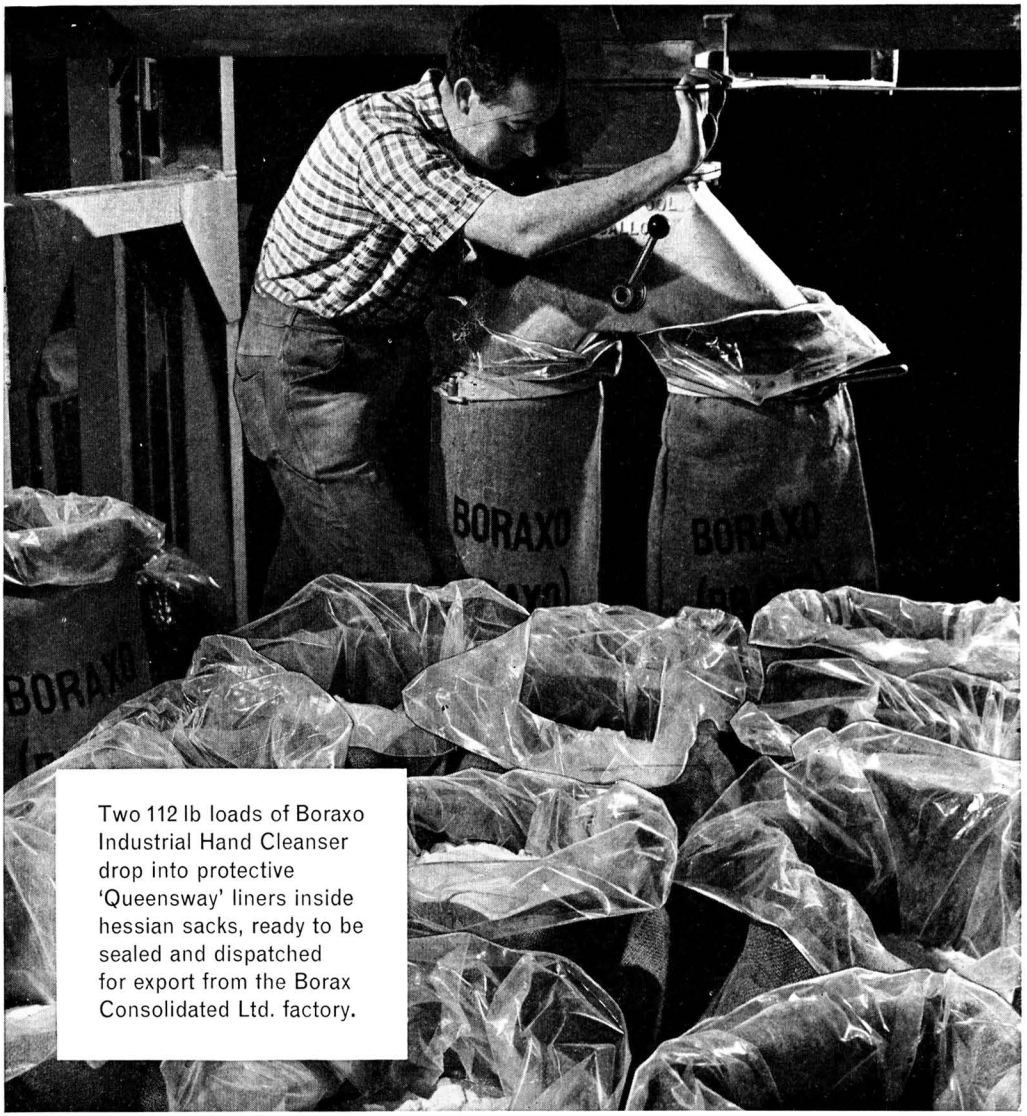
Chemical Age

incorporating

PETROCHEMICALS and POLYMERS

VOL. 86 No. 2205 14 OCTOBER 1961



Two 112 lb loads of Boraxo Industrial Hand Cleanser drop into protective 'Queensway' liners inside hessian sacks, ready to be sealed and dispatched for export from the Borax Consolidated Ltd. factory.

'Queensway'

the liner and the service for bulk chemical sales

'Queensway' polythene liners like these are made by British Visqueen Ltd., the recognised authorities on polythene film packaging. They are made from selected film to your exact specifications by experts. They are chemically inert, provide a quick and complete seal against moisture and are tough enough to withstand long journeys to export markets with only a hessian outer. They are also extremely competitive in price. If you are aiming at large scale bulk sales for your chemicals, whether you pack in drums, cartons or sacks, ring Stevenage 1310 now about 'Queensway' polythene liners.

'Queensway' polythene liners

QW191

FROM BRITISH VISQUEEN LIMITED · SIX HILLS WAY · STEVENAGE · HERTS

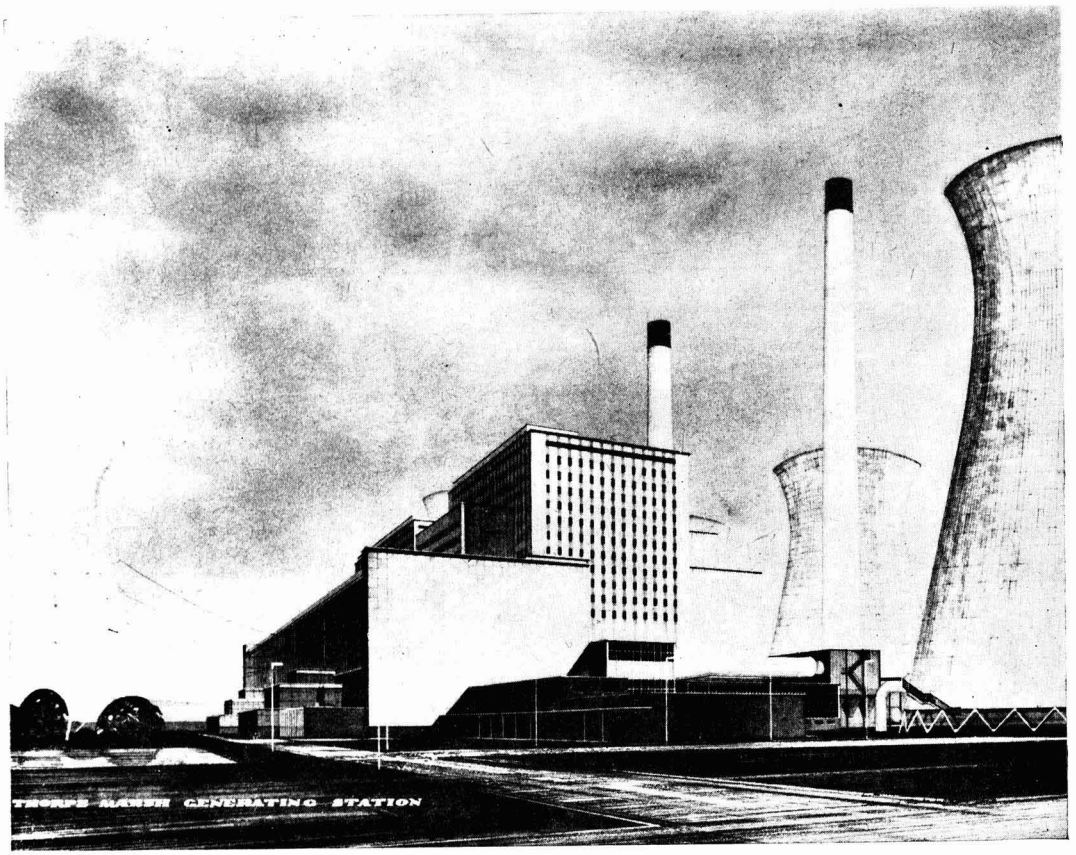
INDEX TO ADVERTISERS

The first figures refer to advertisements in **Chemical Age Directory & Who's Who,** *the second to the current issue*

(Continued on page 574)

INDEX TO ADVERTISERS

The first figures refer to advertisements in **Chemical Age Directory & Who's Who,** *the second to the current issue*



STAND
46

Effluent and Water Treatment Exhibition, Seymour Hall, Seymour Place, W.1.

THORPE MARSH

Two 550 MF twin furnace boiler units.
Evaporation ... ... 3,750,000 lb/hr.
Steam pressure 2,400 lb per sq. in.
Steam temperature ... ... 1,055° F.

The Neckar Water Softener Co. Ltd. is engaged in providing the water softening plant at this station.

Neckar has the knowledge and experience to supply deionisation water treatment plants for installations such as this and for all other purposes.

NECKAR

NECKAR WATER SOFTENER CO. LTD.
Artillery House, Artillery Row, London, S.W.1
Telephone : Abbey 6552

Telegrams : Neckarist Sowest London

How ALLIS-CHALMERS GYRATORY SCREENS serve the people of Britain!

Scores of products which are household names throughout the length and breadth of Great Britain are manufactured with the aid of the world-famous Gyratory Screens made by Allis-Chalmers. With gentle, vibration-free motion these screens size dry lumps or granular materials into 2, 3 or 4 predetermined separations before they are passed on to the compactor mill. Why do so many important manufacturers use Allis-Chalmers Screens?

Simply because they rank with the very best in the world and are developed from Allis-Chalmers vast world-wide experience. It is, moreover, all *modern* equipment produced by first-class engineering methods.

Allis-Chalmers equipment is itself a 'household word' with manufacturers.

You are invited to write for full information about the Allis-Chalmers Screens available for *your* industry.

ALLIS-CHALMERS Great Britain Ltd., 728 Salisbury House, London Wall, London, E.C.2. Telephone: NATional 0821

CFM/61/ACE/6

VOL. 86 No. 2205
OCTOBER 14 1961

Telephone: FLEet Street 3212 (26 lines)
Telegrams: Benformula - London E.C.4

Editor M. C. HYDE
Manager R. C. BENNETT

Director N. B. LIVINGSTONE WALLACE

Midland Office
Daimler House, Paradise Street, Birmingham. [*Midland* 0784-5]

Leeds Office
Permanent House, The Headrow, Leeds 1. [*Leeds* 22601]

Scottish Office
116 Hope Street, Glasgow C2. [*Central* 3954-5]

IN THIS ISSUE

Annual subscription is: home, 57s 6d, overseas, 65s, single copies 1s 9d (by post 2s)

C

Chemical Age
incorporating
PETROCHEMICALS and POLYMERS

BOUVERIE HOUSE · 154 FLEET STREET · LONDON · EC4

ABS POLYMERS

SPECULATION has been rife in recent months as to who would have the first major U.K. plant for the production of ABS (acrylonitrile, butadiene, styrene) polymers. It was thought likely that one of the larger companies (Distillers, I.C.I., Monsanto or Shell) would be first off the mark.

At the end of last week, however, Anchor Chemical in the U.K. and Borg Warner's Marbon Chemical Division of the U.S. simultaneously announced their intention to give the U.K. its first ABS plant. Anchor have been Marbon's sole British distributors for some time and have been marketing that company's Cycolac brand polymers in this country.

No plant capacity has been given for the new unit which, for raw materials reasons, will be sited at Grangemouth, but it has been stated that the U.K. unit will be smaller than the plant operated by Marbon at Washington, W. Va. Capacity of the U.S. plant is 25 million lb./year; and Marbon have made these polymers for several years.

I.C.I. are licensed by the Naugatuck Division of U.S. Rubber, also long-established in the ABS field, and market their Kralastic resins in this country. Naugatuck have capacity for 45 million lb./year at Baton Rouge. Monsanto Chemical Co. will come into production at Addyston, Ohio, by the end of this year or early next year with America's largest ABS plant with capacity of 50 million lb./year. This figure will include an estimated one-third for styrene-acrylonitrile copolymers. Monsanto also have a 6 million lb./year semi-commercial plant at Springfield, Mass. The fourth U.S. producers are B. F. Goodrich, with capacity for 15 million lb. at Akron, Ohio.

The U.K. market has been building up more slowly than in the U.S., where production this year is expected to near 50 million lb., double the 1958 output. That output figure compares with 1961 capacity for 91 million lb., excluding the new Monsanto plant. The U.S. industry expects output to reach 90 million lb. by 1965, and to exceed 200 million lb. by 1970.

Even though U.K. demand is only slowly building up, a big future is seen for ABS polymers, which as engineering plastics can be deemed competitive with nylon moulding resins, acetal resin and polycarbonates. ABS polymers have a price advantage, but this has been diminishing with lower prices for Du Pont's acetal resin.

ABS resins are rigid with high tensile strength, plus high thermal stability, good resistance to abrasion and are easy to process. They can be extruded into pipe or sheet for vacuum forming or moulded for use in domestic appliances, transport construction, communications, office equipment, etc. Typical end-products in this country are telephone hand sets, automative components, shoe heels, appliance housings and vacuum cleaner parts. ABS sheeting has good chemical resistance and will it is felt find new uses in chemical plant, particularly for pipes.

The Anchor/Marbon plant will be strategically located at Grangemouth, where butadiene and styrene are available. There is only one U.K. acrylonitrile plant and that is at I.C.I. General Chemicals Division's Castner

(Continued on page 582)

N.I.F.E.S. Help Save 25,000 Gall. of Fuel Oil in 1960 at Yorks Fertiliser Works

SOME 106 factories and premises in the chemical industry called upon the National Industrial Fuel Efficiency Service (N.I.F.E.S.) to carry out fee-earning work for them in the year 1960-61, making a total of 402 for the seven years, 1954-61, that N.I.F.E.S. has been in operation. Total number of N.I.F.E.S. clients in all industrial groups was 1,441 in 1960-61, the cumulative 1954-61 total being 5,669.

These figures are given in the N.I.F.E.S. annual progress survey, which reveals that, during the year, N.I.F.E.S. engineers paid more than 11,000 visits to factories and premises where large quantities of fuel are used. Backbone of the N.I.F.E.S. work remains the investigation of combustion conditions in boiler plants and "this year's results confirm that, when a boiler plant comes into the hands of N.I.F.E.S., the consumption of fuel, on average, can be reduced by one ton in seven".

One example of N.I.F.E.S. work is an improvement in the performance of a dryer for inorganic fertilisers, in which they collaborated with Robt. Stephenson and Sons Ltd., Beverley. At this works the granulated material has to be dried to a final moisture content of 1% in a rotary kiln, direct fired by oil. The company's staff redesigned the combustion chamber and purchased an improved type of oil burner. A mixing chamber and a system of ducts was then installed to enable the hot gases to be recirculated. The oil consumption, originally 6¼ gall. per ton of dried fertiliser, was reduced to less than 4½ gall./ton, representing a saving of over 25,000 gall./year of oil.

Even then, it was felt that further savings should be possible, and so a further survey on the modified dryer was carried out, confirming the benefits already obtained by the alterations and showing that the fuel oil consumption might be reduced to less than 4 gall. per ton of product. The temperature of the recirculation duct was high enough to justify its insulation. Apart from the fuel saving, the management has reported an improvement in quality of product.

Another example of N.I.F.E.S. work for the chemical industry lies in helping to reduce atmospheric pollution. One recent approach came from I.C.I., who wished to find out the carry-over of grit and dust when mixtures of coal and coke breeze, or of coke breeze and anthracene fat, were burnt at their Trafford Park factory. N.I.F.E.S. obtained the information required and were also able to suggest possible ways of improving the effectiveness of the grit arrestors installed.

St.-Gobain Report Heavy Investment in New Chemical Plants

BUSINESS activity in the various departments of Compagnie de Saint-Gobain was reported as being brisker in 1960 than in 1959 at the annual meeting held on 26 June. Progress in sales was generally only limited by production capacity. After depreciation and allowances, profit for the year under review was NF 39,960,226, an increase of 19.4% on the 1959 figure of NF 33,417,935.

In the chemical sector, the agreement on common interests reached in December 1959 between Saint-Gobain and Pechiney began to take effect, and since November 1960 the sales of chemicals and minerals produced by both companies have been undertaken by Societe Produits Chimiques Pechiney-Saint Gobain, a company set up in December 1959.

The construction of several new plants has been undertaken during the year as part of a large programme of new production units. These include a new contact sulphuric acid plant at Le Havre, two nitric acid plants at Saint-Fons and Rouen and a vinyl chloride polymerisation plant at Saint-Fons, a fertiliser granulation plant at the Bordeaux works, a phosphoric acid plant, two phthalic anhydride plants and a maleic acid unit at Chauny and a new contact sulphuric acid plant at l'Oseraie (already in production) as well as two new fertiliser granulation plants at Balaruc and Chauny. Increased capacity for monomer vinyl chloride and polyesters was installed in the Saint-Fons works.

Turnover on sales of finished organic products showed an increase of 22% over the previous year. The corresponding figure for mineral products for industry is 15% and mineral products for agriculture, 8%.

Activity in associate companies includes the construction of a sulphuric acid plant currently being undertaken by Fabriques de Produits Chimiques de Thann and Mulhouse. The acetylene and heavy hydrogen plants of Aquitaine Chimie and the acetaldehyde plant of Acetalacq, part of the Lacq complex, have come on stream.

Wellcome Grant for Imperial College

The Wellcome Trustees have made a grant of £13,500 to Professor D. H. R. Barton for a nuclear magnetic resonance spectrometer for the Organic Chemistry Department, at Imperial College, London.

Heavy Space Bookings for Second Chemical Plant Exhibition

EVEN though the whole of Olympia, London, had been reserved for the 2nd Chemical and Petroleum Engineering Exhibition, space has already been heavily booked, Mr. J. M. Storey, C.B.E., chairman of the Council of British Manufacturers of Petroleum Equipment, told members and guests at the Council's annual dinner, held in London on 4 October. Mr. Storey also drew attention to the annual meeting of the Federation of European Petroleum Equipment Manufacturers, to be held at Marseilles towards the end of this month, and said that the meeting could be extremely important so far as the Council were concerned.

Attendance at the dinner was some 1,500, the principal guest being Mr. Kenneth Horne, the well-known broadcaster, who until recent years has been a director of a number of industrial companies as well. Other guests included Mr. George Brearley, director of the Association of British Chemical Manufacturers; Prof. P. V. Danckwerts, G.C., M.B.E., Shell Professor of Chemical Engineering, University of Cambridge; Mr. Norman Fraser, chairman, British Chemical Plant Manufacturers' Association.

Unnamed Company Bids for Wm. Butler

THE DIRECTORS of Wm. Butler and Co. (Bristol) Ltd. are conducting discussions with another company which has approached them with an offer to purchase the share capital. These negotiations, says Mr. Eric W. Butler, chairman, are still at an early stage and as yet there is no assurance that a firm offer will be made.

Until a statement is made, which may not be for some weeks, shareholders are advised to retain their shares. The 5s snares rose 1s to 9s 6d when the bid was made, which places a value of more than £1 million on the equity capital.

Members of the William Butler group are Bristol and West Tar Distillers Ltd., Fox and Vowles Ltd., and W. H. Vowles and Sons Ltd.

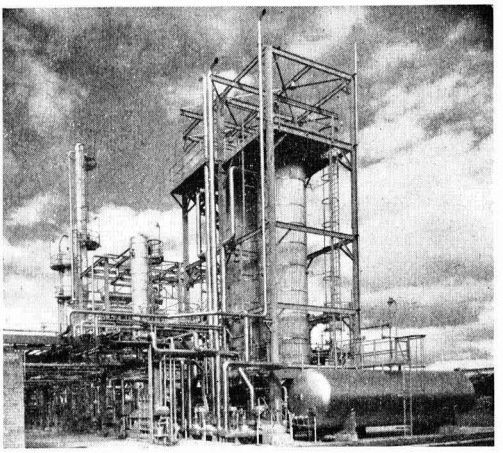
ABS Polymers

(*Continued from p. 581*)

Kellner works. There is a possibility that other companies may enter this field for there are at least four petrochemical processes available—the propylene and ammonia routes of Du Pont and Sohio in the U.S., Montecatini in Italy and Distillers in this country. Acrylonitrile from this route is reportedly cheaper than by the traditional process and Sohio state that investment cost of $340/annual-ton of acrylonitrile compares with $840-$1,200/annual-ton of material made from acetylene and hydrogen cyanide.

Project News

Compactness is Feature of Fluor-designed Butadiene Plant



General view of No. 2 butadiene extraction plant looking west

THE U.K. capacity for the production of synthetic rubbers and co-polymers will be substantially increased when British Hydrocarbon Chemical's second butadiene plant at Grangemouth comes on stream. **Fluor Engineering and Construction Co. Ltd.** were responsible for the design, engineering and construction of the plant which employs the Dow hydrogenation and Esso CAA extraction processes and will yield a product of high purity.

In designing the layout of the No. 2 Butadiene extraction plant, Fluor engineers originally envisaged a straight-in line arrangement of the various units which form the links in the chain of processes leading from the feedstock to the final product. However, due to space requirements for future plants it was necessary to revise this arrangement to such an extent that all the units and ancillary pieces of equipment fitted into a smaller and almost square plot area.

This major revision was effected rapidly and economically by utilising the scale plant models which Fluor had constructed in their own model workshop for use as design tools and construction aids. The resultant layout is unusually compact.

Despite the closeness to each other of all the units and equipment, unobstructed access to any section for ease of maintenance and operation has been achieved through the ingenuity with which the plant arrangement was made. A passageway running in two directions through the plant beneath the overhead pipeway permits entry of large trucks and other heavy maintenance equipment, and is sufficiently wide to allow these to be easily manoeuvred into position.

Although the plot area is comparatively small for the overall size of the plant, the layout is nevertheless in no way cramped. It would not be surprising if future multi-unit plants follow the pattern set by the No. 2 butadiene plant at Grangemouth and are similarly compacted in order to make the most economic use of available land.

I.C.I. Plan Further Big Nylon-66 Expansion

● ANOTHER big extension to the nylon-66 plant at Wilton is being considered by **I.C.I. Dyestuffs Division.** This will be an addition to the extension now virtually complete with capacity for 23,000 tons/year, which by the end of this year should double polymer output and which will be followed by a further extension due to come on stream about the middle of 1962, raising capacity by 25-30%.

Decision to build I.C.I.'s nylon-66 plant at Wilton was taken in 1953 and the first turf was cut in July 1955, to be followed by commissioning of the first plants—for benzene and cyclohexane—in 1957. The latest expansion is planned "for some time in the future". The nylon works at Billingham and Wilton employ more than 2,000 people and make about a tenth of the world's supply of nylon.

I.C.I. Dyestuffs Division also has a £10 million project for the production of nylon-6 using the Emser Werke/Inventa process. Caprolactam for this project will be made at Severnside; a site has yet to be announced for polymer production.

Big Expansions in Organics for Howards

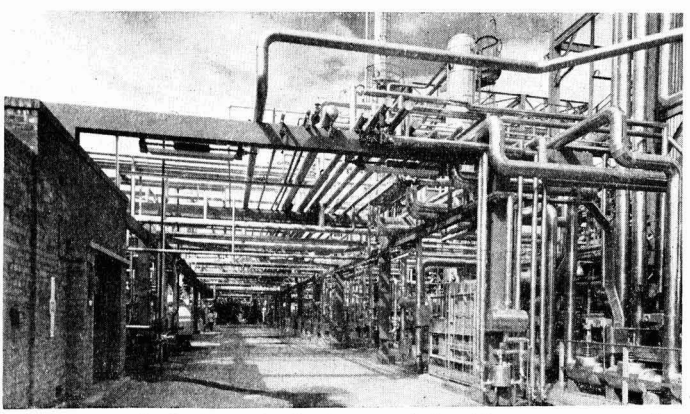
● FURTHER moves into the synthetic organics field, foreshadowed by the chairman of Laporte Industries Ltd. in his annual report, are now disclosed. **Howards of Ilford Ltd.,** a member of the Laporte Group, who are in the final stages of a £1.5 million expansion programme are now to undertake two other major projects.

The first comprises a new unit to make dicyclohexyl phthalate on which construction will start "quite soon," with completion scheduled before the end of 1962. This will be a much larger plant than Howards present unit and will be able to supply all likely increases in home and export needs for some years to come. Dicyclohexyl phthalate is a solid plasticiser extensively used in transparent wrapping film and the paper industry.

The second project covers construction of a plant to produce 9,000 tons/year of cyclohexanol and cyclohexanone by the direct oxidation of cyclohexane with air. These two products will be sold by Howards as such or in the form of derivatives — dicyclohexyl phthalate, resins, cyclohexylamine, etc. This plant is expected to be completed by the end of 1963.

No contractors are named for these projects.

Howards have recently completed a cyclic ketones plant to produce 2,000 tons/year of cyclohexanone and methylcyclohexanone. Main contractors were **W. J. Fraser and Co. Ltd.** Work is also proceeding to schedule on a 1,000 tons/year plant to raise capacity for cyclohexanol and methylcyclohexanol phthalate ester plasticisers. This project is due for completion early next year.



East-west overhead pipe track, showing one of the wide access ways running through the B.H.C. butadiene plant

Project News

Anchor Join With Marbon For First U.K. Production of ABS

FIRST major U.K. production of ABS (acrylonitrile, butadiene and styrene) polymers will be a joint venture by **Anchor Chemical Co. Ltd.**, Manchester, and the **Marbon Chemical Division** of Borg Warner Corporation, Washington, W. Va

Marbon's Cycolac brand ABS polymers and other synthetic resins will be produced at a plant to be built at Grangemouth, site of the B.P. refinery and the petrochemical and plastics plants of British Hydrocarbon Chemicals Ltd. The site is being purchased from the local Town Council and was chosen after a study of various sites as being the most suitable from the raw materials point of view. (Both butadiene and styrene are produced at Grangemouth, butadiene by B.H.C. and styrene by the B.H.C.-associates Forth Chemicals Ltd. Only U.K. producers of acrylonitrile are I.C.I. General Chemicals Division.)

In announcing this joint venture, Mr. F. Savaage, Anchor chairman, and Mr. R. Shattuck, Marbon president, state that the plant to be constructed will be smaller than that operated by Marbon in West Virginia, where capacity is currently 25 million lb./year. Overall cost of the Scottish project will be less than £2 million; the plant will be operated by Anchor Chemical. Main contractors have yet to be announced.

Marbon are one of four U.S. producers of ABS polymers, others being Naugatuck Chemical Division of U.S. Rubber (45 million lb.), B. F. Goodrich (15 million lb.), and Monsanto Chemical whose new Addyston, Ohio, plant will come on stream early in 1962 with capacity for 50 million lb.

Anchor are sole distributors for Marbon in the U.K. and elsewhere in the world. In addition to Anchor, ABS resins have been marketed in the U.K. by B. and I. Chemoplast Ltd., Guest Industrials Ltd., I.C.I., Iridon Ltd., North British Rubber Co. Ltd., S.I.C. Plastics Ltd.. and Witco Chemical Co. Ltd.

Cycolac polymers based on acrylonitrile, butadiene and styrene are engineering plastics with high-impact resistance; as such they compete with nylon, polyformaldehyde and polycarbonates. Industries served include domestic appliances, transport, construction, communications, office equipment and electrical fields.

Procon Awarded Contract to Build Shell Refinery in Mombasa

BRITISH-BASED contracting companies are currently involved in five refinery contracts worth between £50 and £60 million. In addition two further refinery projects are likely to be handled in the U.K.

Latest contract to be awarded is that gained by **Procon (Great Britain) Ltd.**, Bush House, London W.C.2, who are to handle the refinery at Mombasa, Kenya, for Shell International Petroleum. For South African Petroleum Refineries (a 50-50 joint Royal Dutch/Shell and B.P. Company) **Foster Wheeler Ltd.**, London, are main contractors for the 70,000 b.p.s.d. Durban, Natal, refinery. **McKee Head Wrightson Ltd.**, although not main contractors, are handling detail engineering for the new 55,000 bbl/day refinery which Caracas Petroleum, a subsidiary of Ultramar, are building in Panama. Main contractors here are Arthur McKee, partners with Head Wrightson in the London company.

Busiest of the London petroleum engineering concerns, however, are **Kellogg International Corporation Ltd.**, who recently moved into their modern office block in Chiltern Street, W.1. Now working on an extension at the B.P. Dinslaken refinery, they have been awarded contracts to build refineries for Gulf Oil in Denmark and Caltex in Frankfurt.

Contract for Shell's projected New Zealand refinery is now in the tendering stage and will, it is thought, be placed in London. British Petroleum have not yet put their Belfast Lough refinery out to tender; when they do this will almost certainly have a London main contractor. Since Constructors John Brown Ltd. and Matthew Hall and Co. Ltd. have both built units at B.P. refineries, it is felt by some in the oil world that this Northern Ireland refinery could be the first-ever to be handled by a completely British company, as opposed to the London subsidiary of an American organisation.

Over the last few years, U.K. contractors have handled the construction of some 20 complete refineries.

Data Processing Centre for Thomas Hedley

A data processing centre is to be set up by Thomas Hedley and Co. Ltd. at their Newcastle upon Tyne head office. It will be equipped with a N.C.R. 315 computing system. The centre will be developed to provide a variety of services for the commercial and scientific departments. These will include scientific calculations for the company's engineers and research chemists.

Australia Opens First Catalytic Reforming Plant

● AUSTRALIA'S first catalytic reforming plant for the conversion of refinery petroleum gases into standard towns gas—designed and constructed by the Sydney office of **Humphreys and Glasgow Ltd.**—will come into operation on 13 October at the works of the Geelong Gas Company in Victoria.

Last year Geelong Gas produced some 600 million cu. ft. of gas. Thus, the new Onia Gegi plant will supply a big proportion of the city's gas supply. It will consist of two catalytic reforming units, each with a capacity of 1.5 m.c.f.d. of town gas. Feedstock will normally be tail gases piped five miles from the Shell refinery at Corio.

To cater for refinery maintenance periods, the reforming plant will use as an alternative feedstock LPG which will be held in store at a near-by tank farm.

During reforming refinery gases mixed with steam pass through a nickel-base catalyst at a temperature of about 850°C, where the hydrocarbon steam reaction takes place to yield a reformed gas having a calorific value of approximately 350 B.Th.U./cu. ft. This is further enriched with additional refinery gas.

U.K.A.E.A. Contract for Leonard Smith

● AMONG the contracts that Leonard Smith (Engineers) Ltd., Gillingham, Kent, currently have in hand is a plant for the United Kingdom Atomic Energy for the treatment of active liquor.

The reorganisation of the stearine blocking and packaging plant of Price's (Bromborough) Ltd. is also being undertaken by Leonard Smith. In addition the company has further contracts for process plants in the chemical, petrochemical and plastics industries.

U.K. Contract for Yugoslav Gas Plant

● A CONTRACT worth £1 million has been awarded to **Edwin Danks and Co. (Oldbury) Ltd.**, a subsidiary of Babcock and Wilcox, for the supply of a gasoline plant to Yugoslavia. The order, which was secured with the collaboration of two U.S. design companies, includes the supply of well head equipment.

The contract was placed by **Technometal Export-Import** acting on behalf of the Naftagas concern of Yugoslavia. The raw material to be used is the natural gas found in parts of Yugoslavia. The majority of the plant materials will be supplied from U.K. sources.

Fire at Derbyshire Chemical Factory

An explosion followed by fire has occurred at the Woodside Mills, New Mills, Derbyshire, a chemical works.

Ambulances and eight fire engines were sent to the works but at the time of going to press it was not known whether anyone was injured. The latest report was that the fire is spreading.

GAS COUNCIL ANNUAL REPORT

Gas Industry Presses On with Research to Bring Down Production Costs

UNABATED efforts to discover and develop new processes for the economical production of gas and its by-products are a predominant theme of the Gas Council's annual report for 1960-61, published on Tuesday. The report offers no fresh comments on the subject of imported methane, the Council's proposals for importing some 700,000 tons/year of liquefied natural gas from Algeria being still under consideration by the Minister of Power; nor is any further news given of the joint N.C.B./Gas Council study of possible East Midlands sites for a big new Lurgi coal gasification plant (C.A., 23 September, p. 431). Both the imported methane and the Lurgi proposals, along with other investigations, have occupied the attention of the new planning and development section which was announced by the Council in last year's report, and which was established during the year now reviewed.

The daily capacity of gas making plant installed during the year was 43 million cu. ft., or 204,000 therms. Plant with a daily capacity of 109 million cu. ft. or 509,000 therms was scrapped. Total daily gas making capacity on 31 March 1961 was 2,499 cu. ft., or 11.9 million therms. During the year 51 works were closed down, the number in production on 31 March being 378, compared with 1,050 at vesting date.

Hydrogenation. Research on the hydrogenation of oil and coal at high pressure continued during the year and although the process made was encouraging, it was not considered sufficient to justify a resumption of work on the installation of a commercial-scale plant based on that process at the Partington works of the North Western Gas Board.

An extensive laboratory investigation at the Midlands Research Station has shown that coal, if used as a powder, can be hydrogenated to give a gas of calorific value equivalent to or higher than that of town gas. The work is just entering the pilot stage. Testing of the coal hydrogenator has indicated the desirability of further simplification of the design. It is now proposed to hydrogenate the coal in two separate vessels, neither of which will have the counter-current arrangements used previously. The vessel will have a recycle to prevent caking and will operate at 800-850°C; the second will take the char from the first and will operate at 900-950°C. A further application of hydrogenation that is under investigation is in the production of town gas by the hydrogenation of coal using lean gas.

Lean Gas from Coal. Operation of the Lurgi coal gasification process under slagging conditions offers a number of advantages and research on the pilot scale slagging fixed bed gasifier is continuing. Following results obtained from earlier tests, modifications to the plant are now in hand which, when complete, will have an output of 4-5 million cu. ft./day.

A complete gasification process, the slag bath generator process, operating at near atmospheric pressure, is being investigated by the London Research Station (C.A., 4 June, 1960, p. 913).

Town Gas from Petroleum Oils. Pilot scale work on the hydrogenation of oils is proceeding. Tests have been completed on light distillate with and without the production of benzene as a by-product. Tests on crude oil are now in hand and will be followed by tests on heavy oil. In another approach to the production of gas from petroleum products, it has been found that gas suitable for peak load purposes can be produced by the high pressure gasification of light distillate and steam in the presence of a nickel catalyst. The erection of the 200,000 cu. ft/day peak load plant is now completed and testing is in progress. Experiments are being carried out with butane as well as with light distillate.

Lean Gas from Oil. A pressure reformer is being developed for the purpose of producing lean gas rich in hydrogen by reforming the rich gas produced in the hydrogenation of oil. A design study is also being made at Solihull since such a reformer might also be used for reforming imported natural gas.

Gas Purification. In research on the reduction of carbon monoxide in gas, guard catalysts for use in the water gas shift reaction to prevent fouling of the main catalyst are being studied. Small scale tests indicate that nickel subsulphide on china clay, nickel molybdate on alumina and nickel on magnesium silicate are the most promising guard catalysts for carrying out the water gas shift on carburetted water gas. Further experiments will be carried out in a new pilot plant at Beckton.

A study of liquid reagents for the removal of hydrogen sulphide from gases shows, so far, that iron ethylene diamine tetra-acetic acid is a promising reagent of oxidation reduction type, removing H_2S and converting it to sulphur. A pilot plant to treat 1,000 cu. ft./hr. of carburetted water gas in a four-plate sieve column will aid further studies.

Effluent Treatment. The biological oxidation of ammonia effluent is being studied by the London Research Station. A pilot plant at the Southall works of the North Thames Gas Board treats spent ammoniacal liquor from the liquor concentration plant and in several months' operation the rate of treatment achieved is already a substantial advance over the treatment of liquor in sewage practice.

FINANCIAL RESULTS

During the year the gas industry had a surplus of £2,039,124 (against a deficit of £2,376,521 in 1959-60) on a gross income of £401.9 million (£389.1 million).

Capital investment in 1960-61 was £43.3 million, of which £15.4 million was spent on manufacturing plant.

The net revenue from products other than gas was £86 million of which £73.8 million came from coke and breeze and £12.2 million from tar, benzole and other chemical products.

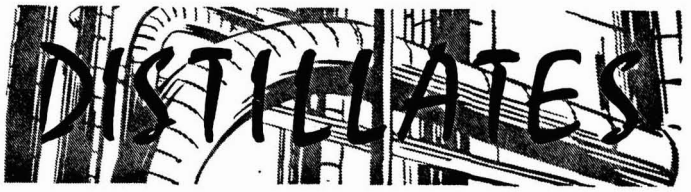
High Demand for Refined Gas By-products Keeps All Recovery Plants Busy

THE decline in the production of crude by-products slackened, in accordance with the pattern of coal carbonisation, the quantities made by Area Boards showing little change over the previous year. Demand for most chemical products remained strong but there was no improvement in the markets for briquetting pitch and coal tar fuels, the stocks of which continued to rise.

Tar Products. Co-operative distillers again handled the greater part of the crude tar produced, which amounted to 1.7 million tons, but 0.4 million tons were distilled by the Area Boards, mainly the North Thames and South Eastern Boards. Sales of refined tar for road work at home were maintained but in the export field, refined tar continued to face strong competition from bitumen. Sales of creosote in the export field were very difficult to obtain, consumption in the U.S. and Europe continuing to fall.

With the exception of phenol, there was no slackening in demand for refined products (carbolic acids, naphthalene and pyridene) and every endeavour was made to obtain maximum recovery from all the plants in the country. The

(*Continued on page 588*)



★ WITH all their existing nylon capacity plus two expansions in hand for nylon-66 and one more in the planning stage and a £10 million project for nylon-6, it might be thought that I.C.I. were worried by over-capacity fears.

But Dr. G. Collin, works manager of the company's Northeast Coast factories, announcing that Dyestuffs Division was at present thinking about the possibilities of still another big extension "for some time in the future", said that nylon accounts for only 2% of the enormous world market for textiles, a market which is still expanding. There is obviously room for all the synthetic fibres to live and to take an increasing share of the market.

The newer synthetic fibres almost certainly will not supersede nylon. The first truly synthetic fibre, nylon is still claimed to be the best all-round textile material.

★ A SUMMIT meeting place for top businessmen aptly describes the board meetings held this week by British company directors. They chose a restaurant at the highest point of the Taunus mountain range in Germany.

They are Peter Ryder, Brian Turpin, John Window and E. L. Harrison. Ryder is chairman and Turpin managing director of Q.V.F. Glastechnik and Quickfit Laborglas, German subsidiaries of the Quickfit group of chemical, scientific and industrial glassware firms. Window and Harrison are their marketing colleagues.

When they come down from the peaks, they will go to Wiesbaden where Ryder will open a new £150,000 factory to make their glassware in Germany—the firm "having already captured a substantial part of the market in Germany, traditional home of scientific glassware."

★ LONG known only in the laboratory, hydroxyacetic acid is at last finding its way into more and more fields of industry due to a large extent to the research efforts of Du Pont. The company produces hydroxyacetic acid during the course of their ethylene glycol process.

One of the most attractive properties of glycolic acid, among the cheapest of organic acids, is its action as a chelating agent. Citric acid is still a popular chelating agent although an expensive one so that glycolic acid has the edge on citric as far as price is concerned, and it is also claimed to be more versatile than many other chelating acids. An example of this is its application in deep water wells which are often clogged with a deposit of mainly ferric hydroxide. The usual procedure is to acidify the well with hydrochloric acid followed by treatment with a chelating agent to keep the iron in solution. The solution is then pumped out and sodium hypochlorite is put in to kill the bacteria. All these needs can now be met by a single treatment with hydroxyacetic acid.

This is only one of the developments which make Du Pont feel that hydroxyacetic acid deserves to be better known.

★ FOLLOWING approval by the American Dental Association of the use of stannous fluoride in their Crest toothpaste, Procter and Gamble's sales have climbed steeply. Now Colgate-Palmolive are test marketing a new stannous fluoride toothpaste known as Cue, while Bristol-Meyers are including sodium fluoride, together with hexachlorophene, in their Ipana product.

According to a recent issue of *Chemical Week*, the big boost for fluorides followed tests sponsored by Procter and Gamble at the Indiana University School of Dentistry. It was discovereed that the use of calcium pyrophosphate as a polishing agent was the key to the successful formulation of the toothpaste. Other polishing agents were incompatible with the tin compound. The patented formulation includes 0.4% stannous fluoride; 39% calcium pyrophosphate; 30% glycerin; 1.0% stannous pyrophosphate; 24.97% water and 4.63% of miscellaneous ingredients.

This formulation shows that stannous fluoride is never likely to become a bulk chemical so far as its use as a toothpaste additive is concerned.

★ HOW can a small firm making only one product compete successfully with I.C.I.? The answer is simple according to I.C.I.'s chairman, Mr. S. P. Chambers. All that is needed is one man who is his own managing director, sales director, factory manager, foreman, Uncle Tom Cobley and all. Put him in a tiny office in a corner of the works, where with one telephone he can control everything.

Customers' orders go straight to this one-man band. He makes no reports to anyone in the business, because there is no-one else. He also has the unique advantage of having no reports to read, virtually no need of a secretary and there is no waste of time. Give that man a product that lends itself to relatively small-scale production, a quality and style that is static and eliminate research costs. The result is a costing which from I.C.I.'s point of view is "quite shockingly low". This one small, one man-at-the-helm, one product business, in fact had overheads that were virtually nil. For the same, unspecified product, Mr. Chambers said "I would hate to confess how much our company overhead costs were".

But for the average business, Mr. Chambers' advice to personnel managers at Edinburgh last week was to delegate authority. Top management, he said, can no longer take account of the economic implications of all the decisions that have to be made. There is, therefore, an urgent need for a bold system of delegation that leaves only major decisions to be taken at the top.

★ SINCE it was introduced in 1955, an Italian law fixing a colour identification scheme for piping at industrial plant has been postponed a number of times. However, the Ministry of Industry in Rome has stated that no further postponements will be accepted.

The regulation concerned stipulates the following colour code: red, high temperature; white, high pressure; yellow-orange, hazardous products; green, water; blue, air; brown, oils; red stripes on a basic colour indicates that the substance is conveyed at high temperature; white stripes on basic colour indicates high pressure; red and white stripes together indicate that material is conveyed both at high temperature and high pressure.

★ ALMOST simultaneously with the granting of a licence to Pfizer Ltd. for the sale of Sabin polio vaccine in the U.S., a serious outbreak of the disease occurred in New York which necessitated the shipping of large quantities of the vaccine to the U.S. This presented a problem for the packaging department.

The oral polio vaccine must be kept frozen until just before administration, and, since an airliner cannot offer vast deep freeze facilities, it meant that the vaccine had to be provided with its own compact deep freeze. This comprised a six-foot long container consisting of three-inch slabs of expanded plastics covered hardboard. An inner vaccine container is placed inside this and on top of a layer of dry ice. A two-inch space between the containers is filled with dry ice. A recessed lid is placed on the inner container and dry ice loaded on the top. The lid of the main container, a similar slab of expanded plastics, is bolted down and sealed. Ventilation holes are placed at intervals round the container to allow the evaporated carbon dioxide to escape.

Packed in this way, the vaccine will remain at a temperature of −60° for three to four days and the vaccine itself will remain stable for a further five days.

Fully loaded with a consignment of a million doses packed with 400 lbs. of dry ice, the load weighs about 1,500 lbs. By the end of October, Pfizer Ltd. will have transported nearly 20 million doses of vaccine to the U.S. in this way.

Alembic

S. P. Chambers on Common Market

Entry Would Put New Life Into British Economy

ENTRY into the European Economic Community was likely to be of great long term advantage to British industry as a whole, as well as to the benefit of Imperial Chemical Industries Ltd., who on balance would gain far more than they would lose. This was stated by Mr. S. P. Chambers, I.C.I. chairman, in a paper entitled 'The economic aspects of business enterprise', which he presented at the national conference in Edinburgh last week of the Institute of Personnel Management.

For too long, said Mr. Chambers, sections of British industry had become increasingly insular, introspective, restrictive, reactionary, and inflexible. The protection of sections of industry that were obsolete and inefficient and ought therefore to be shut down so that the manpower, including management, was available for more progressive and developing industry, had been matched on the trade union side with restrictive practices, arising largely from the demarcation of one union from another, which has made it exceedingly difficult for some enterprises to adopt more efficient methods of production.

Almost anything that would drive away the lethargy of industries hiding behind the high walls of protection and subsidy would put new life into the country's economy.

Productivity

Completely free trade with Continental Europe and complete freedom of movement for both capital and labour would remove much that had prevented productivity in this country from rising as it could. There would be many changes in the structure of industry, and some local unemployment during the changes, but the final result would be a surge forward in production, in exports, and in standards of living.

Some production would automatically cease to be monopolistic—including some by I.C.I.—and persistence in restrictive practices in this country, both by industry and by trade unions, which in the past had led to lack of progress, protection of inefficiency and high costs, would result in loss of business to European competition and ultimately to shut-down. At the same time there would be a great change for the more creative and enterprising managements to seize the new opportunities to employ new methods, to increase productivity and to expand.

For the very large enetrprise there was another consideration. Research and development on new products was so expensive that even a market the size of Britain might not be big enough for an adequate spread of costs. The same was true of capital expenditure or development expenditure in some industries. A market five times the size of Britain meant that those sections of British industry would have a home market comparable with that of the U.S. or the U.S.S.R.

Trade between the U.K. and the countries of the overseas sterling area had been static for some years. Since 1954 imports of manufactures into North America and O.E.E.C. countries have been rising at an average rate of over 10% a year, while the imports of the overseas sterling area and Latin America have risen by only about 4½% a year.

Britain had not been obtaining her share of what growth there had been in sterling area markets. Taking the average for the years 1959 and 1960 and comparing it with the average for 1954 and 1955, the total exports to the overseas sterling area of the nine main exporters rose by 28%. U.K. exports to those markets rose in the same period by only just over 5% and most of that was accounted for by an increase in exports to India.

It was not, incidentally, the U.S. or Japan which gained most from the overseas sterling area markets at Britain's expense, but the Common Market.

This fall in Britain's share of overseas sterling area imports was to be expected with the reduction of discrimination in favour of British goods and against goods from other countries. Another factor which had restricted opportunities for expanding trade in those goods which we have traditionally supplied to the countries of the Commonwealth was the establishment of local manufacturing industry in those countries.

If Britain was to achieve a sound basis for its export trade, it was essential to reduce dependence on the sterling area countries, and other primary producing countries, which made up the slowest growing section of the world's markets, and to be able to meet competitors on level terms in those markets that were growing fastest.

Mr. Chambers declared: "There will be bitter controversy over this matter, but I believe that anybody who is deeply concerned with the more creative side of industry, anybody anxious to see general progress instead of stagnation, will come to realise, even if it may be opposed to his immediate interests, that in the long run the life-stream of British industry would be freshly invigorated by this union with the Common Market countries."

Outside Factors

Discussing the far-reaching effects on businesses of outside factors, Mr. Chambers said that free entry of foreign goods allowed where once there had been a high protective tariff, could ruin enterprise that had been sailing merrily along in the lea of the wall of protection. Sometimes there was nothing that could be done even with reasonably good forecasting, but very often it was possible to increase the advantage, or at least reduce the disadvantage, of external political or economic action by taking suitable action before it was too late.

In the case of a business that made something very specialised and there was only one plant which could not be adapted to anything else, the room for manœuvre was negligible. However, action which the one product business could only regard with impotent rage could often be taken in its stride by the large, diversified enterprise.

For example in Britain, attacks by the Ministry of Health on the pharmaceuticals industry, which were designed to draw attention away from the inefficient and costly administration of many hospitals, were doing irreparable damage to that industry. The argument that the prices paid for drugs were too high would always have a popular appeal, even if the result of starving the

I.C.I. Chairman Says . . .

Sections of British industry have become increasingly insular, introspective, restrictive, reactionary and inflexible.

In the long run the life-stream of British industry would by freshly invigorated by joining the Common Market.

Attacks on the drug industry, designed to draw attention away from inefficient and costly hospitals administration, are doing irreparable damage to that industry.

industry of money needed for research was that the best research workers slip away to America, Germany or Switzerland.

A new drug might cost a few shillings where an old one costs only a few pence, but if because of the efficiency of the new drug a patient was in hospital for one week instead of for several weeks, the saving in hospital costs would be counted not in shillings or pence but in pounds. This kind of consideration, weighing the ultimate saving against an immediate cost, must always be present in any private enterprise, but it was still absent from an administration which "is notoriously penny wise and pound foolish."

Nevertheless, the large, diversified enterprise, however angered and frustrated it might be by that kind of thing, could take action. It could, of course, remove its drug research facilities to another country, and, indeed, such a course had its attractions if some of the best scientific workers had already gone. Or, keeping its research facilities in this country it could concentrate on manufacture for overseas markets and meantime patiently plug away at the rather forlorn task of trying to get politicians to take the long view, which was in the country's interest, instead of the short one, which pleased the political gallery.

In order to assess the risks and to arrive at an estimate of how profitable a venture was likely to be, and to decide not only which products to manufacture but where to manufacture and what markets to go for, one must have economic information of all kinds—information about products, about countries, about what had happened and, more important still, what was likely to happen.

One must also be aware of the way in which an enterprise could be affected by changing economic conditions which were unrelated to political conditions. Here again, sound judgment and action could follow sound forecasting. For example, Mr. Chambers believed that all the evidence led to the conclusion that the really big developments in the clothing and textile industries were going to be in those countries with large populations with low standards of living.

The anwer to such a shift could not be the same for everybody. The single product enterprises with only one or two mills each were likely to fight a hard rearguard action and to seek the highest protection against the import of low priced goods from these Eastern countries. But they could do nothing about competition in their overseas markets. In the case of I.C.I. the erection of dyestuffs plants in India, and plans for Terylene manufacture there at a time when the company was also extending Terylene manufacture in Britain, showed how the diversified enterprise could take into account changes in economic conditions and in the pattern of manufacture and trade throughout the world.

New By-products Installations for Area Gas Boards

(*Continued from page 585*)

North Thames Gas Board completed and put to work its new naphthalene recovery plant which supplements the operation of the continuous creosote oil distillation plant recently commissioned. Towards the end of the year the manufacture of naphthalene from petroleum commenced in the U.S. and it is anticipated that competition from this source will intensify.

The South Eastern Gas Board has completed a new plant for crude tar acid extractions at its Ordnance Wharf tar works; some of the crude tars distilled here are rich in tar acids, for which demand is strong as a considerable benefit to revenue is expected.

Benzole Products. Area Boards extracted 25,682,000 gall. of crude benzole, an increase of 1,215,000 gall. over the previous year. There has been a marked tendency for gas manufacturing stations to maintain higher benzole extraction rates, in order to reduce to a minimum the sulphur content of the gas.

The profitability of benzole refining continued to suffer from changes in the quality of the crude benzole, which became increasingly of low gravity type. This tendency has been accelerated by the growing emphasis in carbonising operations upon the production of highly reactive domestic cokes. The chemical industry continued to demand large quantities of pure benzene for chemical synthesis and an increasing proportion of crude benzole was refined for this purpose.

Ammonia Products. Manufacture of ammonium sulphate and ammonia solution absorbed most of the production of crude ammoniacal liquor but the quantity sprayed directly on to the land as a fertiliser was maintained.

Laporte Yorkshire Companies

The administrative and sales office of the Yorkshire manufacturing companies in the Laporte Group will from 9 October be in new accommodation at Eastgate House, Leeds 2 (Leeds 32171). Companies concerned are Laporte Acids Ltd., with works at Hunslet, Castleford and Cleckheaton, and James Wilkinson and Son Ltd., and the Sheffield Chemical Co. Ltd., both with works at Sheffield and Rotherham.

Canadian Oilseed Mission in U.K.

A 10-man Canadian oilseed trade mission is this week meeting British importers, purchasing agencies, trade associations and Government officials. Aim of the mission is to study the current and long-term oilseed market opportunities in the U.K.

B.o.T. Consider Lifting Duty on Electrolytic Manganese Metal, Nitride

THE Board of Trade are considering an application for the exemption from import duty of (1) electrolytic manganese metal of a purity not less than 99.5%, and (2) manganese nitride containing not less than 4% by weight of nitrogen in all. A statement of the applicants' case will be made available to all interested parties who wish to make representations in the matter, if they undertake "to treat the information contained therein as strictly confidential and to allow their comments to be passed to the applicants for reply".

Requests for a statement of the case, together with an undertaking in the terms set out above, should be addressed in writing to the Board of Trade, Tariff and Import Policy Division, Horse Guards Avenue, London S.W.1, not later than 18 October. Comments from interested parties who have seen the statement of the case should be sent to the same address by 25 October.

Chemical Stoneware Firms Merge

HATHERNWARE LTD., Loughborough, and Shaws Glazed Brick Co. Ltd., Darwen, have merged their interests and have formed a new holding company, Shaw-Hathernware Ltd., of Whitebirk Works, Waterside, Darwen. Directors of the holding company will be Mr. G. N. Hodson, chairman and managing director and Mr. N Tanner (both of Hathernware Ltd.), and Mr. J. A. Clements and Mr. W. R. Nelson (both of Shaws Glazed Brick Co. Ltd.).

The two subsidiary companies, whose products are complementary and cover chemical stoneware, sanitary ware, glazed bricks and tiles, faience and Terra Cotta and Staffordshire blue bricks, will continue to trade under their existing titles with production at Darwen, Hathern and Tamworth.

Australian Firm to Make Boby Water Treatment Plant

Water treatment equipment designed by William Boby and Co., Herts, is to be produced and marketed in Australia under an agreement with the Magnus Chemical Co. (Pty.) Ltd., of Victoria. The concession applies to the whole range of Boby plant except where electrodialytic methods are involved.

This is the second agreement of its kind that William Boby have reached with an overseas company this year. In South Africa, Watermasters (Pty.) Ltd. have already begun production of Boby plant.

Polarographic Society Meeting

A meeting will be held by the Polarographic Society on Wednesday, 25 October, 2.30 p.m., at the School of Pharmacy, Brunswick Square, London W.C.1, when Prof. Dr. M. von Stackelberg will deliver a paper on 'Some special problems in the polarography of indium and tellurium'.

P.V.C. in Britain

PRODUCTION EXPANSION BEATS RISING IMPORT TREND

NET sales of plastics products of U.K. manufacture for the second quarter of 1961 were 158,200 tons, which represents a 10% increase over the previous record set in the first quarter of 1960. This improvement may partly be attributed to higher exports and lower imports. Sales of p.v.c. excluding resins have risen to 28,600 tons from 26,400 in the first quarter of 1960. Imports of p.v.c. reached an all-time high level in 1960, but dropped again in the first half of 1961 due to rapid expansion in the U.K. p.v.c. industry, writes a special correspondent. Export and import figures for p.v.c. are shown in the following table:

	1958 tons	1959 tons	1960 tons	1961* tons
Imports ...	11,343	11,478	28,631	21,605
Exports ...	10,580	14,176	15,965	18,555

*Estimated

Exports have shown a steady increase over the past four years and expansion has checked the sharp increase in imports shown in 1960 although imports still exceed exports by 25%. Production of p.v.c. in the U.K. in 1961 is estimated to be in the order of 120,000 tons—50,000 tons per annum more than the 1958 figure. Production statistics for p.v.c. monomer and excluding polymers are given below in '000 tons.

The total production figure for 1962 is expected to reach at least 135,000 tons.

There are only two producers of p.v.c. in the U.K.—I.C.I. and British Geon (owned jointly by D.C.L. and the B.F. Goodrich Chemical Co. of America). Details of these two companies with respect to the manufacture of p.v.c. are shown below.

Both firms are now engaged in carrying out considerable expansion programmes. The present production capacity of I.C.I.'s plant at Hillhouse is 80,000 tons per annum and new plant now being erected by I.C.I.'s engineering staff is expected to increase the production capacity to 115,000 tons by 1963. This new plant is designed to be capable of expansion to meet the possible market demands of the future. British Geon's polyvinyl plant at Barry has been expanded eight times during the 13 years it has been in operation. The most recent expansion was started in 1960 and supervised by the D.C.L. Engineering Division. This plant cost £2 million and is currently due to go into production. At the end of last year D.C.L. announced plans for yet another extension to their plant to be carried out at some future date. If expansion plans now envisaged by D.C.L. and I.C.I. are carried out to schedule, total U.K. production may reach 190,000 tons per annum by 1965, more than doubling the figure for 1959.

Owing to the ever increasing application of p.v.c. the potential world market is constantly growing and from many other countries come reports of new plant and expansion. Superforsfat Fabriks A.B. Stokholm are to increase their output of p.v.c. by 55% to 25,000 tonnes by the end of 1962. Halvic of Austria are starting an expansion scheme to raise their output of p.v.c. from 8,000 tonnes to 15,000 tonnes per annum. Japan is aiming to double her output within the next three years. A shipment of 440 tons of p.v.c. recently arrived from Norsk Hydro Elektrisk Kvoelstofaktielselskal of Norway. This firm is planning a big expansion to increase exports to the U.K., already Norway's biggest customer for p.v.c. Europe's leading producer of p.v.c. at the moment is Solvay of Belgium, with seven plants and an annual output of 100,000 tonnes. I.C.I's proposed expansion should give them a lead of 15,000 tons per annum over Solvay.

Compared with the rest of the world, the U.K. is not yet among the biggest producers of p.v.c., and the following figures show the percentage production capacity of some of the Western countries, out of the total production for the non-Communist bloc.

Country	*Capacity*
Benelux	2%
France	6%
Italy	7%
Japan	19%
Norway	0.5%
Sweden	0.5%
U.K.	6%
U.S.	39%
West Germany ...	9%
Others	11%

Thus the U.K. produces only 6% of the p.v.c. manufactured by the non-Communist countries and ranks with France and Italy in this respect. By the end of 1965 the U.K. should be on a level with West Germany.

It is unlikely in the foreseeable future that the supply of p.v.c. in the U.K. will outgrow the demand since it is a material of such versatility that its applications are increasing almost daily. It has many uses in the building trade, for cladding boards, for guttering or roofing, for wall coverings in shops and theatres and for floorings. It is now being used in the packaging industry for shrinkage packing. It can be used for chemical plant lining or it can be laminated to fabrics for use in the clothing industry. Gramophone records, shoes and handbags are other uses to which p.v.c. can be put. The largest single use of p.v.c. is in the making of plastic films as shown in the following table:

Film	24%
Wirecoating ...	17%
Fabric coating ...	10%
Extrusions ...	10%
Other uses ...	39%

At the moment it is estimated that new uses are being found for p.v.c. more quickly than the industry is able to expand.

U.K. P.V.C. PRODUCTION ('000 TONS)

	1958	1959	1960	1961*
Moulding and extrusion compounds	41.6	49.5	53.6	58.4
Plasticised sheet	30.7	36.2	46.3	50.4
Unplasticised sheet	2.9	3.8	4.3	4.5
Rod, tube and profile shapes	2.4	3.6	4.9	6.0
Solutions, emulsions and dispersions (net resin content)	1.8	2.2	2.4	2.6
Totals	79.4	95.3	111.5	121.9

* Estimated

U.K. P.V.C. CAPACITIES

	I.C.I.	British Geon
Plant location	Hillhouse, Lancs	Barry, South Wales
Present production capacity	70/80,000 tons/yr.	40/50,000 tons/yr. (estimated)
Route employed	Acetylene	Ethylene
Production capacity by 1963	115,000 tons/yr.	75,000 tons/yr. (estimated)
Overseas subsidiaries	A.E. & C.I. South Africa Electroclor Argentina ICIANZ Australia	

More Pressure Likely on Drug Prices

THE Minister of Health, Mr. Enoch Powell, dismissed the argument that a reduction in the price of drugs could harm the development of the pharmaceutical industry when he addressed the Hastings conference of the Executive Councils' Association. Its healthy development could surely not depend on its customers paying more than they need for its products, he said.

Government pressure for the reduction of drug prices envisages the use of whatever bargaining power may be available, warned the Minister.

Goodenough Pumps Acquire Birmingham Engineering Firm

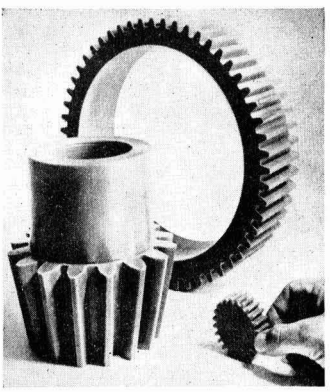
Goodenough Pumps Ltd., 112 Jermyn Street, London S.W.1, have acquired the controlling interest in Silas Hyde Ltd., Birmingham, who established over 110 years ago, are manufacturers of industrial ovens, conveyor stoving plant, dust and fume removal plant, ventilation systems, and are specialists in general sheet metal work, light and heavy fabrications in mild steel, stainless steel, aluminium, etc.

Mr. F. G. Goodenough joins the board of Silas Hyde Ltd. as chairman and joint managing director, and Mr. K. F. Goodenough, B.Sc., A.C.G.I., as director.

U.K. Firm Acquires Monomer Casting Process for Producing Massive Nylon Components

FINISHED nylon parts of considerable mass can be produced from monomer rather than from powders of nylon polymer by a process for which Polypenco Ltd., Welwyn Garden City, Herts, have acquired exclusive rights in the U.K. and many other countries. Polypenco are associated with the Polymer Corporation, U.S., whose development of a new monomer-cast nylon 6 process was discussed in CHEMICAL AGE, 2 September, p. 326.

The new process, performed at atmospheric pressure and described as monomer casting, is quite similar in techniques



The advantages of nylon gears, widely used in miniature sizes for electronic mechanisms, are now made available to heavy industry by the monomer casting process

to the conventional casting of metals, and is expected to open new markets for nylon in heavy industries now using metal castings.

The material, designated as MC nylon, is a type 6 nylon formulation, but it exhibits physical properties which span the range of properties obtainable in nearly all nylons in industrial use today. Until now the inherent advantages of nylon have been unavailable in large components because of the high tooling costs and the processing limitations of conventional moulding methods. In the casting of MC nylon, direct production of the finished nylon parts from monomer eliminates five steps in the processing cycle and thereby enables large parts to be made at lower costs than hitherto. Unlike other nylon conversion methods, monomer casting is performed at atmospheric pressure and the need for expensive moulds required in conventional injection or extrusion moulding of nylon polymers is eliminated. The new process will not, however, compete with injection moulding now widely used for mass production of small parts.

The general production methods used are similar to those used in casting metals. However, chemical controls are required in monomer casting governing the purity and temperatures of materials and moulds. Monomer casting also requires many entirely new handling techniques.

The basic chemistry involved in monomer casting was discovered by the Monsanto Chemical Co. Numerous patent applications broadly covering the process have been filed by Monsanto and a number have been issued or allowed in the U.K. or abroad. Polypenco Ltd., have now developed from laboratory scale to commercial production the technology of using the process for casting nylon shapes.

Castings made from MC nylon are substantially lower in cost than comparable stainless steel or brass castings and compete favourably with alloy steels. In the next few years it is expected that increasing volume and production economies will reduce the costs to about 50% of the present level, making MC nylon competitive with carbon steel and aluminium castings.

The largest monomer cast MC nylon parts produced to date have been semi-finished symmetrical shapes in the 500-700 lb. range. A steel casting of the same size would weigh over 2 tons. It is expected that a progressive increase in the size range capabilities will be achieved in the months ahead. Theoretically there is no technical limitation to the size part that can be made by the process.

Potential major markets include castings for metalworking equipment, railway equipment, paper-making machinery, mining, construction and material handling equipment and other applications where nylon's light weight, toughness and wear resistance without lubrication contribute to better performance at lower costs.

Semi-conducting Diamonds Produced by U.S. General Electric

FOR the first time it is possible to make semi-conducting diamonds in the laboratory using methods developed by the research laboratory of U.S. General Electric. Such diamonds are extremely rare in nature but they can now be grown in the laboratory using a high temperature, ultra-high pressure process.

One of the methods of making semi-conducting diamonds is to add impurities such as boron, beryllium or aluminium to the mixture of graphite and catalyst from which the diamonds are made. The mixture is subjected to pressures of about one million p.s.i. and temperatures above 2,000°C. Under these conditions diamonds form with concentrations of the desired impurity giving conductivities in the semi-conducting range.

Semi-conducting diamonds have also been prepared by diffusing the impurities into man-made or natural diamonds at high temperatures and pressures.

All the semi-conducting diamonds so far produced are of the p-type, but research is continuing into processes that will produce n-type diamonds.

Both p-type and n-type can be produced, however, with another new semi-conducting material that has been made in the General Electric laboratories. Borazon, a cubic form of boron nitride which has a structure very similar to that of diamond and which is equally hard, was made for the first time by General Electric workers. With borazon it is possible to produce p-n junctions which, it is shown, act as rectifiers. Beryllium as an impurity produces p-type borazon and a number of substances including sulphur, many organic compounds and potassium cyanide result in n-type borazon when added to the synthesis mixture.

The semi-conducting diamonds prepared with boron are blue, in shades ranging from pale blue-white to deep blue-black, depending on their boron content. Semi-conducting diamonds found in nature are also sometimes blue. One of the most famous blue-white diamonds is the Hope diamond, and although its conductivity has not been measured, its colour suggests that it is probably a semi-conductor.

O.C.C.A. Exhibition

Some 101 stands, covering a record floor area of 15,000 sq. ft., have been allocated for the Oil and Colour Chemists' Association's 14th technical exhibition, which will take place in the Old and New Halls of the Royal Horticultural Society, London S.W.1, from 26 February to 1 March inclusive. This year it will be the first time that the exhibition has been organised by a committee directly appointed by the Council of the O.C.C.A.

Further information is available from the general secretary, Mr. R. H. Hamblin, Oil and Colour Chemists' Association, Wax Chandlers Hall, Gresham Street, London E.C.2.

Saunders Valve

'The ½ in. flanged valve of the Sanders Valve Co. Ltd., referred to in CHEMICAL AGE, 30 September, p. 520, has a 'bonnet' of cast iron and not 'body' of cast iron as stated. Body is in fact of a solid p.t.f.e.

UNUSUAL BOILER CONVERSION SAVES £10,000 A YEAR AT MANCHESTER EDIBLE-OIL WORKS

SUCCESSFUL conversion of three vertical-tube cylindrical boilers from gas to oil firing at the Trafford Park, Manchester, works of the Southern Oil Co. has led to a saving of £10,000/year —more than half the annual fuel bill. This was a most unusual conversion involving many tricky technical problems, the boilers being used to heat Dowtherm organic heat transfer medium. The company refines many varieties of edible oil and makes considerable use of Dowtherm for deodorising processes in which different types of oil require to be heated at temperatures of 450-550°F and the heat must be carefully controlled within fairly narrow limits to ensure a satisfactory final product.

The boilers each operate on a closed circuit and are fitted with safety valve, pressure gauge, stop valve and level gauge. During working periods the vapour passes out of the stop valve and through pipes to coils in trays, placed at high level, containing edible oils. There the vapour gives up its heat and then returns as a liquid to the boiler in circuit with a receiver and return pump.

Sudden Demand for Heat

The operation of the trays, emptying and filling with the edible oil for treatment, means that the demand for heat is very sudden and that it is also necessary to effect a quick stopping of the heat supply. With Dowtherm it is not permissible to allow the safety valve to blow to relieve extreme pressures, which is the normal practice with a steam boiler. Lifting of the safety valve even for a few seconds can result in the loss of £150 worth of compound, as well as its unwelcome deposition on roofs. Although the boilers do not operate at above 40 p.s.i.g., they are designed, and the safety valve is set, for more than double this pressure. Even so, the rate at which the pressure can rise from 40 to 90 p.s.i. on no-load conditions is much too high if the heating burners are not quickly and effectively controlled.

The demand on the boilers occurs at regular intervals, and each batch of edible oil is heated up and discharged every 25-30 min. Finally, the men operating the process plant are guided by numerous, temperature recorders; and, as the boilers stand in an annexe to the main plant building, any automatic control must be completely reliable and run for long periods without attention.

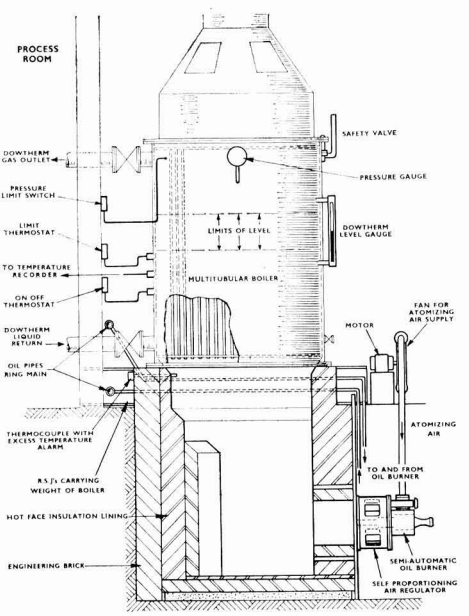
Coal gas is an ideally suitable fuel for this duty in regard to burner operation and control, the only disadvantage being that gas costs 10d/therm and a 5% loss in efficiency means an unnecessary expenditure of £860/year for the three boilers. Fuel oil costs 5d/therm, so a 5% loss in efficiency would not cost more than £430/year. Furthermore, the potential reduction in the annual fuel bill is about £8,000 or £9,000. The type of boiler used must be less efficient when it contains Dowtherm at 500°F than when it contains steam at 330°F, because the flue gases leave at a correspondingly higher temperature. This fact, very important with coal gas as fuel, is much less important with oil as fuel.

Stephenson Clarke Ltd., who have supplied fuel oil for many years for the main boiler plant, asked Mr. S. W. Padbury, chief plant engineer of the company, to investigate the technical problems involved in converting from gas to oil firing. Their associated firm, Powell Duffryn Technical Services Ltd., who normally carry out all technical work for them, made a thorough survey of this problem, and they estimated that it should be possible to halve the annual fuel bill, from approximately £18,000 to £9,000.

The problems to be solved, however, were more complicated than they would have been with a steam boiler, and a number of special conditions had to be taken into account. After thorough investigation Powell Duffryn Technical Services decided that a low-pressure air burner of the semi-automatic type would be the most suitable. They also determined the optimum volume and proportions of the combustion chamber and decided to use hot-face insulation bricks to reduce the thermal content of the brickwork when incandescent. Gourlay Combustions Ltd., of Stockport, were appointed as contractors and a low pressure air semi-automatic burner by Nu-Way Heating Plants Ltd., Droitwich, was fitted under each boiler.

Because of seasonal demands for edible oil the intervals between each boiler conversion were appreciable: No. 3 boiler was changed over in June 1959, No. 1 in March 1960, and No. 2 in November 1960. Although the times of operation of the boilers vary considerably they now average 140 hr. per working week. By March 1961, the converted plant had run the equivalent of one full year, namely 156 boiler weeks.

The monetary saving after the first full year's working was proved to be approximately £10,000, a figure slightly higher than the calculated saving; and it is interesting to note than even with the £2/ton Fuel Oil Tax, the annual saving will only be slightly less than the figure originally calculated. The total cost of the complete conversion from gas to oil firing was less than £6,000.



Boiler conversion at Southern Oil Co.'s works: the diagram shows the general arrangements on one boiler only. The main control panel is not shown as this was placed in the plant room near the main control cubicle

Meldola Medal for 1961

The Meldola Medal is the gift of the Society of Maccabaeans and is normally awarded annually. The next award will be made early in 1962 to the chemist who, being a British subject and under 30 years of age at 31 December 1961, shows the most promise as indicated by his or her published chemical work brought to the notice of the Council of the Royal Institute of Chemistry before 31 December 1961.

I.C.I. Glasgow Offices

I.C.I. Nobel Division has been told by Glasgow Corporation that it is not interested in acquiring Nobel's Glasgow headquarters. The headquarters are being transferred to Stevenston, Ayrshire.

ADVANCES IN KNOWLEDGE OF CHEMICAL FOAM SUPPRESSION

Soviet Work Surveyed by P. G. Morgan

IMPORTANT discoveries concerning the mechanism of action of chemical foam suppressors have been made in recent years, and recent Soviet work throws new light on the possibilities of using such suppressors for the control of the processes involved in the breakdown of foams in boiling aqueous solutions. Possible applications occur in such industrial fields as the treatment of boiler feed water, the foaming of paper pulp and the production of antibiotics; in this last aspect, a close control of the foam suppressor is necessary, since an anti-foaming agent is worthless if it inhibits the growth of micro-organisms responsible for the synthesis of the antibiotic.

The mechanism of the breakdown of foam bubbles involves a gradual decrease in the thickness of their films to a critical minimum value at which rupture takes place. The use of modern synthetic foam suppressors makes it possible to control the process of foam breakdown, both in the cold and under boiling conditions. The action of foam suppressors on strongly surface active substances involves their rapid local saturation of the adsorption layer on the surface of the foam films, the strength and stability of which decrease rapidly in the corresponding regions, but there are at present insufficient data on this mechanism of bubble breakdown.

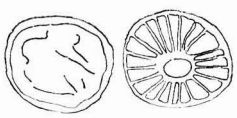


Fig. 1 (left): Print from drop of cuprammonium solution
Fig. 2 (right): Print after addition of castor oil

According to modern views, foam in inorganic electrolyte solutions is formed as a result of stabilisation of the bubble films of the foam by dispersed solid-phase hydrophilic components of the system. Thus in boiler water the part of stabilisers is played by the colloidal fractions of calcium carbonate, basic magnesium carbonate, iron hydroxide, etc. It has been established that the most important condition for the production of foam in inorganic electrolyte solutions in the presence of solid-phase stabilisers is a sufficiently high concentration of dissolved electrolyte, the hydrated ions of which also increase the stability of the foam bubbles. A system consisting of water and a solid dispersed phase without added electrolyte does not as a rule form foam.

Recent Russian work (1) indicates that the change in surface tension of aqueous solutions of inorganic electrolytes containing a colloidal dispersed phase plays no significant part in the production of phenomena associated with the appearance of foam. It has been found that there is a 'critical' concentration of solid phase beyond which increase in concentration does not increase the formation of foam by the solution, and this is attributed to a peculiar mechanism involving the step-wise transfer of solid phase from the upper layer of bubbles being broken to the lower layers of bubbles being produced anew in the boiling process.

This process of foam formation in inorganic electrolyte solutions, however, can be controlled by means of surface-active agents, which may either intensify the process (foam producers) or suppress it (foam suppressors). The foam suppressors act on the one hand by producing hydrophobic properties on the solid-phase 'reserve' components, displacing them from the films, and on the other hand by producing localised regions of weakened bubble film in the regions where they are sorbed.

The process involved in the rupture of bubble films under the influence of foam suppressors was studied by Shearer and Akers (2) who used high-speed cinematography to follow the attachment of the individual sparingly soluble particles of foam suppressor to the bubble film and the resultant rapid breakdown of these films. To examine the mechanism of this process it is necessary to choose conditions which will make it possible to follow the processes taking place in a localised section of the bubble film or liquid when they come into contact with the foam suppressor.

The above mechanism of the action of foam suppressors has deen demonstrated in experiments carried out by the 'print method'. A series of drops of saturated cuprammonium solution was placed on a grease-free microscope slide. A microdose of foam suppressor (castor oil, high-molecular alcohols, etc.) was introduced into the drops by means of a microcapillary and a series of drops of cuprammonium solution prepared for comparison. The prepared specimens on the microscope slides were placed in desiccators with calcium chloride until dry, and the 'prints' of the solid phase were observed under the microscope.

For the drop of cuprammonium solution, the print of salt and other solids shows no peculiar features (Fig. 1), but the prints of the other drops, of which Fig. 2 is representative, are quite different. In the presence of microdoses of foam suppressor there is a local fan-like displacement of the solid phase (salts and other substances) from the point at which the foam suppressor is introduced to the periphery. In the zone of direct contact between the suppressor and the solution there is formed a transparent 'hole' which is free from the solid phase including salts which, like the inclusions of other solids, are displaced from this zone as the drop dries out and becomes supersaturated. In this we observe the action of differences in the surface energies of the local two-dimensional pressures, leading to the breakdown of the structural continuity of the 'reserve' film of solid phase and its mechanical strength. The lines directed radially from the centre to the periphery and containing the accumulated solid phase deposited during evaporation of the drop illustrate the direction of the forces of the two-dimensional pressure operating in the drop of solution under the influence of the foam suppressor.

The above experimental data confirm the preliminary hypothesis regarding the mechanism of action of foam suppressors, which is of considerable importance for the control of the processes involved in the breakdown of foams in boiling aqueous solutions.

REFERENCES

(1) RADVINSKII, M. B. *Doklady Akademii Nauk SSSR*, **135**, 1, p. 143 (1960).

(2) SHEARER, L. T., AKERS, W. W. *J. Phys. Chem.*, **62**, 10, p. 1269 (1958).

Paris Meeting Supports Plan for European Chemical Market Research Association

GENESIS of a Chemical Market Research Association for Europe was created on Tuesday this week in the Hotel Continental, Paris, by some 25 representatives of chemical companies from seven countries. A lunch which initiated this meeting was organised by Roger Williams Technical and Economic Services of Princeton, New York, Toronto, London and Geneva.

As a result of this gathering, a second meeting will be held in London on 16 January 1962.

It was felt by those present that the idea of a European Chemical Market Research Association was an excellent one and that the next meeting should be an informal one in London. The London meeting will be open to all those interested in European chemical market research who wish to attend.

Included at the Paris meeting were representatives from F. W. Berk, Ugine, Degussa, Montecatini, Solvay, Du Pont, Hoechst, Union Carbide, I.C.I., Shell St.-Gobain, Esso, Union Chimique Belge, B.A.S.F., Edison, Shell International Chemical, Mobil Oil, F.M.C. Corporation and Pierrefitte.

There is already an organised chemical market research group in the U.K., but the new move represents an attempt to do this on a European scale. Problems common to all European market researchers are shortcomings in statistics and transport facilities, plus the language barrier.

Overseas News

JAPANESE ACRYLO MAKERS FACE PRICE CUTTING PROBLEMS

ACRYLIC fibre manufacturers in Japan have been agitating for a reduction in the price of domestic acrylonitrile to 170 to 180 yen/kg. on the grounds that the major acrylonitrile manufacturers of the U.S. have reduced their prices to the equivalent of 120 yen/kg. The raw materials manufacturers have been trying to prevent a big reduction to the international price level maintaining that the lowest cost limit is 200 yen/kg. for acrylonitrile produced by the present methods. However, the major fibre producers, by importing U.S. material, have forced the price down, which means that manufacturers are faced with having to cut production costs by increasing capacity.

At present there are five producers of acrylonitrile in Japan—Mitsubishi Chemical, Nitto Chemical, Toyo Koatsu, Sumitomo Chemical and Asahi Chemical who produce material for their own fibre plant.

Mitsubishi have a 600 tonnes/month plant based on natural gas and their output will be increased to 1,200 tonnes/month by a plant using the Sohyo process which is due for completion by the end of 1962.

Nitto Chemical have 160 tonnes/month capacity which will be increased to 760 tonnes by adopting the Sohyo process. Second and third expansions are planned.

Toyo Koatsu are producing 150 tonnes/month at present but plan to increase production by establishing a new firm in conjunction with Mitsui Chemical.

Sumitomo Chemical are considering a plan to increase output to 1,000 tonnes/month and are already considering further extensions which they believe will be necessary.

Activated Carbon Expansion for Yugoslavia

The Yugoslav authorities are stated to be planning to increase national production of activated carbon to a level at which it will cover home demand. At present national output stands at some 120 tonnes, the sole producer being the Miloje Zakic plant, of Krusevac-Obilicevo.

Du Pont to Form Joint Fungicides Firm in Spain

A jointly-owned Spanish company is to be formed by Du Pont and the Spanish company, Energia e Industrias Aragonesas S.A. of Madrid for the production and marketing of dithiocarbamate fungicides, subject to the approval of the Spanish government. The shares of the company, to be called Desarrollo Quimico Industrial S.A., will be owned equally by Energia e Industrias Aragonesas and Du Pont.

Desarrollo Quimico Industrial will build a new plant, expected to begin operation in 1962, at Sabinanigo adjacent to the existing plant operated by the Spanish parent company. The site, design and construction of the plant will be the responsibility of Energia e Industrias Argonesas and know-how and basic engineering data will be provided by Du Pont. The initial products of the new company are to be Manzate maneb fungicide and Parzare zineb fungicide, both developed in Du Pont's laboratories.

Canadian TNT Project

Canadian Industries Ltd. plan to build a $900,000 plant at Beloeil, near Montreal, to manufacture TNT for the first time in Canada.

U.S. Polystyrene Producers Split on Price Rise

Monsanto Chemical Co. and Koppers have stated that they will not follow Rexall Chemical, Dow Chemical and Union Carbide in raising their prices to 19 cents/lb. for polystyrene. Also maintaining the lower price of 18 cents/lb. for the time being are Foster Grant, Cosden and Shell Chemical.

Oil and Petrochemical Developments in Israel

The Canadian Sancana Oil Co. have obtained a licence to carry out offshore prospecting for petroleum in Israel. The company will invest $300,000 in prospecting along the Mediterranean coast and if the results are satisfactory, a concession will be sought.

Steps are being taken in Israel to promote a petrochemical industry and Delek (the State-controlled petroleum-importing and refining company) have invested in Electrochemical Industries Frutarom at Acera (Northern Israel). The exact amount has not been disclosed but purpose of the investment is the construction of a p.v.c. plant with a capacity of 10 or 12 tonnes a day.

Building work has already started near Haifa and the plant is due for completion in 18 months, at a cost of about $3 million. The paid-up capital of Electrochemical Industries currently totals $3,400,000, 80% of which are held by American Electrochemical Industries, Cleveland, Ohio.

A few months ago, a group of Israeli, U.S. and Brazilian investors set up Israel Petrol-Chemical Industries Ltd. with a total investment of about $15 million. This company will build four plants for the production of ethylene, polythene, carbon black, and alkyl detergents.

Bombrini Take Part in Joint Missile Venture

Finmeccanica, Fiat, and Bombrini Parodi Delfino (B.P.D.) have signed an agreement to co-operate in the production of missiles. To carry out this programme, it has been decided to make use of an existing joint company in Rome, Soc. Italiana Generale Munizioni Esplosivi (SIGME). The capital of this company has been increased and redistributed among the three shareholders and its name has been changed to Soc. Generale Missilistica.

General Ferdinando Raffaelli has been appointed president of the reorganised company. Other directors are: Dr. Aldo Bargellini, Ing. G. Di Stefano, Ing. A. Fogagnolo, Ing. C. E. Hidalgo, Ing. F. Masi, and Dr. L. Medugno.

Olin Glycerol Plant Based on New Process

Construction has begun on a new synthetic glycerol plant for the Olin Mathieson Chemical Corp., which is based on a new process developed by the company's Organics Division. The plant, with a capacity of more than 40 million lb. a year, is being built at the Division's Doe Run complex and is expected to be in operation by April 1962.

The new method was developed in the laboratories of the Olin Research Centre at New Haven, Conn. The starting material is propylene oxide which is converted to allyl alcohol in the presence of a newly-developed catalyst and hence to glycerol. The conversion is said to produce excellent yields of high purity allyl alcohol. The laboratory has also developed a method of obtaining a highly purified finished product and a process for the regeneration of the catalyst.

Olin's Doe Run organic chemicals plant, built in 1952, uses natural gas raw material.

Oil and Gas Development Corporation for Pakistan

An ordinance to establish an Oil and Gas Development Corporation, with headquarters at Karachi, has been promulgated by the President of Pakistan. The corporation's activities will cover the exploration and development of oil and gas resources, production, refining and sale of oil and gas, and other connected matters.

The Corporation will have its own fund and the Central Government will subscribe to it Rs. 50 million of which Rs. 10 million will be contributed in the first instance and the rest in instalments.

Construction Begins of Largest U.S. Flash Evaporator Plant

The Westinghouse Electric Corporation, U.S., have begun construction of a 1 million gall./day plant that will con-

vert sea water to fresh water at Point Loma near San Diego, California. A contract for the project, which was awarded by the U.S. Department of Interior's Office of Saline Water and which is jointly sponsored by the State of California Department of Water Resources, calls for construction to be completed during November 1961. Westinghouse will then operate the plant for a shake-down period of 75 days, including 30 days at the full daily output of 1 million gall. Once in operation it will be the largest multi-stage flash evaporator plant in the United States.

The flash evaporation process used in the Point Loma plant will consist essentially of spraying heated sea water under pressure into a chamber that is at a lower pressure and temperature. A portion of the water 'flashes' into vapour and is then condensed, providing water that is nearly free of impurities. The remaining salty water passes through a series of additional chambers where the flashing process is repeated. At each additional stage the condensed, salt-free water is piped off.

U.S./Swedish Sodium Borohydride Agreement

The U.S. firm, Metal Hydrides, and the Swedish company, Mo och Domsjo Akiebolag, have entered into an agreement to develop sodium borohydride as a bleach in the pulp and paper field. Metal Hydrides will administer the U.S. licences for a borohydride process patented by the Swedish firm, and the two companies will exchange information.

Germany Exports Less Chemicals to U.K. in First Half 1961

Over the first half of the current year, West German chemical exports totalled DM3,240 million, or some 7% more than for the corresponding 1960 period; this compares with an export increase of as much as 19% for the first 1960 half-year over the corresponding period of the previous year.

Exports to the U.K. fell for the first 1961 six-month period 5% from the total for the corresponding 1960 half-year, though EFTA member countries still took 27.1% of West German chemical exports as compared with only 26.2% taken by fellow members of the Common Market.

Holland, Italy and France are West Germany's best single customers. Imports into West Germany totalled some DM1,320 million—only slightly more than the figure for the first 1960 half-year. Imports from the U.K. fell by DM8 million. Main supplier remained the United States.

E.N.I. May Build Ceylon Refinery

E.N.I., the Italian State oil organisation, have offered to set up a refinery in Ceylon. Mr. M. Senanayake, Minister for Industry in Ceylon, on his return from a visit to Italy last week, stressed that his country wants a refinery integrated with a fertiliser plant, plus a financial aid programme. Cost of the refinery is put at Rs.250 million, with completion scheduled for 1965. The State Oil Corporation proposes to use Soviet crude oil.

Proposals for a refinery have also been received from Yugoslav and U.K. oil companies, one offer having been submitted last year by a consortium comprising B.P., Caltex, Shell and Stanvac.

New Austrian Plastics Company Established

Two Austrian companies, Semperit A.G. and Heinrich Schmidtberger are to pool their efforts, with the object of developing the manufacture of plastics. For this purpose, a joint subsidiary has been set up called Interplastic Werke AG, whose production in a few years, should reach more than 20,000 tonnes/year.

Cornerstone Laid for Israel Citric Acid Plant

Mr. Irving B. Wershaw, president of Dome Chemicals Inc., a subsidiary of Miles Laboratories Inc., recently laid the cornerstone for a $2 million citric acid plant being built at Haifa for another Miles subsidiary, Miles Chemical Co. The new plant, located on a 10 acre site, is expected to be on stream in 1962.

While in Israel, Mr. Wershaw also surveyed sites for a plant and branch office for Dome Chemicals and established contact with the dermatological department at the Hadassah Medical Centre to formulate joint research plans.

U.C.B. to Manufacture Methylamines

Union Chimique Belge are constructing at their works at Wondelgem an automatic plant for the continuous production of methylamines, as well as for dimethylformamide and of choline chloride. The plant should be in production around the end of 1961.

U.S.I. Open Polythene Labs. in Switzerland

A new laboratory designed for polythene research, evaluation and technical service has been opened in Baar, ZG, Switzerland, by U.S. Industrial Chemicals Co.—International, Division of International Development Co. of National Distillers and Chemical Corporation S.A. In addition to laboratory facilities, the building will act as headquarters for U.S.I.—International's sales organisation.

The research centre will service markets in all European countries and many other world markets. Mr. Kenneth E. Cosslett, U.S.I.'s export manager, states that the world market for Petrothene polythene is expanding even faster than the U.S. market and European consumption alone has risen 20% this year. Newly-developed applications promise to increase that figure considerably.

Since U.S. Industrial Chemicals joined National Distillers 10 years ago, polythene capacity has increased to 300 million lb./year.

Development of Manufacture of Polymethacrylates in Holland

N.V. Chemische Industrie Polyplastic, who have been producing polymethylmethacrylate for some years, are to expand their productive capacity. Up to the present time, the major part of the market for this product in Holland has been supplied by imports from I.C.I., Röhm and Haas and Ressart.

Asahi Subsidiary to Make Polyurethane Foam

Asahi Organic Chemical Industry Co., a subsidiary of the Japanese firm Asahi Chemical, are to manufacture polyurethane foam by the Philip's process. A plant is to be constructed at the cost of 180 million yen (£180,000) with a planned output of 900 tonnes in 1962, 1,600 tonnes in 1963, 2,000 tonnes in 1964 and 2,400 tonnes in 1965. Initial payment for chemical know-how is $20,000 and the royalty ranges from 0.45% to 0.8% according to sales volume

New AKU Plant will Double CMC Capacity

Mid-1962 has now been given as the date for start of operations of a carboxy-methyl-cellulose plant to be operated in the Kleefse Waard area of Holland by Algemene Kunstzijde Unie NV, of Arnhem. AKU already produce carboxy-methyl-cellulose, but the opening of the new plant will double capacity and can itself be doubled if required. The company's CMC output is currently based in its Sove plant.

New S. African Import Duty on Caustic Soda

SOUTH Africa has imposed new rates of duty on caustic soda. For bulk imports, the intermediate duty—payable by the U.K.—is free, with maximum duty rate at 40%; for imports not in bulk, the intermediate duty is 15%, while maximum duty is 40%. At the same time an ordinary dumping duty has been imposed on imports from Poland.

An ordinary dumping duty has also been imposed on tetrachlorethylene imported from the U.K., U.S., France and Czechoslovakia.

Application for an increase in duty on chloramphenicol products from free to 20% *ad valorem* has been made to the South African Board of Trade and Industries by Parke Davis Laboratories (Pty.) Ltd., Isando, Transvaal.

Klipfontein Organic Products Corporation, Johannesburg, are seeking the retention of the present withdrawal of rebate facilities on chlorinated paraffin plasticisers for the production of leather-cloth, plastics-coated paper and plastics-coated bonded material, excluding felt.

Bookshelf

Competent Short Guide to Rapidly Expanding Subject

CARBON-14 COMPOUNDS. By *J. R. Catch.* Butterworths Ltd., London, 1961. Pp. vii + 128. 30s.

For subjects in a state of rapid expansion, short guides are welcomed by newcomers. The present example achieves its objectives in a competent fashion; the style is clear, its limitations are stated and it indicates how the reader can expand his reading.

The chief chapters describe the syntheses of C-14 labelled organic compounds by chemical and by biological methods, together with practical aspects, the characteristic features of these compounds (e.g. isomerism, re-arrangements, radiation decomposition), and methods of analysis and measurement. Accounts of the production of C-14 and the requisite safety precautions to take with its compounds are also given. In addition there are nearly 700 references which, by means of an appendix, extend into 1960.

Besides being appropriate for organic, physical and bio- chemists who are using these compounds, this book is suitable for reading by both finals and honours students. The price seems rather high for so few pages but, although it is not too condensed, not a word has been wasted.

Combustion

COMBUSTION, FLAMES AND EXPLOSIONS OF GASES, 2nd Edition. By *B. Lewis* and *G. von Elbe.* Academic Press, New York, 1961. Pp. xx + 731. 157s 6d.

It is 10 years since the first edition of this book appeared and was generally welcomed as a massive contribution to the ordering of the subject. The last decade has seen great activity in the whole field of the combustion and related processes. One symptom of this has been the increasing size of the volumes recording the international symposia on combustion to which the authors have contributed so much organisational effort.

The general arrangement of the second edition closely follows that of the first. Part I (200 pages) covers the chemistry and kinetics of the reactions between gaseous fuels and oxidants; Part 2 (376 pages) Flame propagation; Part 3 (70 pages) the state of the burned gas; and Part 4 (40 pages) problems in technical combustion processes. There are useful appendices on thermochemical data, limits of inflammability, and flame temperatures. The authors are now clearly most interested in flames and the most substantial revisions follow on the new treatment of combustion wave propagation. The revision of the first part of the book is much less satisfactory. There are very few references to the many recent papers that report experimental results that are far more reliable than those available 10 years ago. The improvement stems very largely from new methods of analysis, particularly gas chromatography. The analyses reveal that combustion is a process of unexpected and baffling complexity. No one could blame the authors if they failed to reduce the subject to order. As it is they have not grappled with the modern problem.

Although some specialists will feel that the treatment of their hobbies is inadequate, all will recognize this volume as a further great service to chemistry rendered by the authors.

Natural Products

THE CHEMISTRY OF NATURAL PRODUCTS. (*Special Lectures presented at the International Symposium in Australia, August 1960.*) Butterworths, London, 1961. 70s.

This volume includes the opening, closing and presidential addresses and 12 special lectures delivered at the International Symposium on the Chemistry of Natural Products organised by the Australian Academy of Science in August 1960 under the auspices of I.U.P.A.C., Organic Chemistry Section. The lectures are reprinted from Pure and Applied Chemistry, Vol. 2, Nos. 3-4.

The opening lecture by A. Stoll deals with the impact of natural product research in industry and is illustrated by reference to the digitalis and ergot alkaloids. This is followed by Sir Alexander Todd's presidential address on 'Natural product chemistry—retrospect and prospect'.

A lecture by H. W. Thompson gives a general survey of physicochemical methods of investigating natural products while A. McL. Mathieson contributes an authoritative paper on the direct determination of molecular structure by X-ray diffraction. In the third lecture of this group, C. Djerassi describes the development and application of optical rotatory dispersion studies during the past five years.

R. B. Woodward's lecture describes (for the first time in detail) the remarkable achievement of the total synthesis of chlorophyll. Two other lectures bearing on heterocyclic chemistry were H. Brockman's account of recent work on the actinomycins and T. R. Govindachari's description of investigations on alkaloids from Indian plants. J. R. Price gives a general survey of Australian natural product research.

Aliphatic and homocyclic chemistry are represented by three lectures: F. Sorm's on sesquiterpene compounds with nine-, ten- or eleven-membered rings; D. H. R. Barton's on the structural problems of the lactonic bitter principles and N. A. Sörensen's account of polyacetylenic compounds isolated from the compositae.

E. Lederer describes extensive studies of the biologically active lipids produced by bacteria, especially the tubercle bacillus. The following lecture by J. W. Cornforth deals with research on the biosynthesis of polyisoprenoids.

Interfacial Phenomena

INTERFACIAL PHENOMENA. By *J. T. Davies* and *E. K. Rideal.* Academic Press, New York and London, 1961. Pp. xiii + 474. 100s.

This volume can be briefly described as an outstandingly good survey of colloid physics. While the subject of colloids generally has carried a great deal of empirical observation and qualitative comment, such material is almost entirely excluded here. It presents a thoroughgoing analysis of the basic physical conditions in a sequence of chapters—the physics of surfaces; electrostatic and electrokinetic phenomena; adsorption at liquid interfaces; monolayers; reactions at liquid surfaces; diffusion through interfaces; disperse systems and adhesion.

While there is ample reference to the research literature, much of the presentation is of an original character and even those familiar with the established texts in this field—many of which have a great deal in common—will find they have a far more thorough treatment of principles in this volume. Apart from an account of aerosols (pp. 347-359), the gas-solid interface is almost excluded from discussion. A number of photographs, including cinematographic ones, illustrate dynamic aspects of interfacial phenomena.

Crystallography Data

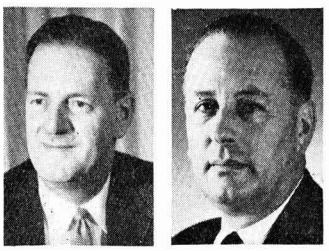
DIRECT METHODS IN CRYSTALLOGRAPHY. By *M. M. Woolfson.* Clarendon Press, Oxford University Press, London, 1961. Pp. viii + 144. 30s.

This volume provides systematic accounts of the detailed methods for transforming X-ray crystallographic data to electron density representations of structure. The first four chapters deal with methods involved in hand calculation and the application of inequality and sign relationships. Chapters V and VI outline the current techniques based on electronic computers, while Chapter VII surveys the past, present and future of computational methods in structural analysis.

The monograph is intended for those immediately active in this special field, and for them it should prove to be a valuable concise summary.

PEOPLE in the news

● **Mr. H. V. Disney, C.B.E.,** deputy managing director of the U.K. Atomic Energy Authority's Engineering Group, will succeed **Mr. J. B. W. Cunningham,** managing director, who is resigning on 20 January 1962. Mr. Disney will have the title of managing director (designate) from 1 November. He joined I.C.I. Alkali Division, Northwich, in 1935 as a design engineer on chemical plant projects. In 1940 he was loaned by I.C.I. for special duties on the construction of Ministry of Supply propellent and filling factories. Mr. Disney was a member of the original team which started the Department of Atomic Energy at Risley in February 1946 and was appointed chief engineer, services and supply, in 1947. In 1950 he became chief design engineer for the diffusion plant at Capenhurst and in 1957 was promoted to deputy director, defence plants, A.E.A. He became deputy managing director, Engineering Group, earlier this year.



Dr. Kurt Hansen (left) new Bayer chairman) ('People in the News', 30 September) and right, J. P. Koppel, who has joined the board of Courtaulds Ltd. ('People', 7 October)

● **Dr. D. C. Pepper,** reader in physical chemistry and a fellow of Trinity College, Dublin, has been appointed to the newly created Chair of Physical Chemistry. **Mr. P. H. Boyle** has been appointed a junior lecturer at Dublin.

● **Mr. C. F. Kearton** has been appointed chairman and **Mr. C. H. Colton** deputy chairman of British Celanese Ltd. **Mr. S. M. Fulton** becomes managing director. These appointments follow the retirement of **Mr. P. S. Rendall,** chairman of British Celanese.

● **Mr. A. McIntosh** has been appointed works manager, Hull, for the Chemical Division of the Distillers Company Ltd.

● **Dr. W. O. Alexander,** assistant research manager of the I.C.I. Metals Division, has been appointed technical director of Foseco International Ltd. with effect from 1 January next.

● Three changes are announced in boards of unit companies of the Turner and Newall group. **Mr. J. Waddell,** executive director of Turner Brothers Asbestos Co. Ltd. and of Glass Fabrics Ltd., has been appointed managing director of each. He continues to be the executive director of J. W. Roberts Ltd. **Mr. E. R. Pochin,** home sales director of Ferodo Ltd., has been appointed managing director of that company. **Mr. M. H. Good,** the home sales manager, has been appointed home sales director of Ferodo Ltd. in place of Mr. Pochin.

● **Mr. B. F. Kingston,** formerly sales director of Thomas and Evans, a member of the Beecham Group, has been appointed assistant managing director.

● **Mr. R. A. Pittman** has taken up the new post of deputy director of the Council of British Manufacturers of Petroleum Equipment as a result of the council's increasing membership and activities.

● **Dr. R. B. Shearn** has been appointed lecturer in the Chemical Engineering Department at Birmingham University.

● **Mr. John H. Pybus,** general manager and director of the Randolph Coke and Chemical Co. Ltd., Co. Durham, has retired after 45 years in the chemical industry. Mr. Pybus took charge of the Randolph Works in 1933 and became director and general manager of the company in 1957. He is a past chairman of the Northern Section of the Coke Oven Managers' Association.

● **Mr. Desmond Ambrose,** recently appointed manager of the southern division of Fischer and Porter Ltd., was until recently manager of the laboratory engineering department of Automatic Control Engineering Ltd., a subsidiary of Constructors John Brown Ltd., and not manager of the C.J.B. Process Control Division as stated in 'People in the News', 30 September, p. 495.

● **Mr. A. C. Jones** has been appointed an assistant general manager within the Automatic Control Valves Group of Elliott Brothers (London) Ltd. Before joining Elliotts, he was manager of the Audco Controls Division of Audley Engineering Co. Ltd.

H. C. Tett, 54-year-old chairman and managing director of Esso Petroleum, who was one of five new members appointed to the Council for Scientific and Industrial Research (C.A., 7 October, p. 562)

● **Mr. A. G. Johnstone** has been appointed marketing executive in the Ethical Division of William R. Warner and Co. Before joining Warner's, he was with the Pharmaceutical Division of I.C.I.

● **Mr. G. K. Hampshire,** a director of I.C.I., left London Airport on 6 October for New York.

● **Mr. W. Robson** has been elected a director of the Lummus Co. Ltd., London.

● **Mr. D. S. A. McDougall** is relinquishing his appointment as vice-chairman of Cooper, McDougall and Robertson Ltd. **Mr. M. H. McDougall** and **Mr. R. P. Cooper** will retire as directors on 31 December. Mr. D. S. A. McDougall continues as a director and Mr. M. H. McDougall will remain as a director of three African subsidiaries. Cooper, McDougall and Robertson are a member of the Wellcome Group.

Berk Chairman Makes Service Awards

C. H. Tanner, chairman of F. W. Berk and Co. Ltd. (centre), recently presented long-service awards to Albert Clements (left) and Richard Wood who have each completed 30 years' service at Abbey Mills, Stratford Works. The full board of directors attended the presentation, the second since the awards were introduced last year

Commercial News

- **Pressure Continues on A.C.C. Profits**
- **Price Cuts Reduce Sturge Margins**
- **Hoechst Nine-months Turnover Up 7%**
- **Saint-Gobain Organics Sales Rise 22%**

Associated Chemical

The first ever half-yearly report of Associated Chemical Companies Ltd. shows that group trading profit and other income for the half year ended 30 June totalled £676,777, higher than in the second half of last year, when the total was £655,356, but below the first half-1960 figure of £816,091. Depreciation accounted for £249,375 (£222,919 in the first half of 1960), and debenture interest £45,000 (same). Pre-tax profit totalled £382,402 (£363,988 in second-half 1960 and £548,172 in first-half 1960). Tax totalled £131,781 (£107,288 for second-half 1960 and £205,270 for first-half), leaving net income for the six months at £250,621 (£256,592 and £342,902).

An interim dividend of 6¼% (same) is announced. Profits of the Farmer's Co. Ltd. are not included in the half-yearly figures, but are treated as pre-acquisition profits.

The directors state that the trend towards narrower margins in both home and export markets has continued. Increasing competition has resulted in reduced selling prices. Increased costs, notably for wages and fuel, have had to be absorbed.

John and E. Sturge

John and E. Sturge Ltd. have announced an interim dividend of 4% (for 1960 dividends totalled an equivalent of 9½%). Trading results of the parent company for the first half of the current year were a little short of the forecast in the chairman's statement. Turnover to the end of September was maintained slightly ahead of last year.

Since June, however, intense competition in world markets has materially reduced selling prices and profit margins and these conditions have affected trading of the overseas subsidiaries.

Taking account of continuing development commitments, the directors hope in the absence of any further deterioration in marks to make the same total distribution for 1961 as last year.

United Indigo

At their recent meeting, directors of United Indigo and Chemical made no decision on dividend or on the date for a general meeting. A subsidiary of Pfeffer Brothers, makers of dyestuffs and animal feeding stuffs, United Indigo have paid no dividends on the 1s 4d ordinary shares since the year ended 30 June 1957. The preference dividend was missed for the year ended 30 June 1960, when there was a trading loss of £6,059 and a net loss of £11,184.

B.A. Oil

The Canadian oil company B.A. Oil, who are to supply the planned petrochemical plant of Shawinigan Chemicals, are to purchase a 25% share in the latter company's capital. The takeover of this holding will be against payment of 12 million Canadian dollars and the transfer to Shawinigan Chemicals of the 50% B.A. Oil holding in B.A. Shawinigan Ltd. Shawinigan Chemicals have hitherto belonged 100% to the Canadian concern, Shawinigan Water and Power Co. Ltd.

Desarrollo Quimica

Desarrollo Quimico Industrial S.A. is the name of a Spanish chemical producing company to be formed jointly by Du Pont de Nemours and Co., Wilmington, Delaware, U.S., and Energia y Industrias Aragonesas, of Spain. The new company will next year start production of plant protection media. (See p. 593.)

Farbwerke Hoechst

Turnover of Farbwerke Hoechst AG, Frankfurt-on-Main, West Germany, during the first nine months of 1961 rose by some 7% over the figure for the corresponding period of last year, despite price decreases of some 4% over the period. During the same period the rate of increase of the country's chemical industry as a whole was some 4.4%.

Capital rise is being considered, but finances for the current year have been safeguarded and are available. It is still planned to place Hoechst shares on the London Stock Exchange.

IG Farben

IG Farbenindustrie AG i.A., the former German chemical group now in a state of liquidation, have made a payment of DM12 million to their successor companies, Badische Anilin-und Soda-Fabrik AG, Ludwigshafen-on-Rhine Farbenfabriken Bayer AG, Leverkusen; and Farbwerke Hoechst AG, Frankfurt-on-Main; as of 30 September 1961. Of capital claims of DM 135 million made on IG Farben in liquidation by the three companies, some DM 96 million has now been paid.

Hooker

Increased sales and earnings for the three months ended 31 August 1961, compared with the same period in 1960, are reported in the nine-months' statement to shareholders of Hooker Chemical Corporation, U.S. Net sales for the quarter were $37,371,900 ($37,216,000) and earnings, 40 cents (38 cents) per common share. For the nine months, sales were $110,371,500 ($112,210,900) and net income $1.16 ($1.24), a decrease of 6.4%. The board anticipate that the volume of sales for the fourth quarter of 1961 will be higher than for the corresponding period of 1960.

Among the company's current expansion activities is the construction of additional facilities at Niagara Falls for the production of organic phosphorus compounds utilising a new process developed by the research department.

Saint-Gobain

The French chemical producers Compagnie de Saint-Gobain announce for 1960 a dividend of 6 francs/share on 5,167,961 shares, as compared with 5.50 francs/share paid on 5,024,055 shares for the 1959 financial year. Net profit for the year, after depreciation of 83,060,000 (65,400,000) francs, was 39,960,000 (33,420,000) francs. Some 2.8% of turnover was spent on research. Turnover in inorganic products for industry rose by 15%, that of inorganics for agriculture by 8% and that of organics by 22% over the year.

Snia Viscosa

Group trading results of Snia Viscosa, fibre and chemical producers, Milan, during the first half of 1961, are satisfactory, state the directors. Demand for man-made fibres, both at home and abroad has been very strong, thus allowing full utilisation of capacity. Investments proceed at a continuously increasing rate.

NEW COMPANIES

CAPENDAMO (SPECIAL PRODUCTS) LTD. Cap. £2,000. Chemical, mechanical, civil, instrument and electrical engineers, designers, manufacturers and consultants, chemical refinery and process plant and machinery makers, etc. Directors: K. G. Allport, R. V. Sedivy. Solicitors: Adams and Co., London S.W.1.

JOHN ROSS (CHEMICALS) LTD. Cap. £300. Manufacturers of and dealers in fine chemicals, etc. Directors: E. C. Durling, J. R. Urquhart, Mrs. Lilian L. Taylor. Reg. office: 502 London Road, Thornton Heath, Surrey.

INCREASES OF CAPITAL

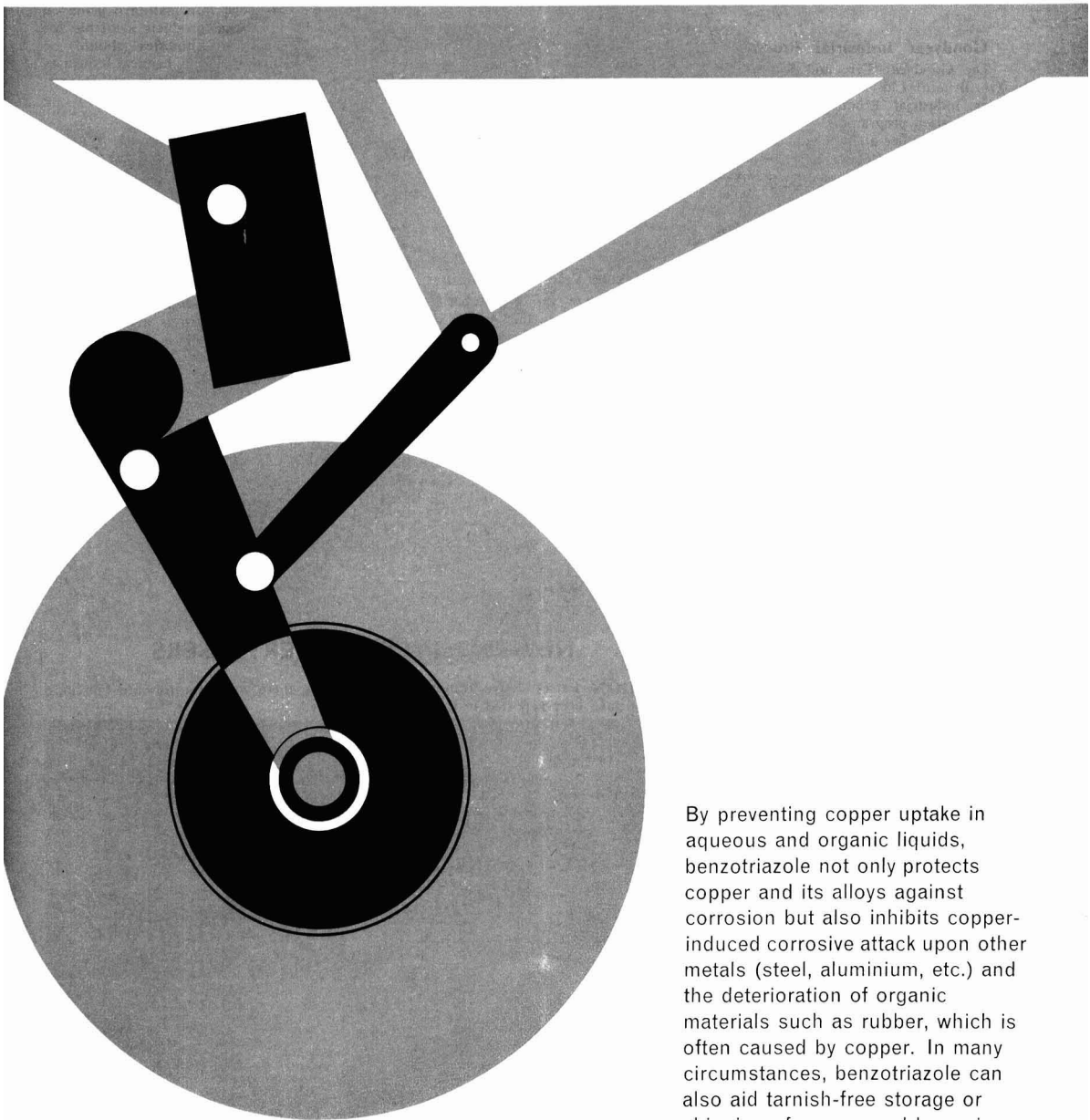
AMOA CHEMICAL CO. LTD., 5 Laurence Pountney Lane, London E.C.4. Increased by £15,000 beyond the registered capital of £25,000.

BAYWOOD CHEMICALS LTD., Brettenham House, Lancaster Place, London W.C.2. Increased by £25,000 beyond the registered capital of £50,000.

KINGSLEY AND KEITH (CHEMICALS) LTD., 38 King William Street, E.C.4. Increased by £23,000 beyond the registered capital of £1,000.

Chemicals for metal treatment

Geigy



By preventing copper uptake in aqueous and organic liquids, benzotriazole not only protects copper and its alloys against corrosion but also inhibits copper-induced corrosive attack upon other metals (steel, aluminium, etc.) and the deterioration of organic materials such as rubber, which is often caused by copper. In many circumstances, benzotriazole can also aid tarnish-free storage or shipping of copper and brass in 'dry' conditions.

Benzotriazole

Corrosion and tarnish inhibitor for copper and its alloys

Recommendations on request to
Development Division
The Geigy Company Limited
Rhodes Middleton Manchester

TRADE NOTES

Goodyear Industrial Products

The Goodyear Tyre and Rubber Co. (Gt. Britain) Ltd. announce, as part of their Industrial Products Division decentralisation programme, the opening of a new sales office at 24 Broughton Street, Manchester, 8 (telephone: Deansgate 7921). This will serve customers in the northern half of England and Wales, Scotland, Eire and Northern Ireland, will be under the direction of Mr. L. G. Millington, Northern Division manager (Industrial Products) and Mr. J. L. Harris has been transferred from the company's headquarters in Wolverhampton to control the sales office operation.

Technical-commercial Service

The increasing difficulty of divorcing technical problems from their commercial implications has led to a decision by Dr. C. A. Redfarn, consulting chemist, and Aubrey Wilson, industrial marketing research consultant, to form a new organisation to provide a comprehensive commercial and technical service. The new organisation, Technical-Commercial Surveys, 1 Dover Street, London W.1, will offer, apart from technical surveys and consultancy, research into industrial markets at home and overseas, product diversification studies, application studies and product and price intelligence services.

Distillers Plastics Group

For the fourth time in three years The Distillers Plastics Group has extended its telephone service, the latest improvement being the installation of a comprehensive telephone system under a Group number, Hyde Park 8131, at Devonshire House, Piccadilly, London W.1.

High Purity Metals

Latest series of data sheets issued by Johnson, Matthey and Co. Ltd., 73-83 Hatton Garden, London E.C.1, covers their range of high purity metals. Information is given on 38 metals including noble, rare earth and certain base and rarer metals. The general properties of each element are tabulated and details are given of the forms of current production. In most cases the metals are available in more than one grade, the metallic impurity contents being expressed in parts per million.

Blow Moulding of Polythene

Homopolymer or copolymer? Which type of Rigidex high density polythene should be used for blow moulding which containers? How do you design a mould for blow moulding? These are some of the questions answered in technical information sheet No. 13 issued by British Resin Products Ltd., Devonshire House, Piccadilly, London W.1.

Performance data on Rigidex types 2 and 9 (homopolymer) and types 3 and 12 (copolymer) are given, together with information on typical conditions for manufacturing blown containers from these four grades—which effectively cover the whole field of current blow moulding applications.

Membrane Filter

A 24-page booklet describes the Polypore membrane filter and its applications in air sampling, chemistry, bacteriology, biochemistry and a number of industrial fields. The booklet is available from the Gelman Instrument Co., 106 North Main Street, Chelsea, Mich., U.S.

New Telephone Number

From 1 p.m. on 25 October the telephone number of the A.P.V. company Ltd. and A.P.V.-Paramount Ltd. will be changed to Crawley 27777 when Crawley's telephone service becomes automatic.

Silicones in Textiles

A new I.C.I. folder contains three pamphlets dealing with the silicone treatment of textiles. They cover, respectively, the use of silicones in textile finishing (wool goods), in textile finishing (cellulosic and synthetic fabrics), and textile water repellents. Information is given on the I.C.I. silicone products available for these purposes. Enquiries should be addressed to Imperial Chemical Industries Ltd., Nobel Division, Silicones Department, Stevenston, Ayrshire, Scotland.

Cellobond Polyester at Work

Polyester/glass as a material of construction is the subject of a new 24 page booklet entitled 'The Cellobond Polyester Story', published by British Resin Products Ltd., Devonshire House, Piccadilly, London W.1. An introductory section deals with the manufacture, properties and use of Cellobond polyester resins and it is then shown how the needs of nine major industries are being met by the special properties of polyester/glass—high strength/weight ratio, and resistance to chemicals and weathering without the protection of paint.

The industries covered include the motor industry, commercial vehicle building, ships and boats, building and construction, chemical plant, electrical equipment, railways, caravans and shop-fitting and furnishing.

Market Reports

NEW BUSINESS IN FERTILISERS

LONDON Fairly active trading conditions have been reported in the chemicals market, with the main consuming industries calling for steady deliveries against contracts. There has been additional inquiry for the soda products and for most routine chemicals.

Copper sulphate has fluctuated somewhat, the current quotation being £78/ton, less 2% f.o.b. Liverpool, but price movements generally have been within narrow limits. In the fertiliser market reports indicate a steady flow of new business, while among the coal tar products there has been a fair buying interest in pitch, but the position generally is little changed.

MANCHESTER From the point of view of new bookings, business for chemical products has been moderately active. A wide range of chemicals finding an outlet in the cotton textile and allied trades are being taken up in fair quantities against existing commitments, and a reasonably steady flow of delivery specification from most other industrial users is reported.

The overseas movement of supplies, so far as the leading sections are concerned is said to be on a satisfactory scale. Among price fluctuations since the last report has been a fresh easing in copper sulphate (see 'London').

SCOTLAND A very much busier week's trading was experienced and, generally, home demands showed an all-round improvement. Although the bulk of them were for immediate requirements, there was some forward bookings placed.

Quantities were well maintained in regard to both spot and contract demands. A little movement of agricultural chemicals can be reported but otherwise the position is quiet.

The overseas market showed some improvement, in particular to the Commonwealth countries.

DIARY DATES

MONDAY 16 OCTOBER

S.C.I.—London: 14, Belgrave Sq., S.W.1., 5.30 p.m. 'Advances in the chemistry of phosphorus insecticides' by E. Sherlock.

WEDNESDAY 18 OCTOBER

S.C.I.—Aberdeen: Marischal College. 'Recent advances in gas chromotography and its application to biochemistry' by Dr. A. T. James.

S.A.C.—London: Meeting Room, Chemical Society, Burlington House, Piccadilly, W.1, 7 p.m. Biological Methods Group. 'The use of bacteriophages in epidemiology'.

Oil & Colour Chem. Assoc.—London: Royal Society of Tropical Medicine & Hygiene, Mansion House, 26, Portland Place, W.1, 7 p.m. 'Solvents in the surface coatings industry' by Dr. L. M. Barakan.

THURSDAY 19 OCTOBER

S.C.I.—Liverpool: Donnan Labs., The University, Vine St. 'The control of woodworm and dry rot in the home and in industry' by N. E. Hicken.

FRIDAY 20 OCTOBER

S.A.C.—Salisbury: Red Lion Hotel, 7.45 p.m. 'Analytical techniques in archaeology and the arts' by E. T. Hall & 'The applications of spectroscopy to the study of Roman & medieval glazed pottery' by John W. G. Musty.

Inst. Packaging.—Bristol, 1: Royal Hotel, College Green, 6.45 p.m. 'Odours in packaging'. Discussion Panel of Suppliers & Users.

NEW PATENTS

By permission of the Controller, H.M. Stationery Office, the following extracts are reproduced from the 'Official Journal (Patents)', which is available from the Patent Office (Sales Branch), 25 Southampton Buildings, Chancery Lane, London W.C.2, price 3s 6d including postage; annual subscription £8 2s.

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

ACCEPTANCES

Open to public inspection 8 November

7-Methyl-morpholyl-theophylline and process for the preparation thereof. Maurernay, R. Y. **881 827**

Casein solutions. Rhone-Poulenc. **881 822**

Polymerisation of olefin compounds in the presence of catalysts based on a boron trialkyl. Solvay et Cie. **881 615**

Process for increasing the dye-affinity of polyvinyl chloride fibres. Montecatini. **881 825**

Production of 1-aryl-4,5-dihalogen-pyridazones-(6). Badische Anilin & Soda-Fabrik AG. **881 616**

Process for the production of β-4-methoxybenzoyl-β-haloacrylic acids. Spofa, Sdruzeni Podniku Prozdravotnickou Uyrobu. **881 617**

Open to public inspection 15 November

Combination of hydrogen and oxygen. United States Atomic Energy Commission. **882 715**

Organosilicon compounds and processes for producing same. Union Carbide Corp. **882 101**

Silicon-containing triazine compounds. Union Carbide Corp. **882 103**

Processes for producing solid polymers from unsaturated hydrocarbons. Pechiney. **882 600**

Arylene-imidazolium compounds and disinfectant compositions containing them. Farbenfabriken Bayer AG. **882 357**

Purification of sodium carbonate. Columbia-Southern Chemical Corp. **882 694**

Organic liquid coating composition and a method for the preparation thereof. Bee Chemical Co. **882 199**

Process for the polymerisation of ethylene and catalyst therefor. Ruhrchemie AG. **882 200**

Process for the manufacture of non-woven fibrous sheet materials. Farbwerke Hoechst AG. **882 359**

Esters of thiocarbamic acid. Monsanto Chemical Co. **882 110**

Copolymers. Borger, Jenson & Nicholson Ltd. **882 113**

Control of molecular weight of polymers. Rohm & Haas Co. **882 586**

Rapidly hardenable compositions of epoxide-compounds and complexes of Friedel-Crafts catalysts. Ciba Ltd. **882 360**

6α-Methyl-17α-hydroxyprogesterone and esters thereof and process for their preparation. Soc. Farmaceutici Italia. **882 387**

Method of polymerising unsaturated hydrocarbons. Montecatini. **882 560**

Organic diphosphine nickel complexes. Imperial Chemical Industries Ltd. **882 400**

Process for the manufacture of diphenyl ether derivatives. Farbwerke Hoechst AG. **882 401**

Manufacture of chlorinated polyethylene. Farbwerke Hoechst AG. [Addition to 828 938.] **882 524**

Manufacture of polymeric materials. Imperial Chemical Industries Ltd. **882 603**

Methylated melamine ethers and process of preparing same. American Cyanamid Co. **882 655**

Steroids and the manufacture thereof. Upjohn Co. **882 604**

Selective hydrogenation of olefins. Imperial Chemical Industries Ltd. **882 686**

Synthetic resin coating compositions. Farbenfabriken Bayer AG. **882 687**

Esters of 2-methyl-2-norcamphanemethanol and their production. Eastman Kodak Co. **882 688**

Monobed ion-exchange methods and apparatus. Zwicky, J. F. **882 254**

Phosphorus-and sulphur-containing lubricant additives and their preparation. Ethyl Corp. **882 529**

Process for the synthesis of 4-hydroxy-tryptophan. Soc. Farmaceutici Italia. **882 592**

Crystalline basic salts of dihydrostreptomycin and dihydrodesoxystreptomycin and methods for preparation of same. Rikagaku Kenkyusho. **882 564**

Manufacture of copolymeric products. Courtaulds Ltd. **882 530**

Chromium-containing monoazo dyestuffs. Farbenfabriken Bayer AG. **882 531**

Seawater distillation method and apparatus to provide a superpure distillate. American Machine & Foundry Co. **882 611**

Preparation of alginate material. Medical Alginates Ltd. **882 565**

Preparation of cyclic tri(disubstituted phosphinoborines). Borax Consolidated Ltd. **882 532**

Water-insoluble disazo-dyestuffs and process for their manufacture. Ciba Ltd. **882 533**

Stabilisation of dichlorophenazone. Smith & Nephew Ltd., T. J. **882 567**

Liquid detergent compositions. Unilever Ltd. **882 569**

Amine molybdates and tungstates and lubricating compositions containing them. Castrol Ltd. **882 295**

Production of sodium dichromate. Columbia-Southern Chemical Corp. **882 302**

Alkylation of hydrocarbons. Shell Research Ltd. **882 132**

Steroid compounds. Soc. Farmaceutici Italia. **882 388**

Method of conditioning organic pigments and the resultant product. California Ink Co. Inc. **882 534**

Suspension polymerisation of vinyl monomers. Bakelite Ltd. **882 535**

Process for producing polycarbonates. Kunoshima Kagaku Kogyo Kabushiki Kaisha. **882 540**

Alkylphenyl mono-ethers of polyoxyalklene glycols. Dow Chemical Co. **882 623**

Unsaturated thiophosphoric acid esters. Rhone-Poulenc. **882 541**

Substituted cyclohexanes and cyclohexadienes. Du Pont de Nemours & Co., E. I. **882 138**

Aza-spiro-cyclodecane compounds and process for their manufacture. Ciba Ltd. **882 542**

Heat-sealable foils produced from ethylene-vinylester-copolymers Farbenfabriken Bayer AG. **882 543**

Phenol modified melamine resin and process of producing same. Formica Corp. **882 140**

Maleimide polymer. Union Carbide Corp. **882 141**

Process for the production of polymers particularly of polyethylene. Dow Chemical Co. **882 675**

Process for the manufacture of O-aryl-phosphorodichloridothioates. Dow Chemical Co. **882 338**

Method of adding hydrogen bromide to vinyl-aryl compounds. Dow Chemical Co. **882 546**

Catalysts for isocyanate reactions. Union Carbide Corp. **882 547**

Curing Novolak resins. American Cyanamid Co. **882 306**

Aliphatic carboxylic acid esters. Food Machinery & Chemical Corp. **882 147**

Process for the manufacture of the di-(beta-hydroxyethyl) ester of terephthalic acid. Kemijoka Industrijska Zajednica. **882 548**

Ammonium nitrate explosives. Dynamit Nobel AG. **882 665**

Derivatives of 3:4-dihydro-1:2:4-benzothiadiazine-1:1-dioxide and process for its manufacture. Ciba Ltd. **882 150**

Separation and recovery of dimethyl terephthalate from vapour mixtures containing the same and methanol. Badische Anilin- & Soda-Fabrik AG. **882 151**

Phosphonic acid esters. Farbenfabriken Bayer AG. **882 703**

Organomanganese carbonyls. Du Pont de Nemours & Co., E. I. **882 549**

Hydrazinium compounds, their production and pharmaceutical compositions containing them. Grace & Co., W. R. **882 154**

Method of the production of citric acid. Benckisen GmbH, Joh. A. [Addition to 865 309.] **882 263**

Process for the catalytic isomerisation of alkenes. Shell Internationale Research Maatschappij N.V. **882 668**

Process for preparing sodium acetyl salicylate. Miles Laboratories, Inc. **882 264**

Preparation of diolefins. Esso Research & Engineering Co. **882 340**

Molybdenum catalyst for use in converting hydrocarbons. American Metal Climax Inc. **882 550**

Use of sodium in a process of polymerisation. National Lead Co. **882 266**

Esters of 2,2,4,4-tetraalkylcyclobutane-1,3-diols. Eastman Kodak Co. **882 642**

Process for the manufacture of a bismuth catalyst. Standard Oil Co. **882 552**

Polymerisable composition of matter based on unsaturated polyester resins. Badische Anilin- & Soda-Fabrik AG. **882 643**

Butadiene monoxide. Columbia-Southern Chemical Corp. [Addition to 852 097.] **882 157**

Antacid compositions and a process for their manufacture. Rehesis Co. Inc. **882 554**

Alykylation systems. Phillips Petroleum Co. **882 644**

Phosphors. Westinghouse Electric Corp. **882 347**

Process for the production of arylborazoles. United States Borax & Chemical Corp. **882 645, 882 270**

Phenylpiperazinylalkyl propionanilides. Miles Laboratories Inc. **882 162**

Process for the recovery of 6-aminopenicillanic acid. Beecham Research Laboratories Ltd. **882 276, 882 277, 882 278**

Production of alpha-olefins. Continental Oil Co. **882 280**

Esters of thiocarbamic acid. Monsanto Chemical Co. [Divided out of 822 110.] **882 111**

AMENDED SPECIFICATIONS

On Sale 8 November

N-substituted products of 2,4-diamino-1,3,5-triazine. Groth, I. **794 398**

Pregnadienes. Schering Corp. **843 217**

Perkin Centenary Trust Awards

Particulars of the Perkin Centenary Trust fellowship and scholarship awards for the academic year 1962-63 are now available from The Secretary, The Perkin Centenary Trust, c/o The Chemical Society, Burlington House, London W.1. The awards are intended to promote technical education in all aspects of the manufacture and use of colouring matters.

CLASSIFIED ADVERTISEMENTS

CLASSIFIED RATES: All sections 5d. per word. Minimum 8/-. Three or more insertions 4d. per word. Box Number 2/- extra.

SEMI-DISPLAY: 30/- per inch. Three or more insertions 25/- per inch.

EDUCATIONAL

CHEMICAL ENGINEERING. Guaranteed Home Study Courses for A.M.I.Chem.E. exam. The highest percentage of successful candidates—up to one third in consecutive years—have been trained by T.I.G.B. Everyone seeking promotion in the Chemical and Allied Industries should send for the T.I.G.B. "Guide to Success". 100 pages of expert advice and details of wide range of guaranteed (Exam and Diploma) Courses, including A.M.I.Mech.E., A.M.I.Prod.E., B.Sc.(Eng.) Courses in individual subjects also available. Send for your copy today—FREE. T.I.G.B. (Dept. 84), 29 Wright's Lane, London, W.8.

FOR SALE

CHARCOAL, ANIMAL AND VEGETABLE, Horticultural burning, filtering, disinfecting, medicinal. Also lumps, ground and granulated. **THOMAS HILL-JONES, INVICTA WORKS, BOW COMMON LANE, LONDON, E.3 (TELEPHONE: EAST 3285).**

PLANT AND MACHINERY FOR SALE

Baker-Perkins Class BB "Double Naben" Bladed Steam Jacketed Mixers. Four—size 12 and Three—size 11, of 20 and 8 gallons respectively.

Oil Jacketed Double Trough Mixer 48 in. by 36 in. by 29 in. deep. Paddle Blades. Bottom Outlets.

Barron 'U' Sifter Mixer 96 in. by 33 in. by 33 in. with 10 H.P A.C. Motor.

Gardner 'U' Sifter-Mixers 66 in. by 24 in. by 24 in. with 5 H.P. A.C. Motors. Four available, of modern streamlined design.

Horizontal 'U' Trough Mixers 48 in. by 18 in. by 22 in. Three—Tilting type, Paddle Blades. Glanded.

Over-Arm Twin-Blade, Tilting, 30 gallon Mixers with 3 H.P. Geared Motors. Five available.

Lying at our No. 2 Depot, Willow Tree Works, Swallowfield, Berkshire.

Apply: Winkworth Machinery Limited, 65 High Street, Staines, Middlesex. Telephone 55951.

Phone 55298 Staines.

(Five) Stainless Steel Duplex 'Z' Blade Mixers 43″×40″×28″ deep.
(Three) B. Perkins **Double Naben** Jac. Mixers 30″×28″×28″.
(Three) B. Perkins Jac. Mixers with **Reverse Duplex Blades,** 70″×53″×42″ deep.
(Two) B. Perkins Heavy Duplex Serrated 'Z' Blade Mixers 54″×44″×36″ deep.
Stainless Steel Duplex 'Z' Blade Vacuum Mixer 3′×3′×3′.
(Thirty) Gardner & other 'U' Trough Mixers up to 9′ 6″×3′×3′.
(Nine) Condensers 8′ 2″×16″ diam. 232—¾″ Brass Tubes 100 w.p.
34′ continuous Drying Oven/Steel Mesh Conveyor 36″ wide, heating unit and (2) Fans.
(60) Glass Lined Cyl. Enc. Tanks up to 9,000 galls.
Send for Lists.
HARRY H. GARDHAM & CO. LTD., 100 CHURCH STREET, STAINES.

SITUATIONS VACANT

UNITED KINGDOM ATOMIC ENERGY AUTHORITY

require a

PLANT MANAGER
(CHEMIST)

to cover, at different times, a range of duties including:—

(a) Control of a variety of manufacturing, fabrication and chemical process operations.

(b) Commissioning and operation of gas purification plants.

(c) Technical control of contracts.

Applicants should preferably possess an honours degree in chemistry or chemical engineering, or be corporate members of a Senior Professional Institution. Previous experience in this class of work is desirable.

Salary: £1,005 (at age 25)–£1,350 (at age 34 or over)–£1,535 p.a.

Superannuation scheme. A house or substantial assistance with house purchase will become available for married officers living beyond daily travelling distance.

Please write for application form to the Senior Recruitment Officer, A.W.R.E., Aldermaston, Berks., quoting ref. 2889/38.

SALESMAN REQUIRED by important tar distillery in the north western area. One fully experienced in coal tar products preferred. Age 30/40 years. Excellent prospects for right applicant. Salary commensurate with experience. Pension Scheme in operation. Please state qualifications, age, etc. All replies treated in strict confidence. Box No. 3765.

WORK WANTED & OFFERED

CRUSHING, GRINDING, MIXING and DRYING for the trade
THE CRACK PULVERISING MILLS LTD.
Plantation House, Mincing Lane, London. E.C.2.

Classified Advertisements can be accepted up to 10 a.m. Tuesday for insertion the same week.

BOX NUMBERS: *Reply c/o "Chemical Age" · Bouverie House · Fleet Street EC4.*

PLANT AND MACHINERY FOR SALE: continued

600

ROTARY DOUBLE SHELL DRIER by **Edgar Allen,** 16 ft. × 3 ft. 4 in. rotating on two roller paths and driven through reduction gears by 5 h.p. motor, final speed 6.75 r.p.m. Oil fired with separate brick lined firebox, Urquhart atomiser, consumption 80 lb./hr. with motorised pump, cyclone and motorised fan. Inlet gas temp. 700/750 deg. C., outlet 60 deg. C. Capacity 2½/3 t.p.h.

TWIN-CYLINDER DRIER by **Simon,** 82 in. × 28 in., complete with gearbox, vee belt drive by 15 h.p. motor and starter, grinding knives and available spares.

VACUUM OVEN by **Francis Shaw,** 6 ft. 3 in. × 7 ft. 10 in. back to front × 5 ft. 1 in. wide internally, cast iron construction, with 12 platens of welded construction and heavy swing door each end having four corner wheel operated swing clamps. Usual flanged connections to internal headers with swan neck connections to platens.

HORIZONTAL MILD STEEL STEAM JACKETED RETORT by **Manlove Alliott,** welded construction 3 ft. dia. × 7 ft. long internally, fitted swing door each end with quick release clamps. Suitable 30 p.s.i. in jacket, 20 p.s.i. in chamber. Mounted on fabricated cradles.

VERTICAL MILD STEEL WATER JACKETED TURBINE MIXER by **Dobson & Barlow,** Model No. 7, 6 ft. dia. × 5 ft. 3 in. deep on straight with bolted on domed cover, flat bottom 4 ft. dia. impeller in bottom of vessel underdriven through worm reduction gearbox from direct coupled 50 h.p. motor. Final impeller speed 130 r.p.m., jacket suitable 40 p.s.i. water pressure. Mounted on mild steel legs.

DOUBLE TROUGH MIXER by **Werner Pfleiderer,** stainless steel lined, 33 in. × 31 in. × 26 in. deep, double geared and glanded shafts. Hand tilting through winch and counterbalance weights. Drive by 20 h.p. 415/3/50 cycles motor with starter.

DOUBLE TROUGH TILTING MIXER by **Melvin & Gillespie,** trough 21 in. × 21½ in./18 in. deep, twin 'Z' blades fitted ring seals. Hinged cover on mixer. Tilting through clutch and chain wheel to back screw. Drive by 4 h.p. 400/3/50 cycles geared motor. FIVE AVAILABLE.

VACUUM MIXER/BLENDER by **Peter Kupper,** tinned steel trough approx. 37 in. × 35 in. × 28 in. deep internally fitted domed cover with top centre 2 in. i.d. vacuum connection and counterbalanced side mounted lifting gear. Twin glanded single geared 'Z' blades arranged for direct coupling to reduction gear and motor on separate bedplate. Quadrant tilting gear arranged for direct coupling to reduction gearbox and motor mounted under trough. Motors and starters not available.

HORIZONTAL RIBBON TYPE POWDER MIXER, 3 ft. 4 in. × 3 ft. 8 in. × 8 ft. 9 in. long with bottom bagging-off outlet. Drive through reduction gearbox from 10 h.p. motor with starter and isolator.

OLIVER CONTINUOUS FILTER by **Dorr Oliver,** four rotating discs 6 ft. dia. with timber filter plates in copper trough, driven through worm gear by chain sprocket, with dry vacuum pump, centrifugal pump, and filtrate and wash water receivers.

JACKETED FILTER PRESS, Serial JK1, by **S. H. Johnson,** 21½ in. sq. with 38 chambers giving total working area of 475 sq. ft., working pressure inside chambers max. 60 p.s.i. Plates arranged for inside circulation of cooling brine. Plates and frames of gun-metal, frame being 1½ in. thick, chamber 1⅝ in. deep. Fitted hand hydraulic tightening gear and complete with available filter cloths. FIVE AVAILABLE.

CAST IRON PLATE & FRAME FILTER PRESS by **Johnson,** 18 chambers, 12 in. × 12 in. × ⅝ in., pyramid surface plates, 1 in. dia. feed and wash connections and individual tap discharge, hand and ratchet bar closing. With vertical 2 in. × 2½ in. stroke Plunger Pump. Mild steel brackets bolted to support legs on discharge side to carry mild steel collecting trough. Press seated in lead covered shallow trough on timber stand approx. 27 in. high.

EVAPORATOR by **A. Johnson,** all contact parts in FMB stainless steel with mild steel backing flanges. Body 10G material, 6 ft. 10½ in. dia. × 3 ft. 4 in. deep on straight, coned bottom 13 in. deep, bolted on coned top 15 in. high, bolted on vapour section 10G material. Main body fitted perforated spray coils, battery of steam 'U' coils overall length approx. 6 ft. 10 in., suitable 50 p.s.i. w.p.

OVERDRIVEN HYDRO EXTRACTOR by **Watson Laidlaw,** 48 in. dia. FMB grade stainless steel basket, 21 in. deep, with 3/16 in. perforations, stainless steel dividers making four compartments, hinged lid with interlock, mild steel monitor with 6 in. flanged runoff. Direct drive from overmounted motor.

COMPLETE BALL MILL GRINDING PLANT by **International Combustion,** comprising 8 ft. × 48 in. chrome steel lined Hardinge Ball Mill driven by 220 h.p. motor with vertical feed hopper, constant weight belt feeder, steel cyclone, double cone separator, motorised fan, etc.

CONTINUED NEXT COLUMN

PORCELAIN LINED BALL MILL by **Steele & Cowlishaw,** 26 in. dia. × 23 in. long internally, 5 in. dia. charging port, mounted in plain bearings on cast iron 'A' frames, overall height 48 in. Belt drive on Mill periphery with loose pulley. Quantity of pebbles available.

SILEX LINED BALL MILL, 31 in. × 26 in. internally, on heavy bearing pedestals to be mounted on concrete plinths. Centre bolted flanged type. 8 in. × 6 in. charging hole. TWO AVAILABLE. 6 ft. **DIFFERENTIALLY GEARED SINGLE-ROLL EDGE RUNNER MILL** by **Cox,** pan 14 in. deep, roll 42 in. dia. × 10 in. face.

GEORGE COHEN Sons & Co. Ltd.

Wood Lane, London, W.12. (Shepherds Bush 2070)

Stanningley, Nr. Leeds. (Pudsey 2241)

600

TWO—1,800 kW pass-out/back pressure type **STEAM TURBO ALTERNATOR SETS,** turbines by **Belliss & Morcom,** designed for steam at 155/195 p.s.i.g., 500/550 deg. F., passing out 15,000 lb. of steam/hr. at 15 p.s.i.g. exhausting remainder at a back pressure of 4/5 p.s.i.g. THESE SETS CAN OPERATE AS STRAIGHT BACK PRESSURE AT A LOAD OF 1,150 kW WITH STEAM AT 150 P.S.I.G., 550 DEG. F. TEMPERATURE, EXHAUSTING AGAINST 10/15 LB. BACK PRESSURE.

Turbine coupled through gearbox ratio 6:1 to alternator by **Bruce Peebles,** wound for 3,300 volts 3 phase 50 cycles supply.

800 kW 400 volts 3 phase 50 cycles 4-wire back pressure type **STEAM TURBO ALTERNATOR SET** by the **English Electric Co.** turbine designed for steam at 185 p.s.i.g., 620 deg. F., exhausting against 25 lb. back pressure, speed 6,000 r.p.m. Direct coupled through gearbox to alternator, speed 1,500 r.p.m., with exciter and switchgear.

2,500 kW 6,600 volts, 3 phase, 50 cycles, condensing **STEAM TURBO ALTERNATOR SET** incorportinag turbine by **Hick Hargreaves,** designed to work with steam at 165/200 p.s.i.g., 500/600 deg. F. temperature, speed 3,000 r.p.m. Direct coupled to alternator by **Lancashire Dynamo & Crypto,** with switchgear. Set complete with **Hick Hargreaves** surface condenser for cooling water at 80 deg. F.

GEORGE COHEN Sons & Co. Ltd.

Wood Lane, London, W.12. (Shepherds Bush 2070)

Stanningley, Nr. Leeds. (Pudsey 2241)

Chemical Age Enquiry Service

For fuller details of equipment, apparatus, chemicals etc., in the advertisement or editorial pages of Chemical Age, fill in the coupons below, ONE PER ENQUIRY, and return to us.

Please send further details about.....
.....
.....
mentioned on page.....*of this issue.*
Name..... *Position*.....
Firm.....
Address .....
.....
Chemical Age Enquiry Service.

Please send further details about.....
.....
.....
mentioned on page.....*of this issue.*
Name..... *Position*.....
Firm.....
Address .....
.....
Chemical Age Enquiry Service.

Please send further details about.....
.....
.....
mentioned on page.....*of this issue.*
Name..... *Position*.....
Firm.....
Address .....
.....
Chemical Age Enquiry Service.

★ *Detach this page complete then fold as marked overleaf to use the post-paid reply folder*

2nd FOLD

Postage will be paid by the Licensee

No Postage Stamp necessary if posted in Great Britain or Northern Ireland

BUSINESS REPLY FOLDER
Licence No. 2501

CHEMICAL AGE
154-160 FLEET STREET
LONDON, E.C.4

1st FOLD

3rd FOLD

Chemical Age

ENQUIRY SERVICE

★

This is a special service for readers of

CHEMICAL AGE

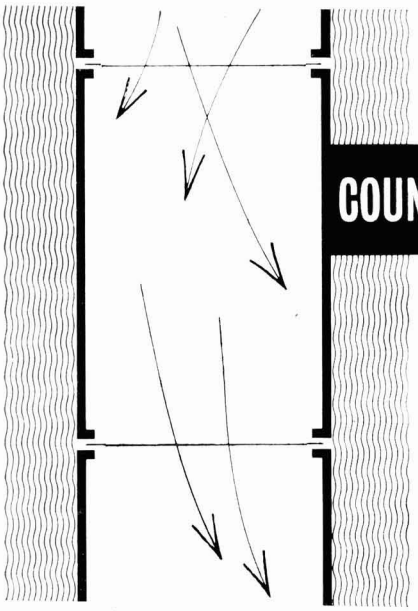
It is designed to give fuller information on equipment, apparatus, chemicals etc., mentioned in this issue—whether in the editorial text or in an advertisement

Cut out the whole of this page, fold as instructed with post-paid address on the outside

★

Chemical Age
154 Fleet Street, London, E.C.4
Tel.: Fleet Street 3212

CUT ALONG THIS DOTTED LINE



Plants designed and built by CJB are operating with outstanding success producing acids, fertilisers, man-made fibres and petrochemicals.

Working from CJB or client's flow sheets, the Company is building plants for the world's chemical manufacturers.

COUNTER-CURRENT PROCESS EQUIPMENT

For Counter-Current contacting between liquids and gases in pressure and vacuum distillation, absorption, direct gas cooling and scrubbing. Kittel Plate tower packing is the most efficient system yet devised. It gives even contact over the whole area and constant renewal of the liquid surface.

A variety of Kittel Columns are working successfully for I.C.I. Wilton, Billingham, Heysham, Huddersfield and Manchester; for Petrochemicals Ltd., Carless, Capel & Leonard Ltd., Fisons Ltd., and over 20 other British Companies.

Abroad, CJB Plants are working in Yugoslavia, Iran, India, South Africa and Australasia.

CJB experience in the design and supply of complete Counter-Current Process Equipment is unique. It is at your disposal.

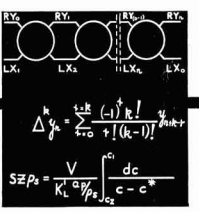
CJB

CONSTRUCTORS JOHN BROWN LIMITED
A member of the John Brown Group

CJB HOUSE, EASTBOURNE TERRACE, PADDINGTON, LONDON W.2
Phone : AMBASSADOR 8080 · Cables : CIVANIC, LONDON · Telex 25356
Also at MANCHESTER · MELBOURNE · TEHERAN

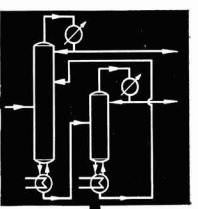
PROCESS PROBLEM

The establishment of a new Department by Metal Formations Limited, means that the Company are now able to offer a complete Process Plant Design, Fabrication and Installation Service for the small and medium sized manufacturer.



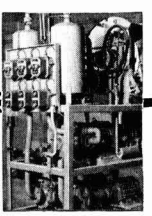
$$\Delta^{k} y_n = \sum_{i=0}^{i=k} \frac{(-1)^i k!}{i!(k-i)!} y_{n+k-i}$$

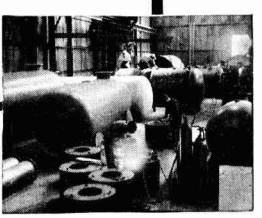
$$SZ\rho_S = \frac{V}{K_L a \rho_S} \int_{c_2}^{c_1} \frac{dc}{c - c^*}$$



METAFORMA

COMMISSIONING





For a swift and guaranteed service to all your process problems
address your enquiries to: T. R. WILLIAMS ESQ., CHEMICAL ENGINEER,

METAL FORMATIONS LIMITED

WOODSETTON, DUDLEY, WORCS. Tel.: Sedgley 3741

Printed in Great Britain by The Press at Coombelands Ltd., Addlestone, Surrey, and published by Benn Brothers Ltd., at Bouverie House, 154 Fleet Street, E.C.4. Registered at the General Post Office. Entered as Second Class Matter at the New York U.S.A., Post Office.