of all sizes, and Warerite has proved very useful for the interior furnishing of air liners.

* * *

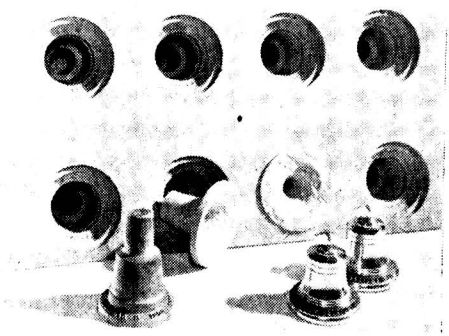
MOST welcome is the Interchangeable Laboratory Glassware Catalogue issued by Quickfit & Quartz Ltd., 'Quickfit' Works, Heart of Stone, Staffs. Although it contains more than 100 large pages, this well-illustrated and generally well-produced catalogue does not pretend to list every part made by the company. It does, however, succeed admirably in depicting broadly the range of 'Quickfit' apparatus from which a wide variety of needs can be met. 'Quickfit' standardisation embraces the dimensions, designs and finish of the whole apparatus and is not confined to the ground connections. Individual pieces are standardised in size so that one part of an assembly may be replaced without undue disturbance to the remainder and so that batteries or trains of parts will conveniently match each other. A rationalised and simplified standard of design is employed. A price list is issued separately.

* * *

HITHERTO available to the home market only, the Muir-Hill LH-1 Loader is now being offered to overseas buyers by the makers, E. Boydell & Company, Ltd., Elsinore Road, Old Trafford, Manchester. Designed to offer the benefits of a mobile-hydraulic bulk-materials loader under the most confined working conditions, this machine weighs less than two tons yet is claimed to be capable of high rates of loading comparable with normal size mobile loaders. Ease of control, general manœuvreability and speed of operation all combine to offset the smaller size of the machine. A minimum of 6 ft. 6 in. headroom is required by the machine, which has a wheelbase of 4 ft. ½ in., a track of 3 ft. 7 in. and a turning circle of 7 ft. 6 in. radius. These leading dimensions enable the machine to operate practically wherever a labourer can swing a shovel. On the other hand, the machine has a maximum under-bucket clearance of 6 ft. 6 in. which enables it to load into hoppers, bunkers, skips and all but the largest road vehicles. The standard method of powering the LH-1 is by a 3-cyl. diesel engine of 2.36 litres capacity which develops 30 bhp. at 1,800 rpm. but a 4-cyl. petrol engine is available as an alternative. Among the industries which have used the LH-1 with every success are the chemical, fertiliser, cement, coal and coke, china clay and glass making industries.

* * *

PROBABLY one of the most outstanding advantages brought to post-war industry is the introduction of silicones. This group of chemicals is already being used in many different spheres. One of its most interesting applications is as a release agent and as such it has found widespread use in the rubber, plastics, metal and packaging industries, to name but a few. These silicone mould release agents are unique among mould lubricants because they are based on



By preventing the sand/resin shell from sticking to the metal casting, higher output is achieved and the castings have a better surface finish

an exceptionally stable network of silicone and oxygen atoms. They are easy to use and effective in such low concentrations that the cost compares favourably with the best organic mould lubricants. Further information concerning Releasil silicone mould release agents is given in 'Silicone Notes E7', obtainable on application to Midland Silicones Limited, 19 Upper Brook Street, London, W.1.

* * *

SPECIALISATION in the manipulation of corrosion-resistant metals is one of the contributory factors to the growth of The A.P.V. Company Limited, Wandsworth Park, London, S.W.18. Founded in 1910 by Dr. Richard Seligman as The Aluminium Plant and Vessel Company, Limited, it initiated the welded fabrication of aluminium equipment in this country. Later, with the development of deoxidised grades of copper, A.P.V. pioneered the commercial welding of this metal also. They co-operated with Firth-Vickers in the development of a stainless steel which would be proof against weld decay. Today, stainless steel takes first place in the company's productions. The organisation of A.P.V. is based on complete co-ordination of specialists, distributed over the laboratories, design offices, technical sales departments and works. The company has just issued an attractive booklet showing something of this team, their equipment and the work they do. Text and illustrations alike are most interesting. Two other shorter publications made available at the same time deal respectively with a standard range of stainless-steel reaction vessels and the 'Bowser' beer filter.

* * *

SPECIALLY designed to give quick and accurate and comparative sieve analyses, and to free the laboratory staff from a tedious operation, the latest test sieve vibrator, made by Podmores (Engineers) Ltd., is electromagnetically operated. This eliminates all wearing and striking parts and the need for adjustment and lubrication. The machine is quiet in operation and the transference of vibration to the work bench is minimised by anti-vibration mountings. The test sieve lawns are subjected to a rotational and vertical vibration, the amplitudes of which are adjustable by means of a built-in controller. A time switch may be incorporated, and the machine can be arranged to take up to ten 8-in. BS sieves.

EXCEPTIONAL sensitivity, sustained accuracy and compactness are among the advantages claimed for a new graphic recorder, made by the Record Electrical Co. Ltd., of Altrincham, Cheshire. Panel space has been saved without sacrificing the amount of chart visible at any time, by mounting the clock mechanism directly in front of the electrical movement. Switchboard projecting, flush and portable cases are available: the switchboard projecting pattern has an aluminium alloy case; the flush mounting pattern has aluminium alloy bezel and lid, sheet steel body and moulded base; and the portable is similar to the flush model, but is fitted with a strong leather handle and PVC-covered steel runners. It weighs 24 lb. The overall size of the recorder is 7.3 in. by 5.6 in. by 9.45 in.

* * *

FLEXIBLE tubing and hoses are becoming more and more popular for a variety of purposes in industry and it is somewhat surprising that until recently there has been no complete advisory service on 'flexibles.' The omission has been admirably remedied by Compoflex Company, Ltd., 26 Grosvenor Gardens, London, S.W.1, who have set up a service with the purpose of providing quickly and economically the answer to all manner of problems on 'flexibles.' In doing this they are able to draw upon years of experience in manufacturing and supplying all types of 'flexibles,' which have given them the specialised knowledge essential for the purpose. Now they have published a well-produced brochure which gives those interested a good idea of the service. Industrial requirements cover such a wide field that it would be impossible to include in one modest publication all types of 'flexibles' and fittings. Enough information is given in the brochure, however, to convince the reader that if there is a 'flexible' answer it can be found at 26 Grosvenor Gardens.

More Oil Used

The *Bulletin for Industry* (issued by HM Treasury) states that last year this country used about twice as much oil as before the war and exported more than 12 times as much oil as in 1938. The import of refined oil in 1938 was 82 per cent of the total; today it is 21 per cent. Oil imports are now so large, they account for one-tenth of the total import bill.

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.)

WILLIAM J. COX LTD., London, N., plastic distillers. (M., 12/9/53.) 27 July, charge, to Westminster Bank Ltd., securing all moneys due or to become due to the Bank; charged on The Bothy, Tring. *Nil. 28 November 1952.

NORTHERN DIECASTING CO., LTD., Burnley. (M., 12/9/53.) 5 August, £20,000 debenture to Union Oxide & Chemical Co., Ltd.; general charge. *£4,597. 19 March 1953.

Satisfactions

AMBER PHARMACEUTICALS LTD., London, W. (S., 12/9/53.) Satisfaction 5 August of charge registered 9 October 1951.

APTEKA LTD., London, W., chemists. (S., 12/9/53.) Satisfaction 5 August of charge registered 12 June 1952.

New Registrations

L. Blass (Wembley) Ltd.

Private company. (523,196). Capital £100. Consulting, analytical, designing and industrial chemists, manufacturers, importers and exporters of and dealers in fertilisers, insecticides, fungicides. Directors: L. Blass, Mrs. D. E. C. Blass. Reg. office: 43 Chalk Hill Road, Wembley Park, Middlesex.

Plastics Scrap Ltd.

Private company. (523,267). Capital £1,000. Manufacturers, importers and exporters of, dealers in and agents for plastics, fibrous materials and chemical compositions. Subscribers: G. D. Kingsley, H. M. Macdonald. Directors are to be appointed by the subscribers. Solicitors: Capel Cure Glynn Barton & Co., 9 Wimpole Street, W.1.

Market Reports

LONDON.—A steady flow of new business is reported in the industrial chemicals market with the movement against contracts covering good volumes. Most of the routine industrial chemicals are freely available and for most items prompt delivery can be offered for home and export. Among the soda products there has been a steady call for chlorate and bichromate of soda and such items as soda ash and hyposulphate of soda are in good request at firm price levels. There has been little change in the position of potash chemicals, which remain in steady demand. Elsewhere fairly active conditions have been reported with quotations for the most part displaying a firm undertone. There has been no change of any importance in the coal tar products market, although a better tone is in evidence and inquiries for exports have been more plentiful. More interest has been shown in cresylic acid on export account and creosote oil continues to enjoy a satisfactory overseas demand.

MANCHESTER.—Prices of the leading industrial chemicals on the Manchester market during the past week have continued on a steady to firm basis and actual changes on balance have been of little consequence. In the home section there has been a fair number of new inquiries and contract deliveries of the alkalis and the principal potash, ammonia and magnesia compounds have been maintained, while a fair movement of supplies on export account has been reported. In the market for the tar products fresh bookings have been patchy, with refined tar, creosote oil, and most of the light distillates the most active.

GLASGOW.—From all reports, business in general chemicals has again been very good during the past week and, with the orders in hand for delivery, the forward position is extremely favourable. An increased demand for chemicals for export has been experienced and it appears that some very substantial orders have been booked.

CLASSIFIED ADVERTISEMENTS

OFFICIAL NOTICE

CHELSEA POLYTECHNIC
CHEMISTRY DEPARTMENT

A SERIES of 20 Post-Graduate Lectures dealing with "Aspects of Technology in the Fine Chemicals Industry," will be given on Wednesdays (7.15 p.m.) during the Autumn and Spring terms (14th October-9th December, and 20th January-24th March inclusive).

The lectures are designed primarily for those graduates who have recently entered the Fine Chemicals Industry and the subjects have been chosen so as to deal with the organisation and techniques of the industry. It is considered that the lectures will also appeal to chemists with other interests and wider experience.

A leaflet giving details of lecture titles and lectures can be obtained from the Secretary of the Polytechnic.

BUSINESS OPPORTUNITY

AN EXCEPTIONAL OPPORTUNITY. For disposal, through ill-health, the whole of the issued share capital in young company recently making highest class English graded hardwood charcoal. There are no debentures or charges on the company, but nearly £3,000 trading losses are available for taxation purposes. Large stocks of wood are assured and complete plant includes several steel kilns, large grader, etc. **BOX NO. C.A. 3257, THE CHEMICAL AGE, 154, FLEET STREET, LONDON, E.C.4.**

SITUATIONS VACANT

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

BRITISH TITAN PRODUCTS COMPANY LIMITED
invites applications from
GRADUATE CHEMISTS AND CHEMICAL ENGINEERS
to assist in Control of Chemical Plant Operations at its
Billingham (Co. Durham)
and
Grimsby (Lincs.)
Factories

Previous experience of plant work not essential. Salary dependent on age and qualifications. Staff Bonus and Superannuation Schemes. Application Forms may be obtained from **THE SECRETARY OF THE COMPANY, KRONOS HOUSE, COPPERGATE, YORK.**

A VACANCY arises for a young **CHEMICAL ENGINEER** whose educational standard is equivalent to A.M.I.Chem.E. A person with a little industrial experience would be preferred, but this is not essential. The work will be of an extremely varied nature under qualified chemical engineers and will be invaluable experience to the successful candidate. Reply in confidence to **BOX No. C.A. 3259, THE CHEMICAL AGE, 154, FLEET STREET, LONDON, E.C.4.**

SITUATIONS VACANT

CHEMICAL ENGINEER required for industrial instrument manufacturers. Some sales experience preferred and willingness to travel essential. Salary, £600-£700 per annum, plus allowances. Interesting job, with good prospects. Apply **BOX No C.A. 3255, THE CHEMICAL AGE, 154, FLEET STREET, LONDON, E.C.4**

CHEMICAL ENGINEERS, capable of leading development teams, required for vital and interesting new process. Reply to **BOX No. C.A. 3258, THE CHEMICAL AGE, 154, FLEET STREET, LONDON, E.C.4.**, when application form will be sent.

ENGINEER required for starting up small-medium chemical plant. H.Q. in London, but applicant must be prepared to travel extensively. High academical qualifications are not of prime importance, the main essentials being intelligence, enthusiasm and mobility. Good salary and prospects for right man. Pension scheme. Write **BOX No. C.A. 3260, THE CHEMICAL AGE, 154, FLEET STREET, LONDON, E.C.4.**

ENGINEER required by Chemical Engineering firm in Westminster District of London. Qualifications required are: age about 30; B.Sc. or equivalent; good knowledge of physics and thermodynamics desirable; good mathematics; understanding of chemistry desirable; practical works' experience of assistance; understanding of general office procedure and technical sales an advantage. The position offers excellent opportunities to a man having these qualifications coupled with a keen business outlook. Write stating age, qualification, salary required to **BOX NO. C.A 3252, THE CHEMICAL AGE, 154, FLEET STREET, LONDON, E.C.4.**

FOR SALE

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

COMPLETE SPECIAL PROCESS SOAP PLANT, to deal with 10 cwt. lots including Electrically Driven Crutching Pan, with agitators. Fitted with special electric motor and reduction gear. Including all tanks, piping, etc. Made by Hanson & Edwards, Ltd., Warrington, in 1949. Enquiries to **MESSRS. WORMWALDS & WALKER, LTD., DEWSBURY MILLS, DEWSBURY.**

DELAFILA, THE INERT FILLER. Used in the manufacture of Fertilisers. Insecticides, Paints, Plastics and Insulating and Sealing Compounds. Prompt supplies in a wide range of fineness grades. **THE DELABOLE SLATE CO., LTD., DELABOLE, CORNWALL.**

SELWOOD FOR TANKS

1— 1,500 gall. enamel lined **STORAGE TANK,** ex milk storage. Cork insulated motor driven agitator fitted. Mounted on adjustable legs.
1 800 gall. ditto.
Full details of these and other **TANKS** on application to:
WILLIAM R. SELWOOD LTD.,
CHANDLER'S FORD,
Hants. Phone 2275.

FOR SALE

ROTATING PAN MIXER by **ARTOFEX.** Two **PANS,** 47 in. diam. by 22 in. deep; 2-sack capacity. Human arm type blades. Fast and loose pulley drive. £100 ex-works.

One Ditto by **T. COLLINS, BRISTOL.** Two **PANS,** 47 in. diam. by 24 in. deep; 2-sack capacity, with automatic feed. Chain drive to 5 h.p. motor. £85 ex-works.

THOMPSON & SON (MILLWALL), LIMITED,
CUBA STREET, LONDON, E.14.
TEL. EAST 1844.

600

PROCESS PLANT

24 in. by 24 in. heavy swing **BEATER PULVERISER** by Christy & Morris. C.I. constr. with steel iron alloy liners. Rotor fitted 6 sets of 9 beaters driven by 9 in. diam. pulley.

4 'Pulmac' **GRINDERS** by Int'l. Pulverisers Ltd. Size P4. Stator & Rotor rasped Grinding Discs 27 in. diam. Side feed admits material which is driven by centrifugal force into Mill.

Pascall **PIN DISC MILL,** type No. 1 motorised 400/3/50. Conical feed hopper approx. 24 in. diam. Permanent magnet of chute type. Discharge chamber enamel lined with bagging outlet 5¾ in. diam.

Vert. **CONE MILL** by Huxham & Brown, 34 in. diam. by 18 in. deep. Fluted grinding cone with renewable wearing plates. Fluted grinding chamber with bagging attachment. Underdriven through bevel gearing f. and l. pulley.

Micro-twin **REFINING MILL** by Torrance with steel Rolls 9 in. by 6 in. diam., and 9 in. by 4½ in. diam. F. and l. pulley drive.

GEORGE COHEN SONS & CO. LTD.,
WOOD LANE, LONDON, W.12.
Tel.: Shepherds Bush 2070 and
STANNINGLEY, NR. LEEDS.

REGULAR supply of **CAESIUM** concentrates (pollucite) available. Write **BOX NO. C.A. 3250, THE CHEMICAL AGE 154, FLEET STREET, LONDON, E.C.4.**

MORTON, SON AND WARD, LIMITED
offer
MIXERS

TROUGH MIXER by **CHALMERS,** 3 cwt. Stainless Steel Tilting Trough, motorised.

TWO TROUGH MIXERS by **GARDNER,** 3 cwt. Stainless Steel-lined Troughs; one motorised, one fast and loose pulley.

ONE WEIRNER PFLEIDLER Jacketed Trough Mixer. Tilting trough. Double "Z"-blades. 100 gallon. Double end drive.

"MORWARD" "U"-shaped TROUGH MIXERS in any size up to 3 tons.

Horizontal or Vertical **MIXERS,** jacketed or unjacketed, made to requirements in stainless or mild steel.

JACKETED PANS

Selection available—40-500 gallons, with or without mixing gear.

HYDRO EXTRACTORS

36 in., 42 in., 60 in. and 72 in., by **BROADBENT,** and 42 in. by **WATSON LAIDLAW,** all electric, complete with starters.

PUMPS

A selection of **MONO** and other Pumps in stock, 2 in. to 6 in.—new and second-hand.

INQUIRIES INVITED.
MORTON, SON AND WARD, LIMITED,
WALK MILL,
DOBCROSS, NR. OLDHAM,
LANCS.
'Phone: Saddleworth 437.

FOR SALE

3 JACKETED INCORPORATORS, double "Z" arms double geared, power-driven tipping motion, with counterbalancing weights.

3—Baker Perkins and Werner Jacketed **MIXERS,** screw tipping pattern, friction pulley drive, single geared, with double-fin type agitators.

4—Gardner **RAPID SIFTER MIXERS** and **MIXERS** only, various sizes, one with brass fitted interior and glass-lined end plates.

27—Various **POWDER DRESSING** or **SIFTING MACHINES,** totally enclosed, with barrels from 80 in. long by 22 in. diam. to 120 in. long by 30 in. diam., belt driven with collecting worm in hopper bottoms.

4—Recessed Plate **FILTER PRESSES,** 30 in. square 70 plates in each, centre fed.

2—Johnson **FILTER PRESSES,** 24 in. square, side feed and enclosed delivery, fitted 29 plates and 30 frames.

1—Johnson **FILTER PRESS,** 36 in. square, plate and frame type, double inlet and enclosed delivery ports.

Johnson Oil **FILTER PRESS,** Premier type, plates 2 ft. 8 in. by 2 ft. 8 in., of which there are 45, with angle lever closing gear.

1—Johnson **FILTER PRESS,** 42 cast-iron plates, 32 in. square, centre feed.

Steam-heated **FILTER PRESS,** Premier type, 32 in. square, with 30 recessed plates

1—Johnson **FILTER PRESS,** 46 plates, 32 in. square, centre feed, bottom corner open delivery.

Wood **FILTER PRESS,** fitted 69 ribbed plates, 2 ft. 8 in. square, with top centre feed and bottom enclosed delivery channel.

1—24 in. and 1—30 in. **HYDRO EXTRACTOR,** self-balancing, swan-neck type, self-emptying bottom, belt driven.

1—30 in. and 2—36 in. Ditto with enclosed motors, 400 volts, 3-phase, 50 cycles.

Heavy Cake **CRUSHING MILL,** 2-pair high, by Nicholson, for cake up to 3 in. thick, rolls 30 in. long, top with coarse teeth 9 in. diam., bottom, with finer teeth 12 in. diam..

5—sets A.A. **CRUSHING ROLLS** for linseed, cottonseed, etc., 48 in. long, belt driven, with feed hopper, side frames, baseplate and striking gear.

Bennett Copper-built **EVAPORATOR,** 4 ft. diam. by 4 ft. 6 in. high, steam-jacketed bottom, mounted on legs, with swan-neck vapour pipe and separate vertical belt-driven vacuum pump.

"U"-shaped Horizontal **MIXER,** 7 ft. long, 3 ft. wide, 3 ft. 3 in. deep, belt and gear driven, end outlet, square horizontal centre shaft with cast radial type mixing arms, last used for linoleum paste.

3—5-roll **REFINERS,** fitted chilled iron, water-cooled rolls, 40 in. long, 16 in. diam., belt and gear driven with clutch drive suitable for motor, by Baker Perkins, Ltd.

7 ft. Torrance Positive-driven **EDGE RUNNER,** 2 vertical Paint Pug Mills, 2-bar Disc Paint Grinding Mills, and 2 Horizontal 40-gallon capacity Cox Pug Mills for paint.

1—No. 1A Water-cooled **CIRCULATOR MILL.**

1—4½ Christy & Norris **DISINTEGRATOR** with 60 h.p. A.C. motor and starter.

4—excellent **VACUUM OVENS** complete with Vacuum Pumps, trays and all belongings.

2—18 in. **KEK PLATE MILLS** complete with feeders, delivery bins, motors and entablature.

9—Worsam **ROTARY PRESSES.**

2—Manesty **GRANULATORS.**

RICHARD SIZER, LTD.
ENGINEERS,
HULL.
Telephone 31743.

FOR SALE

WANTED

CONTINUOUS **CONVEYOR-type HARDENING FURNACE,** suitable 1100° C., with 12 in. conveyor. **BOX NO. C.A. 3256, THE CHEMICAL AGE, 154, FLEET STREET, LONDON, E.C.4.**

AUCTIONEERS, VALUERS, Etc.

WORKING NOTICE

IT is desired to secure the full commercial development in the United Kingdom of British Patent No. 655,349, which relates to "**PREPARATION OF CYCLIC 1, 2-KETOLS HAVING FROM 10 to 18 CARBON ATOMS IN THE RING,**" either by way of the grant of licences or otherwise on terms acceptable to the Patentee. Interested parties desiring copies of the patent specification should apply to **STEVENS, LANGNER, PARRY & ROLLINSON, 5 to 9, QUALITY COURT, CHANCERY LANE, LONDON, W.C.2.**

SERVICING

INDEX TO ADVERTISERS IN THIS ISSUE

Printed in Great Britain by THE PRESS AT COOMBELANDS Ltd., Addlestone, and published by BENN BROTHERS LTD., at Bouverie House, 154, Fleet Street, E.C.4, 12 September, 1953. Registered at the General Post Office. Entered as Second Class Matter at the New York, U.S.A., Post Office.