Chemical Age

MODERN CHEMICAL INDUSTRY IN U.K.

(page 249)

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11 February 1961

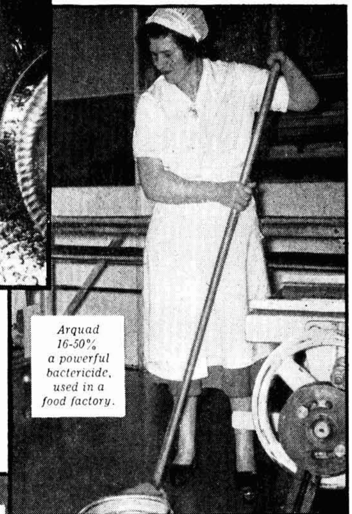
THE WEEKLY NEWSPAPER OF THE CHEMICAL INDUSTRY

INDEX TO ADVERTISERS

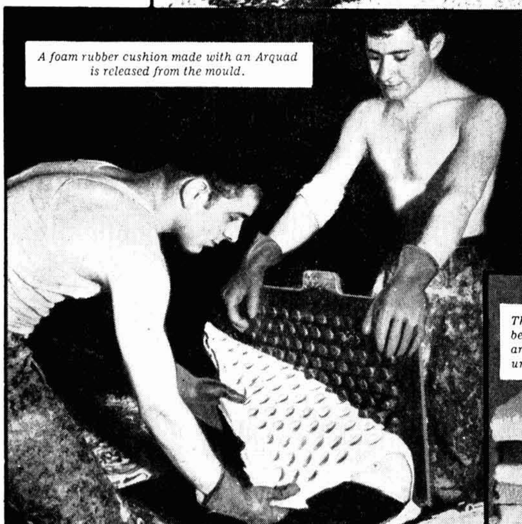
The first figures refer to advertisements in **Chemical Age Directory & Who's Who,** *the second to the current issue*

(Continued on page 232)

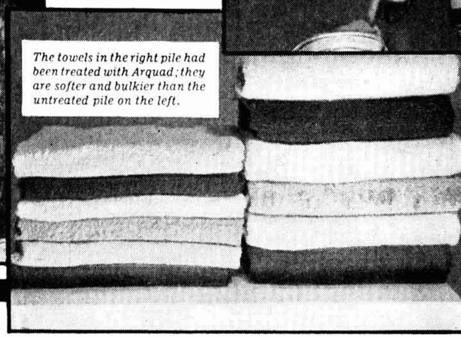
The application of a road emulsion made with an Arquad.



Arquad 16-50% a powerful bactericide, used in a food factory.



A foam rubber cushion made with an Arquad is released from the mould.



The towels in the right pile had been treated with Arquad; they are softer and bulkier than the untreated pile on the left.

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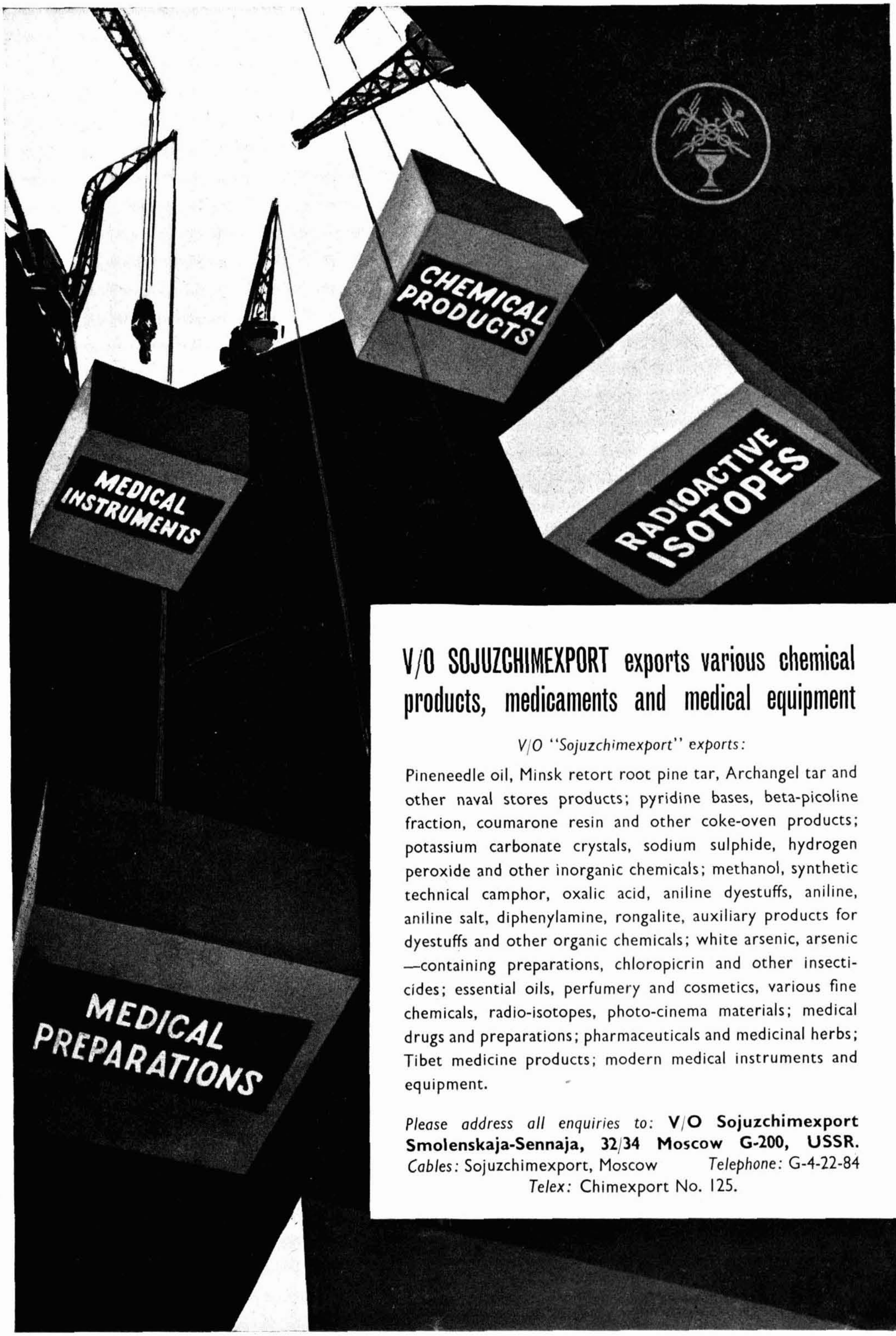

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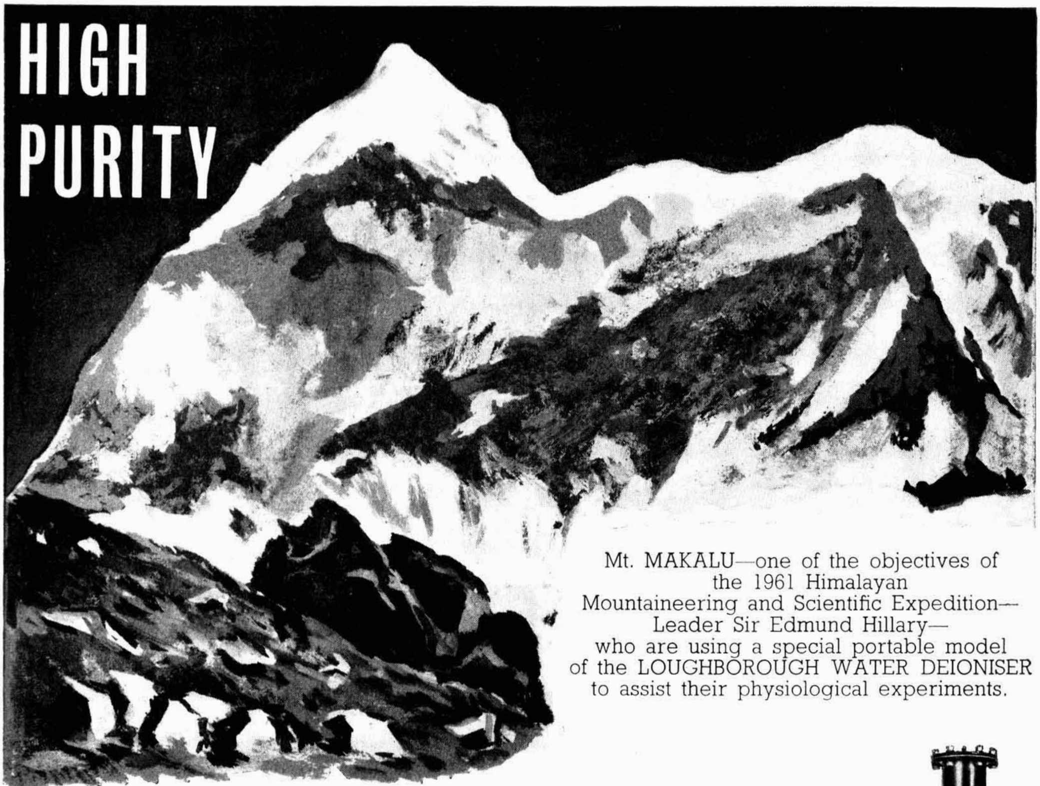

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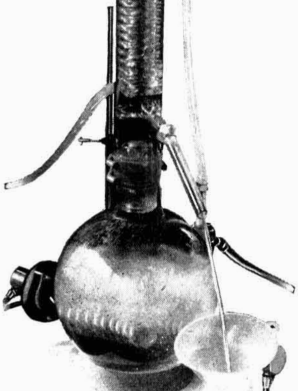

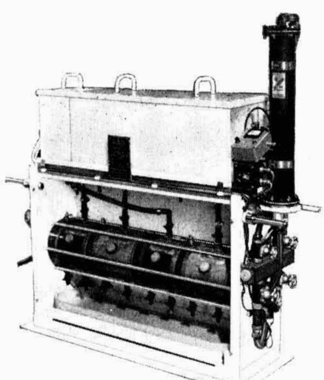

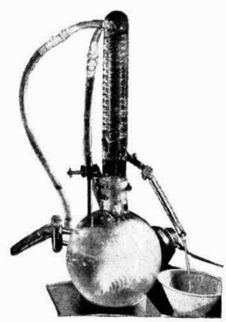

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Full details will be found on page 269

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CHEMICAL AGE

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IN THIS ISSUE

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CHANGING GROWTH PATTERN

THE British chemical industry is currently passing through a period of rationalisation, akin to that of the late 1920's. Several factors are responsible, not least of which is mounting competition from overseas producers, largely brought about by the setting up of the European Economic Community and the consequent attraction to Europe of many major U.S. chemical companies.

Even before the advent of E.E.C., the industry was developing along these lines. The introduction of more synthesis processes and the opening up of the petrochemicals field called for chemical operations on a large scale with complicated plants that could only be financed by powerful concerns. Before the war, these trends had led to the formation of I.C.I. and the Royal Dutch-Shell Group, two mergers that resulted in vast, powerful and technically competent groups. Since the war, the chemical giants have tended to get bigger.

As Dr. James Taylor pointed out in his Cantor lecture on Monday (p. 249) the economic forces which prompted the formation of large companies continue to operate, but many other factors are acting in the same direction. There is a growing tendency for chemical firms to diversify, either by producing intermediates or finished products, such as plastics materials, or by going in the opposite direction, into the raw materials field.

The growth of international activities favours the larger companies since only these can afford to support world-wide manufacturing and selling organisations. The liberalisation of trade can be expected to continue and as a result more companies will set up plants overseas. This too will hasten the movement of small units into larger ones that can be reasonably self-sufficient and possess adequate resources.

Another factor likely to give further impetus in this direction is the Restrictive Practices Act, which tends to drive the inefficient firms out of business. More take-over bids can be expected to be announced in the coming months, as those now under discussion are finalised.

The formation of larger and larger companies is producing monopolies at home, but with international competition becoming increasingly severe, the British chemical industry will only be fit to meet it with organisations that are capable of operating large-scale plants as efficiently as possible.

From a national point of view it can be argued that it is inefficient and wasteful to duplicate research and development, while the erection of similar plants by different firms which might operate below maximum capacity could lead to cut-throat competition, particularly in exports. On the other hand, there are dangers inherent in such a policy. The biggest danger, that of centralisation, has so far been avoided by the large companies, which generally appreciate the present-day need for delegation of authority over a wide sector.

While too much competition can be uneconomic and wasteful, it is also true that no competition at all would be equally disastrous. Fortunately that is not likely to happen for there will always be room for at least two producers of any one product. In addition there will always be a place for the hundreds of specialist firms who have a limited product range. These firms play a vital part in the chemical industry and would not easily fit into the pattern of operations of the large firms.

Albright Bid for W. J. Bush Would Add to Group's Fine Chemicals Interests

A TAKE over offer that seems likely to succeed is the £8.5 million bid announced last week by Albright and Wilson Ltd. for the entire £2.25 million capital of W. J. Bush and Co. Ltd.

The directors of both companies believe that the offer is fair and reasonable and that the merger is in the best interests of shareholders and employees of the two companies; the directors of W. J. Bush and their families control more than 60% of the ordinary shares and 14% of the A ordinary, which carry no voting rights.

W. J. Bush are producers of dyestuffs intermediates, pharmaceuticals and drugs, fine chemicals, food flavourings and dyes, essential oils and compounds. Chief products of the Albright and Wilson international group are phosphorus and its compounds, oil additives, carbon tetrachloride, sodium chlorate (Albright and Wilson (Mfg.)), silicones (Midland Silicones), sulphuric acid, detergents and other surface active chemicals (Marchon Products), sulphuric acid and cement (Solway Chemicals), plasticisers, perfumery chemicals and essences and food and drink flavourings (A. Boake Roberts).

Albright and Wilson, who acquired A. Boake Roberts last year, have expansion projects in hand for carbon tetrachloride and plan the first U.K. production of sulphamic acid. Also in hand are the large-scale expansions at Whitehaven to raise Solway Chemical's capacity for sulphuric acid and cement to about 150,000 tons/year of each. The Canadian subsidiary, Electric Reduction Co., are continuing to expand their Port Maitland facilities. Marchon have contracts to supply detergent materials know-how to the U.S.S.R.

A. and W. directors are satisfied that the profits before tax for 1960 are about the same as the aggregate profits for 1959 of Albright and A. Boake Roberts. The board intend to pay to existing A. and W. holders a second interim dividend in lieu of a final for 1960 of 14%, making a total 20% for the year. The new ordinary capital to be issued to effect the merger would not rank for this dividend.

W. J. Bush directors are also satisfied that pre-tax profits for 1960 are about the same as those for the previous year. On the offer becoming unconditional and before registration of transfers into the name of Albright and Wilson, a second interim in lieu of a final of 9%, making 12½% for the year, would be paid to existing holders.

The intention is that W. J. Bush and Co. will retain their identity and continue to trade under their own name.

A. and W. Develop Pyrophosphate Electrolyte for Copper Plating

A NEW electrolyte for copper plating, based on pyrophosphate, has been developed in the Oldbury, near Birmingham, laboratories of Albright and Wilson (Manufacturing) Ltd. The Pyrobrite bath is claimed to have already demonstrated its outstanding advantages in industrial practice, under a wide variety of operating conditions, from decorative uses to electro-forming.

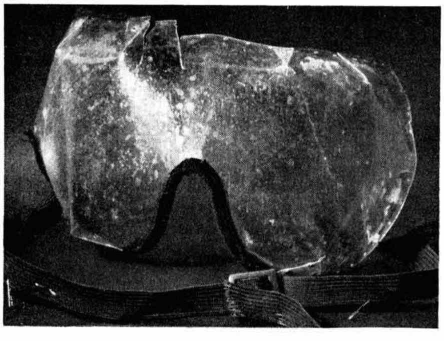
Albright manufacture and supply all constituents necessary for the Pyrobrite bath, main feature of which is the new PY61 additional agent. This ensures fully bright deposits over a wide current density range. The bath is claimed to have outstandingly good levelling characteristics and to produce close grained, smooth deposits which will not finger mark or spot out. It plates faster than acid or cyanide solutions under normal operating conditions because power current densities are possible. It also has excellent throwing power.

Because it contains no cyanide, there is no need for fume extraction and there are no problems associated with the disposal of effluent. The solution itself is only mildly alkaline and does not attack light alloys to any appreciable extent.

According to Albright, the process is ideal for electro-forming; for example, in the preparation of moulds of plastics dolls, it provides a very dense, smooth deposit without the formation of nodules.

Because the deposit is non-porous, a relatively thin layer forms an efficient stop-off medium during the nitriding and carburising of steel. Another important application for the process is in copper plating prior to bright nickel and chromium plating of zinc base die castings and steel.

Safety Goggles Save Acid Worker's Sight



These safety goggles saved the eyes of George Langley, a founder member of the Golden Eye Club and acid plant operator with United Sulphuric Acid Corporation, Widnes. Langley knocked over an oleum container. The contents fell into a sink of water and splashed up into his face. The Golden Eye Club was recently formed by the Royal Society for the Prevention of Accidents for employees who escape serious eye injury by wearing goggles at work

Official Study of Food Solvents, Flavouring Agents

A REVIEW of solvents and flavouring agents will be undertaken shortly by the Food Additives and Contaminants Sub-Committee of the Food Standards Committee. They will advise Ministers on the need for regulations to control the use of these substances in food and in the preparation of food.

The new sub-committee invite the co-operation of the trade, enforcing authorities and other interested bodies in their review. In particular, they wish to obtain information as to the solvents and flavouring agents, both natural and synthetic at present in use; their chemical composition and properties; the food to which they are added or applied; the amount used and mode of use; and evidence to the absence of any deleterious effects resulting from their use. Similar information is also sought about any new substance being developed and which may have advantages over solvent and flavourings in current use.

Fire at Williams' Hounslow Works

The light packing and despatch department of Williams (Hounslow) Ltd., manufacturers of food colours dyestuffs and other chemicals, was destroyed when fire broke out in the department in the early hours of last Monday morning. The fire brigade was called to deal with the blaze, which involved cardboard and paper packaging materials. No chemicals were involved in the fire, except minor quantities of packaged products, and the production areas of the factory were not affected. There were no casualties.

Explosion at Manchester Plant of Hardman

Two workmen were taken to hospital with shock after an explosion at Hardman and Holden Ltd.'s chemical works in Clayton, Manchester on 4 February. The mystery blast blew off the roof and severely damaged the 1,000 square feet three-floor experimental process department. Severe damage was done to a sulphuric acid plant in the building.

Project News

B.H.C. Get Overall Planning Permission for New Site

OVERALL Ministry planning permission has now been given for the new petrochemical complex planned by **British Hydrocarbon Chemicals Ltd.** at Baglan Bay, between Port Talbot and Neath in South Wales. More detailed planning permission will be given as the company's plans become more advanced. Site clearance is scheduled to start shortly. B.H.C. have announced that they will develop this site, adjacent to the B.P. Llandarcy refinery, as a second area for petrochemicals production in the U.K. The first project is for the associated company, Forth Chemicals Ltd., who will build a styrene monomer plant with an annual capacity of 50,000 tons/year.

British Enka and Site for Nylon 6 Project

● HAVING earlier turned down Grangemouth as a site for a new nylon 6 production plant, **British Enka Ltd.** have now shown interest in a site near Irfine. The plant would start with 700 workers and increase to 4,000. The firm has stated that no immediate decision is intended as other sites in the West of Scotland and Northern Ireland are still being investigated. British Enka already operate a viscose rayon yarn plant at Liverpool and have been studying the scope for nylon yarn production in the U.K. for the past year.

Abbotts Will Have Britain's Largest 'Ethical' Plant

● CONSTRUCTION is proceeding as scheduled on the £1.5 million project at Queensborough, Kent, for **Abbott Laboratories Ltd.** Claimed to be the largest ethical pharmaceutical plant in the U.K., it is the first stage of development on a 130 acre site. **C.A.S. (Industrial Developments) Ltd.**, St. James' House, Kensington Square, London W.8, say that the plant will be handed over to Abbotts on 23 October 1961—on time and to a fixed price. C.A.S. were also responsible for the Cyanamid Lederle facilities at Gosport.

Shell Plan Refinery in Denmark

● LAND for a possible refinery site has been purchased by **Shell Oil Co.** at Fredericia, Jutland. The new refinery would supply Denmark and possibly the rest of the Scandinavian market. The company denies that it has already decided to start building the refinery next year; reports say that capacity of crude would be 2 million tons/year.

Currently the Scandinavian market is being supplied by imports, including those from the new Esso refinery at Slagen, Norway. A new refinery is to be built by Svenska Esso in Sweden, allied to a polythene project, while Mr. Paul Getty's Tidewater Oil Co. are building a million tons/year refinery at Kalundborg that will probably be on stream late this year. The Maersk refinery, Copenhagen, will supply feedstock for the nearby joint I.C.I. polythene plant.

Petroleum industry sources estimate that the free world refining capacity at the beginning of 1960 was about 1,073 million tons, 20% more than last year's crude production. Projects in hand in 39 countries will add about 135 million tons to that capacity at an investment of about £950 million.

Bids Invited for Gulf Oil's Denmark Project

● FIVE major contracting firms have been asked to submit bids for construction of the **Gulf Oil** refinery at Stigsnaes, Denmark. The companies are Bechtel International, Kellogg International, Lummus Co., Procon (Gt. Britain) and Foster Wheeler.

Construction is due to start in May and is expected to be completed by the end of 1962.

Sharples Hydrators for I.C.I. Terylene Plant

● INSTALLATION of a battery of Super-D-Hydrators—fully automatic centrifuges designed and manufactured by **Sharples Centrifuges Ltd.**, Camberley, Surrey, has recently been completed at I.C.I.'s new Terylene plant at Wilton, Yorks. They will be operating continuously, producing Terylene intermediates. On this same site a battery of generally similar Super-D-Hydrators has been for some time producing intermediates required in the manufacture of nylon.

A very complex system of time cycle controllers arranges, automatically, for the feeding of the material to the centifruge, and then carries out automatic washing operations and a drying process to produce products of uniform high purity.

A.P.V.'s Annual Turnover

● TURNOVER of the **A.P.V. Company Ltd.**, Crawley, is considerably in excess of the sum of £1 million-a-year referred to in 'Project News' last week. This figure refers only to work handled by the Chemical Engineering Division and not to the company as a whole.

I.C.I. to Boost Phthalic Capacity in Australia

● PHTHALIC anhydride capacity in Australia is to be expanded in a further overseas investment programme announced by **Imperial Chemical Industries Ltd.** Phthalic capacity at the plant of **Newcastle Chemical Co.**, who are jointly owned by I.C.I. of Australia and New Zealand, and Broken Hill Proprietary, is to be doubled at a cost of about £600,000.

In addition, Broken Hill are installing plant at a cost of more than £500,000 to process tars derived from coke-oven operations at Port Kembla for the recovery of naphthalene.

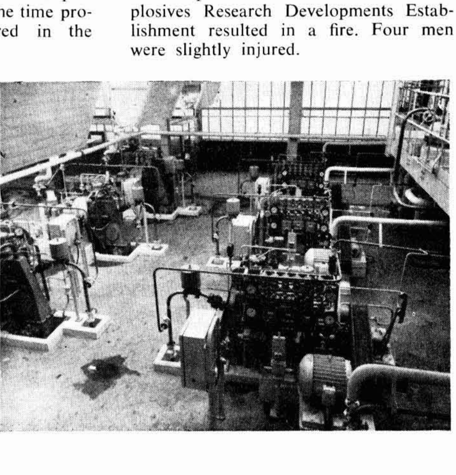
Last week I.C.I. announced a new Terylene project for their Argentine subsidiary (C.A., 4 February, p. 207).

Steam Raising Plant for Monsanto's Ruabon Plant

● AN order for steam generating plant worth about £120,000 has been received by **Clarke Chapman and Co.**, from **Monsanto Chemicals.** The installation, which will consist of a bi-drum oil-fired outdoor boiler with ancillary equipment, will be erected at Monsanto's work at Ruabon.

Fire at Government Explosives Establishment

An explosion at the Government's Explosives Research Developments Establishment resulted in a fire. Four men were slightly injured.



Battery of Sharples Super-D-Hydrators at I.C.I. Wilton Terylene plant

DISTILLATES

★ THE take-over saga took a novel twist last week with the Stock Exchange rocked by rumour and counter-rumour that the most ardent take-over bidders were themselves being bid for. In one day, Fisons' shares rose from 48s 6d to 56s 6d, fell to 51s rose again to 54s before falling sharply away again. Firstly, Shell Transport and Trading were suggested as bidders for Fisons; this was promptly denied by Shell and just as promptly replaced by another rumour that I.C.I. were in the market for the fertiliser group. Since then Distillers have been mentioned as a likely bidder. As practically everyone else has been making suggestions, I offer my tip—readers should look across the Atlantic to a firm such as W. R. Grace.

Sir Clavering was moved to state that he had received no bid from anyone and that he did not expect one. *The Times* City editor, doubtless believing that where there's smoke there's fire, said this denial did not necessarily rule out a bid, since a potential bidder might not yet be ready to make an approach to Fisons' directors.

Had the rumours been true they would have put the bid in the Daily Mirror-Odhams class, Fleet Street's own contribution to the merger stakes. These two groups dominate the magazine and trade Press publishing field, a fact which prompted one reader to ask me which one owned CHEMICAL AGE. I was delighted to tell him that this journal is published by the Benn Brothers Group, which owes allegiance only to its shareholders and the industries its journals serve.

★ CANTOR lectures given by Dr. James Taylor, the last of which included a generous acknowledgement of this journal's listing of new plant projects, were full of interest. To me, highlights of his last paper (see p. 249) were the 'league' tables, showing the relative positions of chemical producers.

Future ratings of U.K. chemical producers on a trading profit basis will show changes, with Albright and Wilson, Borax (Holdings) and Laporte likely to figures higher up the 'league' following take-overs. The D.C.L. position as No. 2 must lean heavily on potable interests, which account for 80% of profits, while Courtaulds are not included, nor are Shell Chemical, Esso or B.P. because of the difficulty of separating their chemical earnings.

I.C.I. were the only U.K. company to figure in the *Fortune List*, although many others must qualify. The employee rating in this list is misleading because of the impact of automation; on this basis I.C.I. must have some fairly old plant since Union Carbide, with half the employees, top I.C.I. on sales performance.

One of the points made by Taylor in his second talk which bears emphasis is that the affairs of the chemical giants are today largely managed by scientists; 30 years ago this was far from true. Of I.C.I.'s 16 directors, 13 are professionally trained scientists. It could not be otherwise in a modern science-based industry, but it is significant that the chairmen of most U.K. chemical companies are still men of commerce or finance.

★ 'ARSENIC in our beer' might well have been the title for a motion presented in Parliament last week by Dr. B. Stross (Lab., S. Stoke-on-Trent) who sought to have annulled regulations concerning arsenic in brewers' yeast dated 7 December last.

Debate ranged far from the subject—from prawns containing 170 p.p.m. arsenic, to detective thrillers by Dorothy Sayers, bees, honey, ice cream, lollies and wrapping paper for chocolate that contained 5,000 p.p.m.—but as pointed out the latter was not made of brewers' yeast.

After all the fun, it seems that the amount of arsenic in beer depends on the quantity of arsenic in the brewer's yeast and in the fuel used. Since anthracite is not yet an ingredient of beer, that danger can be eliminated. Dr. Stross withdrew his motion on learning that the new regulations only apply to brewers' yeast for trade usage, and that they limit arsenic to 5 p.p.m. Beer, Marmite, yeast pills, and other foodstuffs, not including anthracite, must still conform to a content of not more than 2 p.p.m. if the law is not to be broken.

★ "How is it, Doc?" asks the works manager anxiously. The corrosion engineer purses his lips as he carefully packs his thickness measurement gauge into his little black bag. "Well, it could develop into something pretty serious. But here's a formula for a corrosion-resistant coating, just take it along to the paint people and get it made up. That should do the trick. In the meantime," he adds, patting the works manager's shoulder soothingly, "try not to worry, and let me know if you have any further trouble." A smile, a nod, and the corrosion engineer has taken his little black bag off to see an oil refinery manager about a severe case of hydrogen embrittlement.

Well, perhaps that was not quite the sort of scene Mr. C. L. Wilson had in mind when he suggested, at the second annual dinner of the British Association of Corrosion Engineers, that corrosion was a disease of industry and should be attacked as medical profession tackles disease. The corrosion engineer, who might be regarded as the 'G.P.' of the corrosion fraternity, should be called in at the design stage of a project, not when the structure was already in danger of falling down.

The dinner is briefly reported on page 256.

★ ONE of the shortest after-dinner speeches on record was that of Mr. G. N. Hodson (Hathernware Ltd.), at the Cafe Royal last week when he proposed the toast of the Society of Chemical Industry at the annual dinner of the Chemical Engineering Group. I was just about able to cope with the following verbatim report: "Madam and gentlemen—the Society".

Highlight was an extremely witty and able review of a metallurgist's 34 years in the chemical industry by Dr. N. P. Inglis, I.C.I. Metal Division research director. Introducing Dr. Inglis, Mr. E. W. Greensmith, head of that company's central engineering department, spoke of the 1930's when he was at Winnington and Dr. Inglis at Billingham. Mr. Greensmith was then concerned with the early production of polythene and he drew on the research work at Billingham of Dr. Inglis who was then working on what were considered to be high temperatures.

Mr. Greensmith was working in the even higher ranges called for by the polymerisation of ethylene—around 350 atm. On the successful completion of their work, the Winnington polythene team took much pleasure in re-labelling Dr. Inglis's work 'low-temperature'.

★ HAVING just read the Ministry of Labour's catalogue of disaster—'Accidents—How They Happen'—I am amazed that so many chemical works can chalk up long accident-free periods. Latest are the Terylene works at Wilton, who have now worked three periods of 1 million hours without lost time accidents and the Mossend works who have richly earned a special award of £100 to mark completion of 2 million working hours without a lost-time accident.

The Labour Ministry publication (price 1s 3d from H.M.S.O.) is full of case-histories of accidents that should never have happened. The prize example led to the scalding of a fitter, but it could well have been much more serious. The fitter was attending to a stoppage in a 3 in. diameter outlet pipe from a tank containing five tons of heated syrup. The stoppage lay between the tank outlet and the stop valve, stopping the valve from closing properly.

When the obstruction was removed, hot syrup poured out hitting a wall and splashing back on to the man, who failed to close the valve and slithered to the ground sustaining cuts and bruises. The obstruction? A steel pipe clip and a hessian sack—how they got into the pipe is beyond me. A simple filter would have saved a lot of trouble and pain.

Alembic

Modern Chemical Industry in U.K.

C.A. PROJECT SURVEY QUOTED TO SHOW BUILD-UP IN PETROCHEMICALS

PRIMARILY the chemical industry is developing rapidly in the field of petrochemicals, fulfilling the growing demands for all sorts of polymeric substances for the plastics and man-made fibre industries.

This statement by Dr. James Taylor, a director of Imperial Chemical Industries Ltd., is based on a study of the CHEMICAL AGE survey of new chemical plants in the U.K. (see CHEMICAL AGE 24 September, 1960). Mr. Taylor was delivering the third Cantor lecture on 'The modern chemical industry in Great Britain' at the Royal Society of Arts on 6 February. Sir Alexander Fleck, president, Society of Chemical Industry, presided.

In the first lecture the characteristics of a modern chemical industry were described and in the second lecture the development during the present century (see CHEMICAL AGE 4 February 1961). In the third lecture, Dr. Taylor dealt with the present and future state of the industry, its composition and statistics, and the contribution it makes to national prosperity.

In order to give some idea of the likely development in the next few years, Dr. Taylor examined the projects for new and extended plants. He quoted the 'Chemical Age' estimate of £200 million for the capital expenditure involved in projects which were sanctioned, completed or in hand during 1960 and said that since the survey was issued there have been other announcements and the total is now probably £220 million or more.

The survey includes 106 firms and embraces undertakings of a wide range of size and activity. In the inorganic field eight projects are on hand for sulphuric acid, which is usually considered to be a good overall trade indicator. It is presumed that the requirements for sulphuric acid, which have shown a growth of about 4.3% per annum over the last two decades, have caught up with the surplus capacity which has been available in recent years.

A notable feature of the CHEMICAL AGE survey is the installation of large high-pressure catalytic reforming plants and of Lurgi plants, by the Gas Boards. This represents the application of a new type of chemical process to the gas industry to produce fuel gases instead of gases for synthesising chemicals. The Lurgi high-pressure coal-gasfiication plant uses oxygen instead of air to oxidise the coal or fuel and thus produces high-calorific value gas, not diluted with atmospheric nitrogen. Tonnage oxygen plants have made this possible and nine (perhaps 10) oxygen plants are involved in the various projects. The techniques of preparing oxygen cheaply have triggered off a number of important advances in industrial chemistry and metallurgy.

It would appear that at the present time the chemical industry is expanding

Dr. James Taylor, M.B.E., F.R.I.C., director of I.C.I., presenting the third part of the R.S.A. Cantor lecture

sufficiently to keep pace with the increasing demand for the basic heavy chemicals of the industry and for the rising requirements of fertilisers. It is also exploiting new techniques, but the primary expansion is in the field of petrochemicals. No less than 27 projects are directly concerned with petrochemicals and account for a high proportion of the expenditure. Plants for the manufacture of high polymeric compounds, for resins, plastics and rubber-like materials are particularly prominent; there are 31 projects concerned with polymeric materials.

The chemical industry is vitally important, not only because of its direct contribution to our well being but also because of its exports. It is now third in importance in our list of exporters. Exports in 1957 had risen to 265% of the 1948 level and are currently round about £290-£300 million a year (1960 total was £316.4 million). This is about 10% of total exports and 28% of it goes to West Europe.

In the last 23 years, production of sulphuric acid has increased by $2\frac{1}{4}$ times, plastics by over $2\frac{1}{2}$, fertilisers by nearly 3 times, and man-made fibres by over $3\frac{1}{2}$ times. The overall rate of increase of production in chemical products is around $5\frac{1}{2}$% a year, or twice that for

(*Continued on next page*)

TABLE I

Larger U.K. Chemical Companies

Company	*Actual Trading Profit, 1959* £000's
I.C.I.	121,257
Distillers	27,100
British Oxygen Co.	14,329
Boots Pure Drug Co.	8,009
Albright & Wilson	6,940
Glaxo	6,582
Borax (Holdings)	5,569
Fisons	5,312
Monsanto	4,525
Laporte	2,860
De La Rue	1,945
Bush, W. J.	1,030
British Glues & Chemicals	822
Berk & Co., F. W.	750
Reichhold	723
Hickson & Welch	702
Boake Roberts & Co. (Holdings)	387
Blythe & Co., Wm.	374
Holliday, L. B.	341
Hardman & Holden	309
Lawes Chemical Co.	141
Howard & Sons 1958*	135

Source—Moodies Sheets.

* *Data for* 1959 *not available.*

New Trend Pointers by Dr. Taylor

- **C.A. project investment figure of £200 million is to-day probably £220 million or more**
- **27 of projects listed by 'Chemical Age' were for petrochemicals**
- **Overall rate of chemicals output increase is around 5.5% year, twice that for all U.K. industry and about the same for U.S. chemicals**
- **U.K. chemical industry's fixed assets now probably exceed £2,000 million**
- **Major advances are looked for in synthetics, photochemicals, rocket fuels, biochemistry and biosynthesis, as well as nuclear chemicals**

the manufacturing industry as a whole.

The British chemical industry is growing at about the same percentage rate as the American industry, but is about one-fifth the size of it.

The annual rate of expenditure has risen from about £64 million in 1949 (corrected to 1959 prices) to £163 million in 1958. The current figure equals about 17% of the total expenditure of all manufacturing industries. The total capital invested in fixed assets in the chemical industry is reliably believed to be in excess of £2,000 million.

The industry is backed by a high rate of expenditure on research and development which, by and large, has been very successful and has led to much technical innovation, providing attractive possibilities for new investment. In 1958, expenditure of this type was £22 million.

A list is given of the larger U.K. chemical companies, tabulated according to trading profits (Table 1).

In order to compare U.K. with other countries, Table 2 shows the larger companies in the Western world. I.C.I. are the only U.K. chemical producers to figure in the list.

Although many of the activities of the chemical and allied industries require large resources, there is still room for the small, but efficient, specialist. Thus according to the 1954 census of production, there were 1,424 companies with less than 11 employees and 58 with more than 1,000, these larger companies accounting for 38% of the gross output.

Sir Alexander Fleck introduces Dr. James Taylor

On diversification, Mr. Taylor said that he saw nothing against ancillary activities and diversification if they are undertaken for good reasons and can be continued profitably and efficiently.

Apart from accidental inclusions there is a strong and growing movement for chemical firms to diversify. This can be because the firms wish to secure their supplies of raw materials but there is also an urge to have captive outlets for chemical products which has led firms into paints, plastics, etc. This trend is bound to intensify as the chemical industry evolves and as applied chemical science widens its scope.

The future pattern of the chemical industry has been examined by Mumford (see CHEMICAL AGE 8 April 1960, p. 603). He concludes that by 1970 the total production of synthetic fibres may be 420,000 tons which is more than double that of today, and that the output of resins and plastics materials may be around 1¼ million tons compared to ½ million at present. Total production of organic chemicals is likely to increase 2½ fold and inorganics by only 40%.

Polypropylene may well play a part in this expansion both as a film and as a fibre-forming material. The production of foamed plastics and synthetic rubbers is likely to increase very substantially. Synthetic detergents will also be required in increased quantities. The requirements for the newer metals and for materials of a purity previously unparalleled for specialist applications are likely to show a substantial increase. Important advances in colour photography is certain to increase business for photographic chemicals, and rocket fuels, thought Dr. Taylor, in due course will become substantial business, both as regard solid and liquid propellents.

TABLE 2

The larger U.S. and European Chemical Companies

Company	*Order of Size* 1959 *Sales Basis*	*Employees Basis*	*Sales* 1959 $ *Millions*	*Employees* 1959 000's
Du Pont (U.S.)	1	2	2,114	85
Union Carbide (U.S.)	2	4	1,531	59
I.C.I. (U.K.)	3	1	1,424	110
Borden Co. (U.S.)	4	10	941	32
Allied Chemical Co. (U.S.)	5	11	720	30
Dow Chemical Co. (U.S.)	6	13	705	27
Olin Mathieson (U.S.)	7	9	702	38
Monsanto Chemical Co. (U.S.)	8	18	615	19
Farbenfabriken Bayer (Germany)	9	5	585	55
American Cyanamid (U.S.)	10	12	584	29
B.A.S.F. (Germany)	11	6	540	53
Farbwerke Hoechst (Germany)	12	7	529	45
Montecatini (Italy)	13	3	472	60
W. R. Grace (U.S.)	14	8	470	41
Kaiser Aluminium & Chemical (U.S.)	15	16	436	20
Saint-Gobain (France)	16	17	395	20
Rhone-Poulenc (France)	17	20	304	15
Pechiney (France)	18	14	298	25
Hercules Powder Co. (U.S.)	19	23	284	11
CIBA (Switzerland)	20	15	235	21
Stauffer Chemical Co. (U.S.)	21	27	228	7
E. Merck (U.S.)	22	21	217	12
Rohm & Haas (U.S.)	23	19	216	17
Chemstrand Corp. (U.S.)	24	25	197	9
Glidden (U.S.)	25	28	196	6
Parke Davis (U.S.)	26	22	192	11
Thiokol Chemical (U.S.)	27	24	190	10
Hooker Chemical (U.S.)	28	33	150	5
Diamond Alkali Co. (U.S.)	29	30	138	5
Abbott Laboratories (U.S.)	30	26	123	9
Interchemical Co. (U.S.)	31	32	123	5
Vick Chemical Co. (U.S.)	32	31	115	5
Wyandotte Chemicals (U.S.)	33	34	94	4
Reichhold Chemicals (U.S.)	34	38	94	2
American Agricultural Chemicals (U.S.)	35	35	91	4
Pennsalt Chemicals (U.S.)	36	36	88	3
Schering Inc. (U.S.)	37	29	81	6
Miles Laboratories (U.S.)	38	37	72	3

Source—The "Fortune Directory" of the 500 *largest U.S. industrial corporations, and the* 100 *largest foreign industrial corporations.*

Big Future for Synthetics

For future developments it may be said that, as the public comes to accept synthetics in their own right and not as substitutes, there will be a great increase in the demand for a wide and increasing range of high polymeric materials. There are great possibilities of revolutionising our clothing by use of continuous filament, of non-woven fabrics and of synthetic foam sheeting.

In the pharmaceutical industry the chemist, for lack of alternative routes, is using microbiological methods of preparation, but he is applying to the separation and analysis of these products chemical techniques of the highest order. There have been considerable advances in the pharmaceutical industry in recent years, and progress is likely to continue at an accelerated rate as medical chemical science advances. In the fields of biochemistry and biosynthesis we are in the early stages of new and exciting developments.

The chemical industry is also vitally concerned with the enormous potentiality of nuclear energy applications and the promise of vast sources of energy. All present trends indicate that the nuclear energy industry will become a major one. This will be accompanied by a considerable expansion in the chemical industry designed to serve it.

Census Reports on Fertilisers, Pesticides, Resins and Plastics

In 'The Report on the Census of Production for 1958', Part 26, published by the Board of Trade, statistics relating to the production and sale of fertilisers and pest control chemicals in the U.K. are given. The industry's output, sales and expenditure are analysed by subdivisions of the industry and of its products. The report includes tabulated sales by larger firms of fertilisers (total £94,632,000 in 1958, £68,306,000 in 1954) and of disinfectants, insecticides, weedkillers, sheep and cattle dips etc. (£23,271,000 in 1958, £17,531,000 in 1954).

Part 35 of the same report deals with synthetic resins and plastics materials in a similar manner, showing, for instance, that sales of the principal resins and plastics reached a value of £137,074,000 in 1958 compared with £87,451,000 in 1954. Of the 1958 total, p.v.c. in its various forms accounted for some £28.2 m., phenolics and cresylics, £16.8 m., and polystyrene £8.3 m.

Both reports are available from H.M.S.O., price 2s each.

Laporte Data Manual on Hydrogen Peroxide

First publication of its type to be produced by a U.K. company is a new data manual on hydrogen peroxide now available from Laporte Chemicals Ltd., Luton, Beds. The manual is intended for direct reference on the laboratory or workshop bench.

It covers the major properties of this chemical and contains physical and chemical data on hydrogen peroxide in graphical and tabular form. Also included is information on materials of construction, storage and handling, as well as a section on suitable equipment for use with hydrogen peroxide.

Emphasis is on those aspects of the properties of hydrogen peroxide which are particularly relevant to the controlled production of high power output for assisted take off, missile propulsion and other development applications. Copies of the manual are obtainable on request from Laporte Chemicals Ltd., P.O. Box 8, Luton, Beds.

In Parliament

'Live' Polio Vaccine

A Ministry of Health statement is to be made 'before long' on the use of a 'live' poliomyletis virus vaccine, it was stated in the Commons last week.

Parliamentary Secretary for Science?

The Prime Minister last week said he was considering the appointment of a Parliamentary Secretary for Science to answer questions on scientific policy in the House of Commons. He hoped to make an announcement shortly.

First Ministry List of Farm Chemicals Under New Scheme

To ENABLE users to select and advisers to recommend efficient and appropriate crop protection chemicals and to discourage the use of unsatisfactory products, is the purpose of the new Agricultural Chemicals Approval Scheme. The scheme, which came into operation 1 June 1960, is a voluntary one under which proprietary brands of crop protection chemicals can be officially approved.

Announcing the publication of the first list of approved products on 1 February, Mr. W. M. F. Vane, Joint Parliamentary Secretary, Ministry of Agriculture, Fisheries and Food, said that it was a joint venture. It could not be a success unless manufacturers submitted their products for approval, if the merchants did not sell approved products, and if the farmers did not buy them.

Former Scheme Replaced

The scheme replaces a similar voluntary scheme which was never very widely known and under which the use of chemicals remained a mystery to too many people. The most important feature of the new scheme is that it should be possible to grant approval to a new chemical by the time it is ready for marketing. In this way the farmers will be able to choose approved products from among the newest agricultural chemicals.

Manufacturers of agricultural chemicals have agreed to co-operate to achieve these ends. When a manufacturer is planning his field trial programme to assess the efficiency of his new product, he will inform the approval organisation, in confidence, of the chemical composition of his product, the work so far done on it, and of the trial programme he intends to carry out. The organisation will advise him whether the proposed programme is satisfactory.

The scheme does not deal directly with safety requirements, but approval cannot be given for a product containing a toxic chemical unless its safety in use has first been considered under the notification scheme and precautions have, if necessary, been recommended.

Once approval has been granted, no change can be made to the claims included on the label without the permission of the approval organisation.

The list of approved products is divided into five sections: insecticides; fungicides; herbicides; seed dressings; and miscellaneous products including baits, grease banding materials, wetters, etc. Each section is divided into headings comprising the common names of the active ingredients arranged alphabetically in their formulations. The precautions necessary in using a chemical are included where appropriate. A point stressed by Mr. Vane is also well emphasised in the list—that it is important to follow instructions on the labels exactly. The list also includes the names and addresses of the manufacturers of agricultural chemicals.

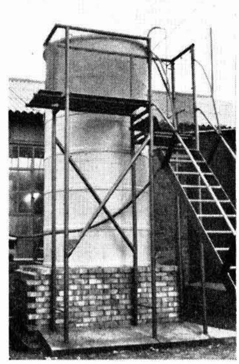
The list will be published on 1 February each year and copies may be obtained free of charge from Ministry of Agriculture, Fisheries and Food (Publications), Ruskin Avenue, Kew, Surrey, or any of the Ministry's Regional and Divisional offices.

First additions to the 1961 list of approved products has been issued. It consists of: insecticides—DDT dusts, dieldrin wettable powders, dimethoate sprays, DNOC/DDT winter washes, malathion sprays, Sevin; fungicides—copper dusts, dicloran dusts, Zineb wettable powders; herbicides—2,4,5-T ester sprays, aldrin-organo-mercury dry seed dressings, heptachlor-organo-mercury seed dressings.

Ethion on Agriculture Poisons List

Ethion should be included in the Agriculture (Poisons Substances) Regulations as a Second Schedule Part III substance. The use of ethion on non-edible crops is acceptable, under certain conditions.

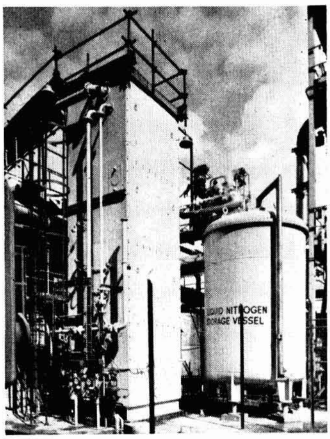
Self-supporting Tank in Rigid P.V.C.



Completely self-supporting rigid p.v.c. tank manufactured from Fibre-Vinyl—a dual construction of rigid p.v.c. with a chemically bonded reinforcing of polyester glass fibre. Fabrication was by A. C. Plastics Industries Ltd., 1/3 Long Street, London E.2, who say that tanks of up to 5,000 gall. capacity can be constructed. Other applications are for other types of corrosion-resistant plant, vessels, pipe installations, fume extraction ducting, and the technique can also be applied to polythene and polypropylene

HIGH-PURITY NITROGEN FROM NEW PETROCARBON SERIES OF AUTOMATIC PLANTS

A SERIES of fully automatic nitrogen production plants, easy to start up and requiring virtually no attention from the operator, has been developed by Petrocarbon Developments Ltd. Capacities range from 4,000-40,000 cu. ft./hr., but larger sizes can be built. For a unit delivering 12,000 cu. ft./hr. the power consumption is approximately 120 kw. and the cost of the nitrogen, excluding liquid storage facilities, is



Cold box and liquid nitrogen storage vessel

estimated to be about 2s 5d/1,000 cu. ft., inclusive of depreciation and reasonable maintenance charges.

The plant was developed to meet a need by the U.K. Atomic Energy Authority for a supply of high purity nitrogen at an elevated pressure, and has been in successful operation for some time in one of the U.K.A.E.A. Production Group's installations.

The high-purity nitrogen is produced by the fractionation of air at low temperatures in a single column operating at 100 p.s.i., and is delivered direct to to the consumer at this pressure. Compression of the product, with consequent risk of contamination, is thus unnecessary. The purity of the nitrogen is normally 99.99%, but still purer gas can be made available.

The air is compressed to 110 p.s.i. only and passes through the purification system and the heat exchangers directly to the column without expansion. The low temperatures are maintained by expanding a part of the compressed air, after its passage through the column, in a turbine of novel design rotating on air bearings at 60,000 r.p.m.

Output of a plant varies automatically with demand from zero to the upper limit and power consumption is reduced when the offtake diminishes. If no nitrogen is consumed the plant will 'tick over' with a minimum consumption of power and will automatically come on stream again when consumption is resumed.

For emergency storage and to cover short periods of peak demand, up to 10% of the product can be delivered as liquid and is then passed to a large vacuum-powder insulated storage tank. If then the momentary demand for gas exceeds the productive capacity of the plant, and if, as a result, the pressure in the user's supply line tends to fall, liquid nitrogen is automatically discharged from the tank and vaporised, restoring the pressure to normal and permitting an increased offtake as long as liquid remains in the tank. If the purity of the product should fall below the desired value, production ceases automatically, thus preventing impure nitrogen from entering the user's supply line. The plant then runs on total reflux until the purity is restored, after which production is automatically resumed.

Chemical Engineers Shy Away from Designing New Materials—Dr. Inglis

"MAYBE we are not as bold as the first Elizabethans," suggested Dr. N. P. Inglis, research director of the I.C.I. Metals Division, when he spoke last week of a too cautious attitude to new materials of construction in the chemical process industry.

Speaking at the annual dinner of the Chemical Engineering Group, Society of Chemical Industry, Dr. Inglis said that at the top it might be that the industry was too concerned with returns on capital, so finely worked out that investors could not possibly lose. When that happened in the board room, it spread down the line so that research workers also tended to become cautious, afraid to take worthwhile risks. The chemical engineer shied with fright at any material outside the price range from 4d to 4s a lb.! The chemical engineer did not like designing—he only liked substituting. Because of this dislike of designing specially for the use of new materials, those new materials—whether they were metals or plastics—did not get a fair crack of the whip.

Dr. Inglis recalled his 34 years as a metallurgist in the chemical industry. Those were exciting years that had seen many new developments both in materials and methods of application. A third of a century ago there were no welded pressure vessels. Now people preferred the welded vessel—there were almost more people engaged on testing and inspecting such vessels than there were involved in their manufacture.

Aluminium, nickel, titanium, zirconium, beryllium and hafnium were now being used in curious shapes and forms that were unknown 33 years ago. New techniques like the vacuum process had come into widespread use enabling new materials to be produced. The metallurgist of today owed much to other disciplines, particularly the analyst. Without his work on the analytical chemistry of the newer metals, it would not be possible to work to specifications calling for maxima in so very few parts per million.

Dr. Inglis told his audience that in 1960 more than 1,000 tons of steel had been melted in vacuum in the U.K. with "very interesting results".

Much of the stimulus for these new materials and methods of fabrication stemmed from the modern chemical industry's development of new synthesis processes, particularly for ammonia and alcohol. In their turn the new materials developed for one process made possible other developments.

The toast of 'The Guests' was proposed by Mr. E. W. Greensmith, chief of the I.C.I. central engineering department, who welcomed Sir William Garrett, chairman, Association of British Chemical Manufacturers, and Mr. W. K. Hutchison, deputy chairman of the Gas Council. He particularly mentioned Mr. F. A. Greene, the group's hon. treasurer since 1927, who is to retire from office.

New Company to Make Rotron Flowmeters

A NEW subsidiary, Rotron Controls Ltd., owned jointly with the Rotron Controls Corporation, Woodstock, New York, has been formed by Elliott Brothers (London) Ltd., a member of the Elliott-Automation Group. Elliott's have a two-thirds controlling interest.

Rotron Controls will have headquarters at the Elliott-Automation factory at Airport Works, Rochester, Kent. It will manufacture the range of flowmeters and associated equipment developed by the Rotron Controls Corporation for positive and mass-flow measurements in the oil, gas, water and petrochemical industries and will sell these instruments throughout Europe, the Middle East and the Commonwealth (except Canada).

The Rotron Flowmeter measures the rotational speed of a vortex created outside the main stream, which is directly proportional to the rate of flow of the fluid in the pipeline, and is said to provide a substantially more accurate measurement than meters normally used for this purpose.

CHEMICALLY BONDED PIPE INSULATION

Automatic Precision Moulding at Chemical and Insulating Co. Works

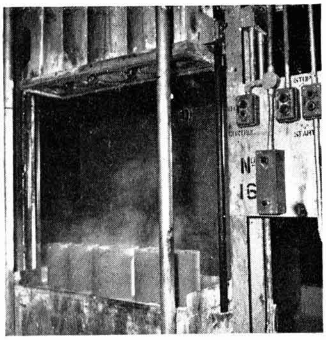
A PRECISION moulding process which results in the chemical bonding of 85% light basic magnesium carbonate with 15% asbestos fibre is being used at the Darlington works of the Chemical and Insulating Co. Ltd. to produce Super-Magnesia heat insulation material which is claimed to have superior mechanical strength, high resistance to vibration, and high retention of shape after wetting. More accurate forming of pipe and vessel insulation sections is also ensured. The new insulation material was briefly discussed in CHEMICAL AGE, 2 July 1960, p. 22; members of the technical Press visited the works last week to see the manufacturing process, which is claimed to be unique in Europe.

The new moulding technique is also used to produce calcium silicate insulation for use at higher temperatures. Other insulation materials are also produced at Darlington, in addition to magnesium carbonate, oxide and hydroxide in both pharmaceutical and industrial grades.

The Chemical and Insulating Co. are the chief manufacturing company in the Darlington Chemicals Ltd. group of companies, which includes a number of companies, manufacturing, selling and contracting mainly in the insulation and related fields. Chemical and Insulating have been in operation since 1929, after the present works was built in Darlington to extract magnesium compounds from the local dolomite deposits.

Preparation of Crystals. The works consumes some 800 tons/week of dolomite, which is mixed with coke and calcined to give magnesium oxide and calcium oxide. The mixed oxides are slurried and passed to the first stage of carbonation, in which conversion to a solution of calcium carbonate and magnesium bicarbonate takes place. Second-stage carbonation is followed by filtration to separate off calcium carbonate, which, being a waste product, is led off to lagoons.

The magnesium bicarbonate solution undergoes a boiling operation, in which temperature and agitation conditions are carefully controlled, to obtain a suspension containing needle-like crystals of magnesium carbonate trihydrate, average size of the crystals being 30 by 7 microns. An alternative method of obtaining these crystals, which is sometimes employed at the Darlington works, uses magnesium hydroxide, the magnesium hydroxide suspension being carbonated using carbon dioxide gas under controlled conditions of agitation and concentration.



Preformed pipe sections of 85% Super Magnesia being automatically ejected from mould

Controlled Agitation

The suspension is filtered on a Dorr-Oliver rotary vacuum filter to remove water and the wet cake is removed continuously to a mixing tank containing water and asbestos fibres, where the entire mass is agitated at a controlled speed to produce a uniform mixture. The amount of water added during mixing determines the density of the final dried product.

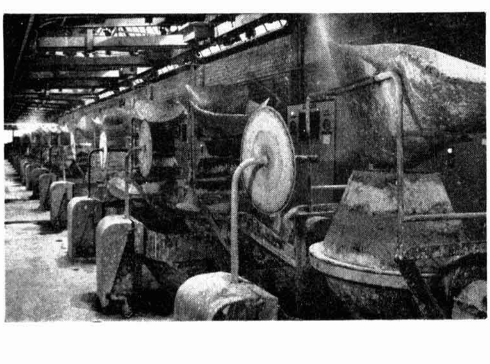
Automatic Moulding. After mixing, the suspension is automatically weighed and pumped to a container travelling on a mono-rail system. A carefully timed and automatically controlled sequence of operations then follows, in which the suspension is first conveyed to a line of pre-heaters, which are revolving mixers of the concrete-mixing type, and each of which serves a moulding station on the lower floor. A red light shows the moulding operator that the pre-heater has been charged, so that at the appropriate moment he can press a button to start the next cycle of operations.

As the pre-heater revolves and tilts, steam is injected into it until the temperature of the suspension is raised to 120-130°F. At the same time the mould filling assembly, which is connected to the outlet hopper of the pre-heater, descends to the mould surface.

The filling assembly is equipped with finger agitators which help to fill the suspension into the moulds and at the same time eliminate air bubbles in the suspenison, while the vertical mould cavities themselves are accurately machined in a block which is heated by circulating water at high temperature. The suspension is rapidly converted into a solid mass and the moulded pieces are then pushed out by pistons sliding upwards through the block, to be removed for drying, machining and packing.

The new moulding process, with its associated automatic cycle of operations, has been in use for some two years, following four or five years of research and development work. Previously, the works produced a standard 85% magnesia heat insulation material produced by a manual process on horizontal moulds; this method is still used for some of the company's production but it is planned to convert the works completely to the new precision moulding method.

Calcium silicate insulation, known as Paratemp, is also produced by the new process, but with higher pre-heating and moulding temperatures, the finished product being capable of giving insulation for temperatures of 650-1,400°F, 650°F being the maximum for Super-Magnesia.



Slurry is pre-heated in these mixers before gravitating to the moulding stations on the floor below. The steam injection equipment can be seen to the left of the mixers. Above: part of the mono-rail system

A.B.P. to Sell Parkfield Foundry

FOUNDRY business of Ashmore, Benson, Pease and Co., a member of the Davy-Ashmore Group, is to be sold as a going concern to Parkfield Foundries (Teesside) Ltd., Bowesfield Lane, Stockton-on-Tees, a recently registered private company with a capital of £400,000. Existing A.B.P. foundry contracts will be assigned to the new company.

Employment will be offered to most of the present A.B.P. staff and workpeople; it is expected that the new company will start trading on 13 February.

First directors of the new company are Mr. G. T. Cantlay, chairman, the Hon. Anthony Berry, Mr. E. K. Gould and Mr. G. Hobman. Mr. G. B. Taylor, sales manager of the A.B.P. Works Division, has been appointed managing director.

Highly-active Hydrogenation Catalyst Stems from Lab. Blast

A HIGHLY active and easily prepared hydrogenation catalyst for use at room temperatures, and a new intermetallic compound of lithium and platinum have been produced by Dr. C. P. Nash at the University of California.

The discovery was the result of a laboratory accident which occurred when the heating of a mixture of lithium and lithium hydride in a platinum crucible resulted in an explosion.

Lithium reacts violently with platinum at 540° ± 20°C. Removal of the excess lithium by hydrolysis leaves a brittle metallic-looking solid which can easily be powdered, and which analysis shows to have the formula, $LiPt_2$.

During the course of his work on the new intermetallic compound, Dr. Nash found a simple way to make a very active hydrogenation catalyst—on a weight basis twice as active as a supported platinum oxide catalyst, although only about equal in activity on a platinum content basis. Platinum hydrogenation catalysts are usually difficult and time consuming to prepare but Dr. Nash's group can make a laboratory quantity of active reproducible catalyst in 15 minutes.

Molten lithium is able to penetrate the platinum lattice at temperatures well below those at which the reaction occurs. The catalyst is made by just melting the lithium at about 200°C and lowering a platinum strip into it (*J.A.C.S.*, 1960, **82**, 6203). The end of the strip disintegrates, and by using a continuous feed technique several hundred mg. of platinum can be assimulated. On the addition of water the lithium hydrolyses and the platinum forms a microdispersion.

The platinum, recovered in the form of a very fine black powder, is a very active hydrogenation catalyst at room temperature. At higher temperatures, however—about 200°C—a rearrangement occurs and the catalyst decreases in activity.

Unilever Buy Ministry Freeze-drying Experimental Factory at Aberdeen

UNILEVER have bought the Ministry of Agriculture, Fisheries and Food Research Establishment and Experimental Factory at Aberdeen.

The Research Establishment and Experimental Factory was instituted by the Ministry of Food in 1949 to meet the special circumstances of the time. The Experimental Factory has evolved a new process of preserving food by a method known as accelerated freeze drying by which various foodstuffs can be dried and stored without special facilities. It has been successfully demonstrated that this process can be undertaken on an industrial scale, and the Minister has decided that the process has reached the point where commercial exploitation should be undertaken and that the Establishment should be closed.

An experimental all-glass freeze-drying unit is being used at the Aberdeen factory. This plant has been constructed from standard glass pipeline supplied by Q.V.F. Ltd., chemical engineers in glass. The use of glass enables the reactions of foods and fluids to be studied at all stages of drying.

It is understood that Unilever propose to continue research into the problems of food at the Establishment.

R.I.C. Spring Lecture Course on Electrochemistry

The Birmingham and Midlands Section, Royal Institute of Chemistry, has arranged its spring lecture course to take place at the College of Advanced Technology, Birmingham, on Saturday mornings in March.

The subject of the course is electro-chemistry and the programme will include lectures on: electrolyte solutions; electrode reactions; anodic processes; the protection and corrosion of metals; polarography in analysis; electrometric titrations, etc.

Further details may be obtained from the hon. secretary, Birmingham and Midlands Section R.I.C., c/o College of Advanced Technology, Birmingham 4.

RAW MATERIALS—1960

	Imported sulphur	Recovered sulphur H_2S and filter cake	Pyrites	Spent oxide	Anhydrite	Zinc concentrates
	Tons	Tons	Tons	Tons	Tons	Tons
Stock 1 Jan.	51,288	6,466	148,131	88,475	8,131	54,079
Receipts	390,564	64,076	339,955	229,575	765,783	201,468
Use	377,731	65,567	352,964	250,206	760,089	197,521
Adjustments†	10,889	−653	2,598	−2,091	−1,935	−75
Stock 31 December ...	53,232	5,628	132,524	69,935	15,760	58,101
Acids made from these Raw materials:						
Tons 100% H_2SO_3 ... ... (Total 2,701,300 tons)	1,103,600	185,900	460,100	332,300	457,500	161,900
Per cent of total	40.9	6.9	17.0	12.3	16.9	6.0

† Overall effect of stock adjustments, transfers and uses for purposes other than sulphuric acid manufacture.

U.K. Sulphuric Acid Output and Use, 1960

OUT of a total U.K. sulphuric acid capacity in 1960 of 3,044,190 tons (excluding Government plants), some 88.7%, or 2,703,429 tons, was used. For the last quarter 91.4% of capacity was used. Usage figure for contact acid was 2,262,843 tons and for chamber and tower, 440,586 tons.

Materials used in 1960 were: imported sulphur, 377,731 tons; recovered sulphur, H_2S and filter cake, 65,567 tons; pyrites, 352,964 tons; spent oxide, 250,206 tons; anhydrite, 760,089 tons; and zinc concentrates 197,521 tons.

The following tables are those compiled by the National Sulphuric Acid Association, in which all Government plants are excluded.

SULPHURIC ACID AND OLEUM —1960

(100% H_2SO_3 New Acid)

	Contact	Chamber & Tower	Total
	Tons	Tons	Tons
Stock 1 Jan. ...	76,978	25,066	102,044
Production ...	2,262,257	439,117	2,701,374
	2,339,235	464,183	2,803,418
Stock 31 December	76,392	23,597	99,989
Apparent use ...	2,262,843	440,586	2,703,429
Total capacity represented (tons/year) ...	2,493,490	550,700	3,044,190
Per cent of capacity in use	90.7	79.7	88.7

U.K. CONSUMPTION

	Oct.-Dec. 1960	1960
	(Tons 100% H_2SO_4)	
Trade Uses		
Acids—organics & misc* ...	9,954	37,608
Accumulators	3,420	13,660
Agricultural purposes ...	910	13,864
Bromine	6,694	23,464
Clays (Fuller's earth, etc.) ...	3,050	12,293
Copper pickling	652	2,404
Dealers	3,390	13,423
Dichromate & chromic acid	6,002	22,687
Drugs & fine chemicals ...	5,115	20,417
Dyestuffs & intermediates ...	26,258	104,485
Explosives	2,374	9,493
Export	1,681	9,554
Glue, gelatine & size ...	100	532
Hydrochloric acid	14,493	53,418
Hydrofluoric acid	4,045	14,707
Iron pickling (inc. tin plate) ...	34,361	137,395
Leather	1,000	3,882
Lithopone	2,342	13,457
Metal extraction	617	2,608
Oil refining & petroleum products	18,415	77,057
Oils (vegetable)	2,398	9,281
Paper, etc.	3,035	9,494
Phosphates (industrial) ...	975	4,081
Plastics, n.e.s.	17,288	65,267
Rayon & transparent paper ...	67,725	278,087
Sewage	3,072	12,572
Soap, glycerine & detergents	31,024	124,828
Sugar refining	381	831
Sulphate of ammonia ...	75,994	294,112
Sulphates of copper, nickel, etc.	4,228	20,670
Sulphate of magnesium ...	44	181
Superphosphates & other phosphatic fertilisers ...	156,468	621,451
Tar & benzole	6,055	23,837
Textile uses	4,193	16,310
Titanium dioxide	119,379	467,745
Unclassified	54,097	202,977
Total	691,229	2,738,150

* Included in previous annual summaries as unclassified.

Chemical Additives May Alleviate Corrosion Problems Due to Boiler Combustion Gases

A BOILER that consumes 20 tons of coal per hour producing combustion gases containing 0.005% SO_3 by volume, could produce enough sulphuric acid to dissolve away 15 tons of steel every 1,000 hours. Although corrosion of that order is not produced in the boiler, this large amount of acid is discharged into the atmosphere in the form of mist which is difficult to trap, and which is practically unaffected by water sprays. Such is the nature of the problems arising from the use of sulphur containing fuels which was dealt with in a paper, 'Sulphur problems in boiler operation', presented to the Institute of Hospital Engineers, Welsh Branch, by H. N. Wigan, director of Combustion Chemicals Ltd.

The occurrence of corrosion in boilers has been a widespread problem for many years and the commonest cause of corrosiveness in flue gases is the presence of sulphur in the parent fuel. Sulphur appears in two main forms in coal—organic and pyritic, each contributing almost equally to the average sulphur content of just under 2%. Organic sulphur is chemically bound and physically irremovable. Iron sulphide may be present in the form of nodules or bands both easily removed by cleaning or in the finely divided form which is almost as firmly fixed as organic sulphur. The trend in the last few years has been for the level of sulphur in coal to rise due to the increasing demand for the lighter and more refined fractions in which the sulphur becomes concentrated.

Fuel Oil Crudes

Fuel oil crudes, even from the Middle East, contain only small proportions of sulphur but in the course of refining it becomes concentrated in the heavier fractions resulting in the sulphur content of the residual fuel oils rising progressively to the maximum levels of about 5% in the heaviest grades.

The corrosion process arising from the sulphur content of the fuel is complex and controversial. It is generally agreed that sulphur fouling and corrosion problems have their origin in the presence of SO_3 in the flue gases, and that the sulphur in the fuel is first oxidised to SO_2 on combustion, but the question of the conversion of SO_2 to SO_3 is still undecided. Some believe that the formation of SO_3 is a further oxidation by combustion but others contend that it is formed primarily by the catalytic oxidation of SO_2 passing over heated metal and refractory surfaces. In oil-firing, the oxidation process is further accelerated by the presence of vanadium pentoxide, a well-known catalyst for the oxidation of SO_2 to SO_3.

Fouling and corrosion is of two types—high-temperature and low-temperature. The high-temperature fouling and corrosion, occurring in the hot zone, results in the build up of sulphate scale on generating tubes, super-heaters and refractories, which frequently entails considerable mechanical difficulty in removal.

Low-temperature fouling and corrosion occurs in the so-called cold zone and results in an accumulation of acidic deposits in the flue passages and the stack. Such deposits are usually wet and sticky due to sulphuric acid and frequently cannot be removed by soot-blowing.

Several factors influence the amount of corrosion produced; increases in the sulphur content of the fuel, in excess air and in furnace wall and generating tube temperatures all cause the level of SO_3 in the flue gases to rise. Most of the sulphur that passes through the boiler system will be in the form of sulphur oxides and most of these find their way into the atmosphere.

There are two ways of dealing with this problem. Firstly there are several mechanical measures which can be taken. Modifications in design not only of the boilers themselves but also of auxiliaries can play an important part particularly in the incidence of high temperature deposits. Fouling and corrosion can also be cut down by the use of new alloys more resistant both to high temperature scale build-up and to low temperature sulphur corrosion.

Secondly, the use of chemical additives can do much to alleviate the problem. Chemical additive attack has followed three main lines: the combination of an additive with the atomic oxygen in the flame to prevent the conversion of SO_2 to SO_3; the combination of an additive with the sulphur trioxide once formed—that is the neutralisation of the acid by reaction with a basic particle; and the physical absorption of sulphur trioxide by the additive. A great variety of products have been used, among them basic refractory powders such as carbon and magnesium carbonate. Other processes have involved the injection of basic ammonia and coal tar amines.

T.V. MONITORING OF PROCESS DATA

DEMONSTRATIONS of the use of closed-circuit television for monitoring process measurements—as an alternative to conventional telemetering were held under the auspices of Woodall-Duckall Construction Co. Ltd. in the main instrument-panel assembly department of George Kent Ltd. on 26 January. The TV equipment was provided by Pye Ltd.

Visitors were able to see comparisons of picture clarity in various light-intensity environments with camera equipment providing panoramic and close-up shots in association with 8½ in. and 14 in. standard monitors and a 14 in. high-precision monitor.

During the day visitors were also given the opportunity to look at some of the items in a new range of forthcoming Kent measuring and control units.

New Steroid Cuts Risk of Side Effects

A NEW corticosteroid, Betnelan (betamethasone)—16β-methyl-9α-fluoro-prednisolone, has been introduced by Glaxo Laboratories Ltd., who say that it has a higher potency and a greater anti-inflammatory effect than existing steroids. This enables the new compound to be prescribed in smaller doses and at the same time diminishes the risk of side effects. Tests have shown that the compound is devoid of salt-retention activity (thus eliminating the risk of oedema), has negligible effect on potassium balance and causes no mental depression or muscle weakening.

The marketing of this steroid is noteworthy in that it is being offered at a lower price dose-for-dose than any existing cortisone derivative; this is the first time that a new corticosteroid has been introduced at a price lower than existing preparations.

Using Commonwealth produced hecogenin as the starting material in Glaxo's exclusive process, the company was able to develop an economic method of producing Betnelan on a large scale. Developed by Glaxo and manufactured at the company's cortisone plant at Montrose, Angus, the new steroid involves 29 manufacturing stages. In the 10 years they have been engaged in this field, Glaxo have invested about £1 million on corticosteroid research and development.

Forestal Seek Buyer for Harpenden Labs.

CENTRAL laboratories of Forestal Land, Timber and Railways Co. Ltd., one of the world's largest producers of tanning extracts, are to be sold. These fine and well-equipped chemical laboratories have been used by Forestal for research on tanning extracts and have enjoyed a world-wide reputation with experts visiting them from all parts of the world.

Forestal are expanding their factory at Widnes and have now decided to place production and research centres on the same site.

The Harpenden laboratories occupy a 2½-acre site and cover 13,000 sq. ft. A price of £90,000 is being asked; Knight, Frank and Rutley have been engaged to find a buyer for them.

Schools Show Continuing Interest in Research, says Royal Society Committee

INTEREST shown by schools in undertaking research continues to increase, according to the third annual report of the Committee on Scientific Research in Schools. The committee was set up by the Royal Society in 1957 to aid school teachers wishing to carry out research.

Many young graduates going into the teaching profession straight from university would like to follow some project, if only on a small scale—and the committee is there to help them do so, as well as to help and encourage teachers of longer standing who would like to do research.

The help and encouragement given by the committee is both advisory and practical. An adviser, who is usually a Fellow of the Society or a senior member of a university department, is appointed, and contact is maintained between teacher and a university. Should special chemicals or equipment be required, financial aid can be given from a small fund. During the year from November 1959 to October 1960, £2,000 was provided by the Royal Society for this purpose. During the same period, Shell Research Ltd. gave an additional £75 for special assistance.

The committee is now administering 66 separate research projects in 56 schools —12 to 15 new projects are supported each year. As the research must be done in the schoolmasters' spare time, either at the school or at a university department in the evenings, an individual project may take a number of years to complete. The work, however, is beginning to come to fruition; one or two papers have already been published and there are also a number of members more advanced than others, since they were already engaged on a project before the scheme started.

Another important aspect of the committee's work is that it encourages the pursuit of projects in which the older boys and girls can take part. In many cases this is in the capacity of laboratory assistants, but there are instances in some schools where the boys have helped considerably. The transition from school to university is often a difficult one and to give a sixth form student the chance to assist in some 'real' research is a step in the right direction, particularly in view of the recent criticisms of the inadequacy of science teaching in sixth forms (see CHEMICAL AGE, 28 January, p. 173).

Bringing Automation to Small Process Firms

To bring advanced automation projects within the reach of small manufacturers and to enable the introduction of automation into industry generally to be carried out step by step, is the ultimate aim of the automatic process plant control equipment being developed by Elliott-Automation Ltd.

Referred to in the report of the National Research Development Corporation (see also CHEMICAL AGE, 28 January, p. 178), the project comtemplates the development of a range of standard equipments which will permit electronic analogue and mixed analogue/digital computing techniques to be used for example in chemical plants, the individual elements being capable of assembly in a variety of ways to enable control systems to be designed as required for any particular plant. In this way manufacturers may be encouraged to try out inexpensively the affect of the application of computing techniques.

The cost of the work is being shared by Elliott-Automation and the corporation. It is still in its early stages but work has started on the design of circuit elements and components and on the study of potential plant applications.

Esso Cut Development Price of Chlorobutyl

MARKET development price of a chlorine modified butyl rubber, designated chlorobutyl MD-551, previously sold in experimental quantities by Esso Petroleum Co. Ltd. has been cut to 2s 6d per lb., ex store, duty free, from 1 February. The Esso chlorobutyl polymer is now being produced in the U.S. on a commercial scale and will now be known as butyl HT 10-66.

Advantages which this product offers above those of conventional butyls are said to be: compatibility with other elastomers, increased cure rate, wider choice of cure systems, and exceptional heat resistance.

HT 10-66 has created interest in the U.S. in applications ranging from tubeless tyre inner liners and non-toxic compounds for food containers to high-temperature steam hose, conveyor belting and various moulded and extruded items. It is felt that usage in the U.K. will develop along similar lines.

Technical information is available from the Chemicals Division, Esso Petroleum Co. Ltd., 10 Stratton Street, London W.1. A paper on the subject is to be presented by Mr. P. E. C. Davies at a meeting of the Manchester Section, Institution of the Rubber Industry on 27 February.

Armour Hess Introduce New Cationic Propomeens

A NEW range of cationic chemicals, the Propomeens, has been introduced by Armour Hess Chemicals Ltd., 6 Arlington Street, St. James's, London S.W.1. Propomeens C/12, C/25, HT/12 and HT/25 are propylene oxide adducts of the Armeens (fatty amines), containing a minimum of 95% tertiary amine.

The Propomeens are insoluble in water, but soluble in polar and non-polar organic solvents. The quaternary ammonium salts formed by neutralising the Propomeens with inorganic acids or low molecular weight organic acids display surface active properties, and are soluble in water and alcohols. Being difunctional alcohols the Propomeens will undergo normal glycol and alcohol reactions.

Suggested uses are as chemical intermediates, surfactants, biocides, corrosion inhibitors, demulsifiers, defoaming agents, viscose additives, etc.

Export Services of Chemical Works Projects

THE export services offered by Chemical Works Projects Ltd., Simon House, 28-29 Dover Street, London W.1, are the subject of a new and well-illustrated brochure. This describes the facilities offered by the joint company set up a year ago by Humphreys and Glasgow Ltd., the Power-Gas Corporation and Simon-Carves Ltd.

Aim in setting up the company was to create a designing, engineering and contracting organisation of such technical and financial strength that complete turnkey contracts, no matter how large, can be executed from start to finish under the sole responsibility of a single contractor.

In addition to the wide range of design and process know-how gained through their own experience and research, Chemical Works Projects also have access to an even wider range of know-how possessed by more than 20 of the leading chemical and chemical engineering companies in the U.K., Europe and the U.S. Processes and techniques available cover most aspects of the chemical, fertiliser and petroleum industries.

Corrosion Engineers' Dinner

Formation of an Institute of Corrosion and the classification of workers in the corrosion field into research workers, specialists and general practitioners, on the lines of the medical profession; these were two suggestions made by Mr. C. L. Wilson at the second annual dinner of the British Association of Corrosion Engineers, held in London on 26 January. Dr. T. P. Hoar, head of the Department of Metallurgy at Cambridge University, also spoke at the dinner, as did Mr. H. M. Powell, chairman of B.A.C.E., and Mr. M. T. Shaw, Chief Civil and Structural Engineer, War Office.

The guests included Mr. W. H. Driscoll, chief engineer, Pipeline Division, Esso Petroleum Co., Dr. J. E. Garside, Borough Polytechnic.

Overseas News

NEW FAMILY OF C-8 PROCESS MATERIALS MAY BOOST BUTADIENE USAGE

A NEW family of C-8 process materials has been developed by City Services Co., New York. These new petrochemicals—cyclo-octadiene, cyclo-octene and cyclo-octane, are expected to prove promising intermediates in the plastics industry for use in injection moulding nylon fabrics, high-quality adhesives, coating materials, improved synthetic lubricants, and high-energy fuels for jet aircraft.

Behind the development of these new C-8 chemicals lie two new butadiene catalysts by City Services research laboratory, details of which are not released owing to patent applications. The four carbon atoms of butadiene's molecular structure provide a natural building block for formation of the new group's peculiar 'cyclic' linkage of eight carbon atoms.

Much investigation has been carried out in the field of C-8 chemistry, particularly in West Germany, but until now acetylene has been the basic raw material. Cost and limited production facilities in the U.S. have been disadvantages for this approach. With the discovery of butadiene as a suitable building block, it remained only to find the proper method of combining two butadiene molecules to yield the desired eight-carbon molecules of the new petrochemical family. City Services' discovery could, in fact, have far-reaching effects on the not-so-healthy U.S. butadiene industry.

One of the important chemicals obtained from the new C-8 group is suberic acid at present, a relatively rare research material.

First Stage of Soviet Phenol Plant on Stream

The U.S.S.R. is building a cumene-type phenol section at the Novokuybyshevsk chemical plant. First section of the plant, which is now in operation, produces synthetic ethyl alcohol. The second section is scheduled to produce phenol, acetone and α-methylstyrene.

Dortmund Firm to Build Phthalic Anhydride Plant

Harpener Bergbau AG, Dortmund, are to build a 7,500-annual tonnes phthalic anhydride plant. To start production at the end of the current year, the plant will use naphthalene produced from crude tar made in Harpener's own cokeries.

Seurobor Boric Acid Plant Due on Stream this Year

Société Européenne de Bore (Seurobor), the joint subsidiary of the American Potash and Chemical Corporation and the Société d'Electro-Chimie, d'Electro-Métallurgie et des Aciéries Electriques Ugine whose formation was recently announced (C.A., 7 January, p. 13), have now given details of their proposed production programmes.

The company is to open a plant at Pierre-Bénite, near Lyons and close to a Ugine production unit, for the processing of imported boron ores to boric acid. To cost an estimated Fr.10 million, the plant will come into operation during the course of the current year. Marketing of the boric acid produced there, which will bear the trade name of 'Three Elephants', will be by the U.K. concern Borax and Chemicals Ltd., a subsidiary of American Potash.

Zahn to Engineer Finnish Sodium Sulphate Plant

Project engineering and design work of the Finnish sodium sulphate project (see CHEMICAL AGE, 28 January, p. 182) has been given to the Berlin and Hamelin firm of Zahn und Co. GmbH. Rikkihappo ja Superfosfataattitehtaat Cy. of Helsinki will produce the sulphate in 10 mechanical furnaces, each with a diameter of 6 m. Modern methods will be used in the pretreatment and automatic metering and feeding of raw materials.

At Harjavalta, in western Finland, production of aluminium sulphate from locally produced sulphuric acid and imported aluminium hydrate has begun. The production unit has an annual capacity of from 30,000 to 35,000 tonnes.

Government Loan for Norwegian Carbide Plant

The Norwegian Government has granted Kr.7 million (£350,000), with the promise of a further Kr.3 million (£150,000) later, to the township of Verdal for the development of modern harbour facilities for a carbide plant to be built there by A/S Hafslund, of Sarpsborg. This loan will make possible the production as from 1963 of some 40,000 annual tonnes of crude carbide by Hafslund, exports of which will earn about Kr.25 million (£1,250,000) in foreign exchange per year. Annual production will be able to rise to as much as 120,000 tonnes. Possibilities of attracting foreign capital for the project are at present under study.

Poland Claims Biggest European Synthetic Fibre Plant

Construction of a synthetic fibres plant has begun at Brzes, near Wloclawek, in Poland with what is claimed to be the biggest capacity of any plant of its type in Europe. Production is to begin in 1964 and full capacity reached in 1966. The plant will produce viscose artificial silk, viscose foils, synthetic casings and chemical semi-products.

New French Company to Make Aniline

A new company to manufacture aniline, Lorraine Aniline, has been formed by the State-owned Houllieres du Bassis de Lorraine (Lorraine Colleries) and Francaise des Matieres Colorantes (controlled by Ets. Kuhlmann). The new company will start production in 1963 and is scheduled to produce 6,500 tons of aniline and 2,700 tons of by-products a year. The project involves investments of N.Fr.12.5 million.

Australia Probes Duty on Penicillin

First hearing on imports of penicillin G and its salts and veterinary penicillin was held by the Tariff Board of Australia on 26 January. A second hearing is scheduled to be held on 16 February. Object is to consider whether imports are being sold at prices which detriment the Australian industry and whether an anti-dumping duty should be imposed.

The Tariff Board has imposed a temporary duty of 9d/lb. wet weight on cellulose nitrate with a nitrogen content of less than 12.3% for all tariffs.

Carbon Black and Acid Plants to Use Sui Gas

Plans to exploit the Sui natural gas deposits in West Pakistan include a study of the economics of establishing facilities for the production of carbon black, also synthetic fibres, sulphuric acid and other chemicals. Also under consideration is a pipeline north from Multan to Lyallpur, Lahore, Rawalpindi and other centres.

Fatty Alcohol Process Developed in Hungary

The Hungarian Institute for High Pressure Experiments has developed a process for the production from various oils and vegetable and animal fats of fatty alcohols. The process consists of the conversion of fatty acids to fatty alcohols by hydrogenation. The fatty alcohols thus produced are separated from the feedstock by a distillation technique and further processed to sulphonates. The process is one of several developed to meet the increasing call for fatty alcohol sulphonates.

Polyamides for China

Production is to begin in Communist China of Silon polyamide fibres, with Czech plant and equipment.

Saint-Gobain to Double Phthalic Production

Expansion now in progress at the Chauny, France, works of the Compagnie de Saint-Gobain will double production of phthalic anhydride. The new installations, which will use the process developed by Saint-Gobain, will be brought successively into production starting in the second half of this year and by mid-1962 output will exceed 30,000 tonnes/year.

The company attribute the expansion

to the growing demand for phthalic from both home and overseas, particularly for the manufacture of paints and varnishes, plasticisers and polyester resins.

Polio Epidemics Beaten in U.S.S.R.

Polio epidemics have been wiped out in the Soviet Union, according to Prof. Chumakov, head of the U.S.S.R. Institute of Polimyelitis. More than 77 million Soviet people were immunised in 1960 and vaccine was provided for the children of many countries of the Soviet bloc.

The vaccine used by the Russians is prepared from three strains of attenuated virus selected by Siban of the U.S. The vaccine is administered both to children and adults in the form of sweets.

Amoco to Build Queensland's First Refinery

An agreement signed in Brisbane last week by the Queensland Government and American interests will give Queensland its first oil refinery. It will be built by Amoco Pty. Ltd., Australian subsidiary plant of the Standard Oil Co. of Indiana. The agreement provides for the reclamation of a factory site near the mouth of the Brisbane River and for dredging to allow the entry of large tankers.

The refinery will start commercial operations not later than the end of 1966. It will initially handle 15,000 barrels of crude oil a day.

130,000 T.P.A. Aromatic Plant for Mobil in Italy

Tenders for the construction of a new aromatics plant at Naples will shortly be sent out by Mobil Chimica Italiana S.p.A., a newly formed Italian company affiliated with Socony Mobil Oil Co. Inc. Initial output will be 130,000 tonnes/year (39 million U.S. gall.) of benzene, ethylbenzene, *o*-xylene and *p*-xylene; more than 75% of output will be represented by benzene and *o*-xylene. Raw materials will largely come from the adjacent refinery operated by Mobil Oil Italiana, said to be Italy's largest.

Expanding Plastics Materials Output in Austria

Two Austrian companies, Semperit AG and Heinrich Schmidtberger are to increase their production of plastics materials, setting up, for this purpose, at Wels, a joint company called Interplastic Werke AG. Joint output of the two firms will expand in a few years to 20,000 tonnes a year or by about 100%.

Austrian production of plastics materials has grown enormously during the past 10 years. In fact, the aggregate output in this sector rose from 2,132 tonnes in 1950, to 9,880 tonnes by 1955 and to almost 23,000 tonnes in 1959. Today 14 Austrian works are engaged in production of synthetic resins.

In spite of the substantial expansion, about 54% of the country's needs are still imported. The following are the main items among the products imported: polythene, polystyrene copolymers, acrylic resins for injection moulding, polyamides, polyurethanes, esters, cellulosic esters, silicones, and fluorine resins.

At present, the following materials are produced in Austria; urea, formaldehyde, phthalic and maleic acids, plasticisers and solvents.

A new synthetic-phenol plant is being built at Kufstein. It will start production soon, at the rate of about 1,600 tonnes a year.

The new Sch.200 million petrochemical plant which is being completed at Schwechat near Vienna will go on stream turning out polypropylene at the initial rate of 5,000 tonnes a year. For the time being about 90% of this output will be exported.

Austrian Plans for Acid, Acetaldehyde and Alkali

Plans have been announced for the use to be made of the discussed Moosbierbaum oil refinery site in Austria by Donau-Chemie AG. As well as erecting a sulphuric acid unit there with an initial capacity of some 80 daily tonnes, Donau-Chemie are to build Austria's first acetaldehyde plant, using acetylene from carbide produced in a plant at Landeck, Austria, and a chlorine-alkali electrolysis with attached processing units.

Hercules Powder's New Facilities in Operation

Production has started at the recently expanded plant of Hercules Powder, at Hercules, Calif. The expansion, which cost several million dollars, gives Hercules Powder annual production capacities of 8 million gall. of methanol, 50 million lb. of formaldehyde and 11,000 tons of urea-formaldehyde compositions.

More Nitrogen from Dutch State Mines

The nitrogen plant and the two coking plants of the Dutch State Mines produced last year 220,000 tonnes of pure nitrogen —12,000 tonnes more than in 1959. Most of it was used for the manufacture of 955,000 tonnes of fertiliser. The State Mines also produced 38,000 tonnes of plastics and raw materials for plastics.

D.S.M. are currently negotiating with the Delfzijl local authority on the construction of plant to make fertilisers and other chemicals based on the large natural gas deposits at Slochteren, near Groningen.

5·4 Million Tonnes of Soviet Produced Acid

Production of sulphuric acid in the U.S.S.R. last year totalled 5.4 million tonnes, or a 6% increase over 1959, according to statistics released in Moscow. Mineral fertiliser output rose 7% last year to 13.8 million tonnes, while production of artificial and man-made fibres was higher by 18% at 211,000 tonnes.

A 29% increase was recorded in the output of chemical equipment, which was valued at Roubles 224 million. A slightly smaller increase, one of 21%, was recorded for the production of oil equipment, which totalled 92,800 tonnes.

Du Pont to Expand Methanol Facilities

Du Pont are to expand their methanol production facilities at Orange, Tex., increasing their capacity by 35%. The expansion is expected to be complete by late 1961.

Pesticide Plant to be Built at Saskatoon

A multi-million dollar chemical complex which will include Canada's first basic pesticide plant will be constructed in the Saskatoon area this spring by Interprovincial Co-operatives Ltd. It will consist of a caustic-chlorine unit, a basic agricultural chemical processing plant and a chemical formulating plant.

Potash Corp. Plan KCl Expansion

A $3 million expansion and modification programme is planned by Southwest Potash Corp., a subsidiary of American Metal Climax, for their potassium chloride plant at Carlsbad, N.M. Engineering, design and construction will be handled by Jacobs Engineering Co.

Italy's Furfural Industry Made Great Strides in Last 10 Years

PRODUCTION of furfural in Italy has made great strides during the past 10 years or so, rising from 61 tons in 1949 to 2,905 tonnes in 1959. Until 1953 Italy imported most of the furfural she needed, but after that she became an exporter. By 1957, excess of exports over imports in this sector totalled 1,897 tonnes.

Major consuming industry in Italy of furfural is that of lubricating oils. Four Italian refineries producing lube-oils account for about 79% of the whole Italian consumption of furfural.

About 60 substances can be utilised as raw material for the production of furfural, but in Italy olive husks or rice chaff are usually preferred. The main problem of the industry is the large quantity of the raw material needed. For this reason the industry underwent a crisis in 1953 when the price of furfural dropped to about Lire 150/kg. Gradually, however, the price increased to over Lire 200, reaching even as much as Lire 240/kg.

According to the 1957 statistics, Italy was the world's third largest furfural producer. (Italy's production was then 4.75% of the world total):

U.S.	50,000 tonnes
U.S.S.R.	5,000 tonnes
Italy	2,800 tonnes
Other countries	2,166 tonnes
World total	59,966 tonnes

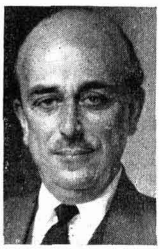
PEOPLE in the news

● Following the recent death of Mr. A. E. Berry, president of the Manbré and Garton sugar, glucose and starch group, Mr. Berry has been succeeded in the business by his sons, **Mr. Eustace A. Berry** and **Mr. Derbe C. Berry** as chairman and managing director respectively.

● **Mr. Brian H. Turpin,** managing director of Quickfit and Quartz Ltd., makers of interchangeable laboratory glassware, and of Q.V.F. Ltd., chemical engineers in glass, has been appointed chairman of Q.V.F. Glass (Canada) Ltd., Canadian subsidiary of Q.V.F. **Mr. J. G. Window,** Q.V.F. sales director, has also joined the board. As already announced, the Canadian manager will be **Mr. George Large.**

● **Mr. Rolf H. Stein,** who has been associated with the company for a number of years, has been appointed a director of Victor Blagden and Co. Ltd., Plantation House, Mincing Lane, London E.C.3. This company is a wholly owned subsidiary of Blagden and Noakes (Holdings) Ltd. and represents the chemical interests of the Group.

● **Mr. Frederick A. Lesser,** deputy chairman and managing director of Borax (Holdings) Ltd., has been appointed to the board of Hardman



F. A. Lesser

and Holden Ltd., Manchester. Mr. Lesser's appointment follows the recent acquisition of Hardman and Holden by the Borax Group.

● **Mr. F. V. Mills,** sales manager, and **Mr. L. Hammond, F.C.A.,** secretary, have been appointed directors of Christy and Norris Ltd., manufacturers of disintegrating, grinding and pulverising equipment and laboratory mills, Chelmsford, to promote the company's rapidly expanding home and overseas business. Mr. Mills became sales manager in 1951. Before joining the firm in 1950, Mr. Harris had served with Coalite and Chemical Products Ltd.

● **Dr. J. Lewis** has been appointed a reader in chemistry at London University in respect of his post at University College.

● **Mr. J. Markland, B.Sc., F.R.I.C.,** County Analyst for Durham, County Analyst's Department, Shire Hall, Durham, has been appointed chairman of the North of England Section, Society for Analytical Chemistry. He succeeds **Dr. J. R. Edisbury, D.Sc., Ph.D.,** who has held the office since 1959. At the annual meeting on 28 January, Dr. Edisbury gave an address on 'Validity of observation'.

● **Mr. D. L. Campbell, M.C.,** has been appointed managing director of Davy-Ashmore Export Co. Ltd., 15 Portland Road, London W.1, the newly-formed subsidiary of Davy-Ashmore Ltd. (see also C.A., 4 February, p. 207).

● **Dr. S. R. W. Martin,** a director of W. A. Mitchell and Smith Ltd. since 1953, has been appointed managing director.

● **Mr. G. H. W. Cullinan,** deputy managing director of Shell Chemical Co. Ltd., is a member of the Federation of British Industries delegation that will visit Spain later this month. Headed by Sir William McFadzean, F.B.I. president, the delegation will discuss the opportunities for increasing Anglo-Spanish trade.

● **Mr. W. Fletcher,** who has been appointed sales manager, stainless steel plant, by A. Johnson and Co. (London) Ltd., Villiers House, Strand, London W.C.2, was formerly senior chemical and project engineer with Constructors John Brown Ltd.

● **Mr. J. S. Simpson, F.I.M.L.T.,** bacteriologist at the Midlands Counties Dairy Ltd., Birmingham, was elected chairman of the Biological Methods Group, Society for Analytical Chemistry, at the recent meeting. **Mr. W. A. Broom, B.Sc., F.R.I.C.,** development controller of the British Schering Group, was elected vice-chairman, and **Mr. K. L. Smith, M.P.S.,** of the standards department, Boots Pure Drug Co. Ltd., Station Street, Nottingham, was elected hon. secretary and treasurer.

● **Dr. Eric W. Mills,** a graduate of Liverpool University, has now taken over as principal of the new College of Technology at Chesterfield. After graduating, Dr. Mills became a research chemist in industry, and then became a senior lecturer and was head of the chemistry department of Rutherford College of Technology, Newcastle upon Tyne, before being appointed principal at Carlisle.

● **Dr. J. W. Bayles, M.A., D.Phil. (Oxon),** lecturer in chemistry at University College, Cardiff, has been appointed Professor of Physical Chemistry at Natal University, Durban.

● **Mr. C. H. Kostering, Dr. B. Verkaaik** and **Mr. A. G. van den Bos** have been appointed directors of Nederlandsch Verkoopkantoor voor Chemische Produkten, Amsterdam.

● **Mr. H. G. Hill** has retired from Cornelius Produce Co. Ltd., with whom he has been associated since 1939. In future **Mrs. G. Fenton** will handle U.K. sales of synthetic waxes and p.v.c. tubing; **Mr. A. C. Stammers** will handle natural waxes.

● **Sir Miles Thomas,** chairman of Monsanto Chemicals Ltd., has joined the board of P. Leiner and Sons Ltd., ossein gelatine producers, Treforest, Glam. Sir Miles, who is also chairman of the Development Corporation for Wales, recently resigned from the board of British Glues and Chemicals Ltd.

Obituary

Mr. J. W. Urban, director of Monsanto Chemicals Ltd. since 1954, died in Bombay on 31 January, after a short illness. He had been visiting India on official business connected with Monsanto Chemicals of India Private Ltd., of which he was managing director. Mr. Urban joined the sales department of Monsanto Chemicals Ltd. in 1929. He left the company in 1940 to enter the safety glass industry and later served with H.M. Forces before rejoining Monsanto in 1945. He was particularly concerned, in his later years, with the company's overseas activities.

Mr. Albert Eustace Berry, B.Sc., president of the Manbré and Garton group of refiners and manufacturers of sugars, glucose and starch products, died recently, aged 85.

Formerly head chemist to A. Boake, Roberts and Co. Ltd., later joining their board, in 1906 he negotiated the purchase of a neighbouring glucose and sugar refiner, Johnson's Saccharum Co. of Stratford. A company with a working capital of £55,000 was formed and had a prosperous career. Then in 1919 Mr. Berry arranged the purchase of the Manbré Saccharine Co. and the two firms merged in the Manbré Sugar and Malt Co. Ltd., of which he became managing director and chairman. Mr. Berry also acquired the whole share capital of three other businesses in Liverpool: Liverpool Saccharine, Freeman, Lloyd, and Liverpool Malt. This was followed by the acquisition of Garton, Sons and Co., and the combined businesses now trade as Manbré and Garton.

Early in 1935, Sankey Sugar Co., Earlestown, Lancs., was acquired and in the same year Mr. Berry undertook on behalf of Manbré and Garton the technical production of glucose and starch at African Products Manufacturing Ltd., Germiston.

U.K. Chemical Prices Showed Downward Trend in 1960, When Prices Generally Rose

AMONG the few exceptions to the general upward trend in prices of manufactured products in 1960 were prices of chemicals. The Board of Trade wholesale price index, based on a 1954 average of 100, showed at December 1960 a provisional index of 104.8 for home market sales in the chemical and allied industries (a 1.8% decrease on the December 1959 figures of 106.7). Provisional index for home sales of all manufactured goods was 113.8 in December 1960, an increase of 1.8% over the December 1959 figure of 111.8.

The following is an extract from the B.o.T. wholesale price index for 1960, based on 100 in 1954:

	Annual averages 1958	1959	1960
Lube oil & greases	113.5	113.4	114.0
Dyestuffs	110.7	109.0	107.2
Disinfectants	112.9	113.4	113.7
Fertilisers*	117.2	115.0	113.3
Insecticides, weedkillers & fungicides	93.4	92.4	81.9
General chemicals	107.7	106.7	105.0
Acetic acid, B.S. 576/1950	113.0	113.0	112.0
Acetone, B.S. 509/1950 ..	95.8	95.8	90.7
Aluminium sulphate (14% Al_2O_3)	113.6	111.9	111.4
Barium carbonate, precip. 98/99% (powder) ..	105.1	105.1	105.1
Barium chloride, fine, 98/100%	125.4	125.4	110.4
Benzole, pure B.S. 135A/ 1950	106.9	106.9	106.9
Butanol, B.S. 508/1950 ..	93.2	91.4	85.4
Calcium carbide, B.S. 642/ 1951	119.5	119.5	119.5
Caustic soda liquor, 100° TW.	116.3	121.0	121.0
Dichromate of potash ..	119.1	120.3	120.3
Ethyl alcohol, ind., B.S. 507/1933	146.2	146.2	140.2
Hydrogen peroxide, 130 vol.	103.5	93.1	89.6
Liquid chlorine, pure ..	110.8	107.3	103.9
Methanol, refined ..	107.6	106.1	100.6
Nitric acid, conc., 95/96%	107.6	107.6	107.6
Pharmaceutical chemicals	82.7	82.1	81.4
Phenol	100.4	100.4	100.4
Phosphorus, 99.9% pure, sp.g. 1.82, m.p. 44.1° ..	110.2	110.2	103.0
Phthalic anhydride ..	114.0	114.9	116.8
Pigments & earth colours, inorganic	110.5	109.9	111.3
Salicyclic acid, tech. or comm.	99.8	99.3	98.7
Soda ash, light, d/d. ..	115.3	116.8	116.6
Soda ash, light, f.o.r. works	117.7	119.6	119.6
Sodium cyanide, 96/98%, standard	107.6	110.3	110.3
Sodium sulphide, solid, 60/62%	114.3	114.3	114.3
Sulphuric acid, B.O.V. ..	103.3	99.3	98.6
Sulphuric acid, R.O.V., 94/95%	102.0	99.4	96.8
Titanium dioxide, Anatase	122.2	121.6	121.6
Titanium dioxide, Rutile	115.2	114.3	113.9
Trichloroethylene ..	110.9	110.9	108.6
Urea, tech. pure	106.6	106.6	101.5
Pharmaceutical preparations	102.5	101.4	100.9
Explosives, private	113.1	113.9	112.1
Paint	109.0	108.7	103.3
Soap	122.1	127.9	128.9
Detergents	103.3	103.9	103.5
Glycerine	71.2	81.4	85.3
Syn. resins & plastics mats.	93.7	90.3	88.8
Aminoplastics: urea-formaldehyde ..	99.8	99.8	99.8
Cellulose acetatemoulding powder	90.2	90.2	90.2
Phenolics & cresylics; laminates	98.5	98.5	98.1
Phenolics & cresylic: moulding powders ..	103.2	105.7	104.9
Polystyrene moulding powders	91.4	80.3	75.3
P.v.c., Geon 101	91.9	86.0	86.0
P.v.c., gran.	90.5	79.7	79.7
Commodities Wholly or Partly Imported			
Phosphate rock	103.4	97.6	96.8
Pyrites, c.i.f. U.K. ports ..	76.3	66.9	63.0
Sulphur, crude, c.i.f. ..	82.2	77.8	75.5

* Prices revised in 1959.

	£ per ton		
Calcium carbide, high-grade, over 4 tons, c.p.	43.25	43.25	43.25
	Shillings/gall.		
Pure benzole, min. 200 gall., d/d.	5.58	5.58	5.58
	S./mega unit		
Penicillin, crys. 1, m.u. (vial)	1.17	1.17	1.17
	£ per ton		
Sulphuric acid, R.O.V., 94/95%, f.o.r. min. tank loads 5/6 tons	9.76	9.51	9.26
	Pence per lb.		
Phenol-formaldehyde, g.p. grade, 50–99 tons over 1 year†	18.54	18.50	18.50
	Shillings per lb.		
Polystyrene, crystal, c.p. U.K. buyer	2.58	2.21	2.06
Urea formaldehyde, wood meal, d/d U.K., & f.o.b.	1.29	1.29	1.29

† Terms revised in 1959.

One-day Symposium on Effluent Treatment

A SYMPOSIUM on the application of laboratory and pilot plant studies to full-scale water and effluent treatment will be a feature of the ninth annual meeting of the Society for Water Treatment and Examination to be held at the Royal Society of Health, London, on 17 March. The symposium will be presented by Dr. Gordon Carter, deputy director of water examination, Metropolitan Water Board; Mr. A. H. Waddington, chief chemist, Paterson Engineering Co. Ltd.; and Mr. R. W. Bayley, Water Pollution Research Laboratory. A visit will be made to the Chemical Engineering Department at University College, London, on 16 March.

Details can be obtained from Mr. A. W. H. McCanlis, hon. secretary, 41 Carshalton Road, Sutton, Surrey.

New U.S. Method for Determining Styrene-Butadiene Copolymers

A METHOD for determining the composition of copolymers which has been used to measure the ratio of bound styrene to butadiene in samples of synthetic rubber, has been developed by the U.S. National Bureau of Standards, under the sponsorship of the Government Synthetic Rubber Programme.

The method, based on the amounts of water and carbon dioxide formed when the copolymer is ignited, is an adaptation of a method previously developed for the determination of carbon and hydrogen in hydrocarbons. Although the new procedure is precise (analysis of copolymers, ranging from 8.6 to 83.7% styrene, giving a mean standard deviation of 0.0010) it is too time consuming to be of value in routine copolymer determinations. However, it has been used to measure the copolymer composition of reference standards, which then serve as a basis for the development of more rapid techniques.

Basically, the method consists of igniting a sample of purified copolymer and absorbing the water formed in a tube packed with magnesium perchlorate and phosphorus pentoxide and the carbon dioxide in a second tube containing soda asbestos, magnesium perchlorate and phosphorus pentoxide. In the analysis of the copolymer containing styrene (C_8H_8) and butadiene (C_4H_6), the percentage of styrene by weight (x) is given by the expression

$$x = 29.0831\,[11.1809 - 100/(R + 1)]$$

in which R represents the carbon-hydrogen ratio obtained from the analysis. The constants are derived from the molecular formulae of the polymers and the atomic weight of carbon and hydrogen.

Other copolymers containing monomers differing considerably in carbon-hydrogen ratio could be analysed with little modification of the present procedure.

Samples whose copolymer compositions had been determined by this process were used as reference standards for refractive index measurements. Tables were prepared which related copolymer composition—obtained from combustion analysis—to an accurately determined refractive index. Analysis of butadiene-styrene copolymers can now be made on a rapid routine basis, using the simple refractive index measurement.

Chemicals Production Index Still at High Level

Board of Trade's index of production for chemicals and allied industries in October last was at a figure of 151 (compared with 151 in September, 141 in the third quarter 1960, and 131 in 1959). The index is based on a 1954 average of 100. For general chemicals the October figure was 152 (152 in September, 141 in third quarter 1960 and 132 in 1959). A provisional November index is available for coke ovens, oil refineries, etc., this being 141 (146 in October, 140 in third quarter 1960 and 127 in 1959).

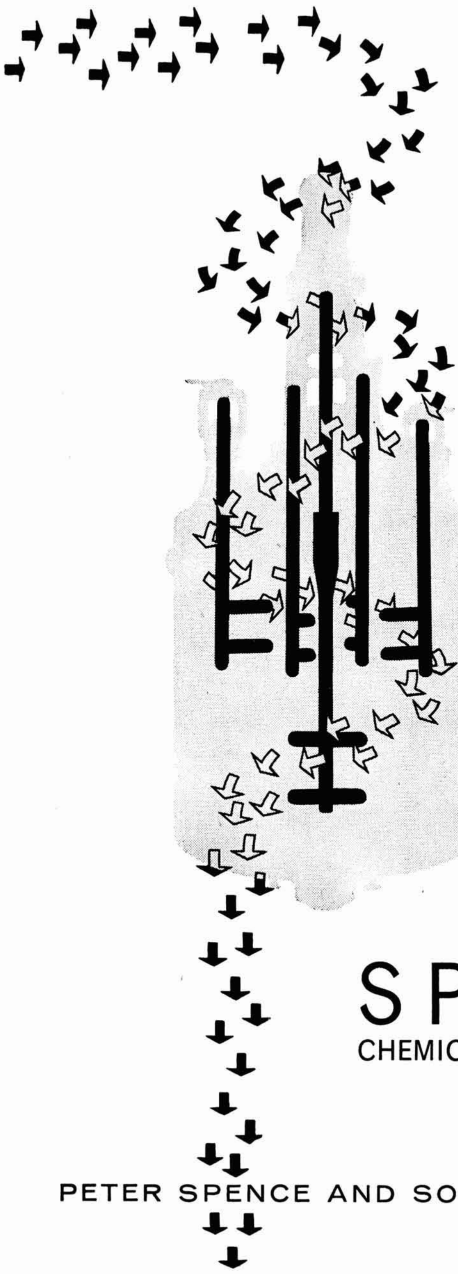
Sturge Mail Destroyed by Arson

The head office of John and E. Sturge Ltd., Wheeleys Road, Birmingham, was broken into an Sunday, 5 February, and a number of small fires started deliberately. The damage included the destruction of a large part of the mail received the previous day. Sturge are asking home market customers to send duplicate copies of correspondence and orders which might have arrived on 4 February, and which have not yet been acknowledged.

Will

Mr. Laurence Chrimes, secretary, Evans Medical Ltd., who died on 8 October last, left £2,033 net.

Metal alkoxides and acetylacetonates



Derivatives of catalytically active metals which are soluble in organic media are becoming increasingly important to the organic chemist in his search for high reaction yields under easily attained conditions. Metal alkoxides and acetylacetonates, for example the derivatives of Al, Co, Cu, Fe, Ni, Ti and Zr, for use as catalysts, co-catalysts, and curing agents can be supplied for your evaluation.

For further details write to the Product Development Department, Peter Spence and Sons Limited, Widnes, Lancs.

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Bookshelf

CLASSICAL ANALYSIS, A COMPREHENSIVE REVIEW

COMPREHENSIVE ANALYTICAL CHEMISTRY, VOL. 1B, CLASSICAL ANALYSIS. Edited by *C. L. Wilson* and *D. W. Wilson*. Elsevier, Amsterdam, 1960. Pp. xxii + 878. 155s.

There has been a definite need for a comprehensive work on analytical chemistry for many years. This need has probably been felt not so much by analysts as by those who occasionally wish to use analytical techniques. Both classes of reader should be served by the present series which will no doubt find its way into all large libraries.

Vol. 1B is equally devoted to two topics in classical analysis: inorganic titrimetric analysis and organic quantitative analysis. Many authors have contributed sections.

The present series invites comparison with Rodd's 'Organic Chemistry' issued by the same publisher. The format is very similar and less suitable for the analytical series. Vol. 1B falls into two completely separate parts and it would have been more convenient for most readers if they had been published separately. The editors have succeeded admirably in providing a mass of practical instructions appropriate to a laboratory handbook, but the size of the volume makes it inconvenient for bench use. Moreover there must be many individuals who would have bought one chapter but will jib at the price of the two, one of which they would rarely consult.

The writers have kept the requirements of all their different classes of readers in mind and have spared no effort to give them the information they are likely to need.

Activation Analysis

ACTIVATION ANALYSIS HANDBOOK, VOL. I. By *R. C. Koch*. Academic Press, New York and London, 1960. Pp. x + 219. $8.

During the last 10 years there has been an ever increasing application of the method of activation analysis for it can be a sensitive and speedy way of determining trace quantities of many elements. However, before a specific analysis is undertaken it is necessary to collect and examine particular data such as which type of irradiation is most suitable (neutrons, charged particles, photons) to produce the most convenient radioisotope, the half-life of this, which materials cause interference, which are the possible side-reactions, and which has been published on experimental techniques. All such information and other pertinent data have been collected by Dr. Koch (Nuclear Science and Engineering Corporation, Pittsburgh), and arranged in tables ranging from hydrogen to plutonium. In addition the handbook contains sections on experimental methods, theoretical aspects, a comprehensive bibliography and a detailed index.

This reference book should be of great value to analysts who have the task of estimating trace quantities, especially those who have not yet tried this new procedure.

Trends in Catalysis

ADVANCES IN CATALYSIS AND RELATED SUBJECTS, VOL. XII. Edited by *D. D. Eley*, *P. W. Selwood* and *P. B. Weisz*. Academic Press Inc., New York, 1960. Pp. x + 324. $11.

This 12th volume in the annual series contains six chapters: (1) The wave mechanics of the surface bond in chemisorption by T. B. Grimley; (2) Magnetic resonance techniques in catalytic research by D. E. O'Reilly; (3) Base-catalysed reactions of hydrocarbons by Herman Pines and Luke A. Schaap; (4) The use of X-ray K-absorption edges in the study of catalytically active solids by Robert A. Van Nordstrand; (5) The electron theory of catalysis on semiconductors by Th. Wolkenstein; (6) Molecular specificity in physical adsorption by D. J. C. Yates. Workers in the field of catalysis will find this volume, in keeping with its 11 companions, a useful source of references. The complete series of volumes forms an invaluable summary of the up-to-date and pertinent facts on this vast and complex subject. Chapter 2 in Volume XII, dealing with magnetic resonance of the solid state, is particularly timely and well presented. The world wide appeal of the study of catalysis in all its diverse forms, as pointed out in the preface of Volume XII, is reflected in the countries of origin of the chapters in this volume; four were written in U.S., two in the U.K. and one in the U.S.S.R. A cumulative subject index covering the main topics that have been reviewed would be a useful addition to the 13th volume.

Organic Chemistry

BASIC ORGANIC CHEMISTRY. By *Louis F. Fieser* and *Mary Fieser*. D. C. Heath, Boston, 1959. Pp. vii + 369. 42s. 6d.

The aim of this book is to present a simple account of the basic facts and theories of modern organic chemistry, chiefly for the benefit of students who do not intend to specialise in the subject. Instead of adopting the traditional divisions into types of compounds, the authors have organised the material (except for a few basic chapters) into a series of topics. These include oxidation and reduction, elimination reactions, replacement reactions, acids and bases, synthesis, petroleum, polymers, etc. The result is a brilliant success. Classical principles and modern mechanistic and stereochemical theories are presented with great clarity; the numerous photographs of molecular models are particularly helpful. The book provides a stimulating picture of the *raison d'être* of organic chemistry and an exciting survey of its manifold applications; it is much more than a mere grammar. In short, this is the most lively introductory textbook the reviewer has ever seen.

Nuclear Review

ANNUAL REVIEW OF NUCLEAR SCIENCE, VOL. 10. Annual Reviews Inc., Palo Alto, California, 1960. Pp. vii + 617. $7.5.

This collection of 18 review articles by specialists is excellent value although the bulk is mainly of interest to nuclear physicists. The report by A. P. Wolf on the labelling of organic compounds by recoil methods (hot-atom chemistry) is perhaps the one with the most appeal to chemists. In this, a survey of current views on mechanisms is followed by clear and systematic accounts of the labelling with carbon-14 and tritium (T) of an extensive series of organic compounds. Labelling by T_2 gas is also reviewed for there is evidence that HeT^+ recoil fragments are partly effective; mention is also made of e.g. Cl^{38}, Co^{60}, S^{35} recoil effects and of accelerated ions and ionisation methods of C-14 labelling.

For biochemists, there are sections of interest in articles on cellular radiobiology (T. Alper) and on the metabolic effects of emitters located internally in biological material (R. C. Thompson). Examples of relevant topics are the effects of O_2, NO and temperature during irradiation, the effects of U.V. and X-rays on tissues, micro-organisms, enzymes, and DNA synthesis, and on chemical protection by certain drugs.

Essential Oils

INDIAN ESSENTIAL OILS. By *A. K. Menon*. Sree Saraswaty Press, Calcutta. Pp. v + 89. Rs7, 10s.

This is a review of the Indian essential oil industry by A. K. Menon, a former chairman of the C.S.I.R. (India) Essential Oils Research Committee established in 1941 and includes a foreword by P. A. Narielwala (its present chairman), co-author with J. N. Rakshit of a previous Report of the essential oil advisory committee (1946).

The first chapter (34 pages) reviews 37 different types of essential oils; the second (4 pages), six spice oils; the third (2 pages) covers attars and aqueous products while the fourth chapter deals with musk, ionore, coumarin, vanillin and a miscellany of aromatic substances.

The book will be of value to research workers as well as to commercial interests connected with the industry.

Commercial News

• Increase in Ilford Ltd. Net Profit
• Danubia, Kali-Chemie to Float Loans
• Montecatini Set up Joint Dutch Company
• Berk Form Pharmaceuticals Company

Beecham Group

The second interim ordinary dividend of the Beecham Group Ltd. is maintained at 8%, as forecast, making so far a total of 16% (same).

D.C.L.-British Xylonite

With their formal offer for the issued capital of British Xylonite Ltd. (reported in C.A. last week, p. 206), Distillers Company Ltd. state they expect to pay a final dividend of not less than 7½%. An interim of 6% was paid prior to a one-for-five scrip issue. D.C.L. group assets at 31 March 1960 totalled £111.14 million, the British Xylonite figure at 31 December 1959 was £5.11 million. If the offer is accepted, D.C.L. issued capital will be increased to £100.46 million, including £98.26 million in ordinary.

Ruplex Plastics N.V. is the name of a plastics concern set up at Roden, Holland, with a capital of Fl.1,000,000 by British Xylonite and Mr. P. O. C. Vosveld, Roden.

I.C.I. Heavy Organic Chemicals

For administrative reasons, I.C.I. (Heavy Organic Chemicals) Ltd. have been voluntarily liquidated and their assets and liabilities transferred to Imperial Chemical Industries Ltd., the parent company. The former company will continue as the I.C.I. Heavy Organic Chemicals Division, Organic House, Billingham, Co. Durham; there is no change in trading policy or activities.

Ilford Ltd.

Consolidated pre-tax profit of Ilford Ltd. for the year ended 31 October was £1,539,722 (£1,591,862). Parent company's pre-tax profit was £1,415,011 (£1,518,305). Tax took £601,205 (£712,681) and net profit was £813,806 (£805,624). Final dividend of 12½% (same) is declared, making 17½% (same).

Abbott Laboratories

A record year was recorded for turnover by Abbott Laboratories, U.S., last year, sales reaching $125,600,000 ($122,600,000). Net profit is, however, expected to be some 5% down on the 1959 level of $13 million dollars, or $3.32 per share.

B.A.S.F.

1960 turnover of Badische Anilin- und Soda-Fabrik AG amounted to some DM2,588 million, or about £216 million (DM2,268 million, some £189,500,000). Almost 37% of the turnover came from export sales.

Danubia-Petrochemie

For the financing of expansion of the Danubia-Petrochemie AG of Vienna, an Austrian loan amounting to Sch100 million is to be issued. Danubia-Petrochemie, who are owned 40% by Stickstoffwerke, Linz, 40% by Montecatini, and 20% by the Austrian Federal Government, are to start production this April with 5,000 tonnes of polypropylene.

Dow Chemical Co.

Net profit of Dow Chemical Co., U.S., in the second quarter (that ending 30 November) was $14.7 million ($22.8 million), or 53 cents a share (84 cents). For the first half-year, net profit totalled $33.2 million ($45.2 million) or $1.19 a share ($1.66).

Hercules Powder

Net income for 1960 of Hercules Powder, U.S., was equal to $3.05 a share ($2.73); sales totalled $336.9 million ($283.6 million).

Kali-Chemie AG

Kali-Chemie AG, Hanover, are reported to be preparing to float a loan worth DM 15 million through the Deutsche Bank AG.

Schelde Chemische

Montecatini of Milan, and S. A. Participations Commerciales Chimiques Minières, Basle, have jointly set up a new Dutch chemical company with the name of N.V. Schelde Chemische Maatschappij, with its seat in Terneuzen. The capital, of which Montecatini will hold a majority, is Fl.1 million. Schelde Chemische will produce and trade in raw materials and chemicals and chemical products.

Monsanto Chemical Co.

The Monsanto Chemical Co., including the Chemstrand Corporation and subsidiaries, recorded for last year a net profit of $67,700,000 ($74,800,000) or $2.49 ($2.80) per share, after an annual turnover of $890 million ($875 million). The year under report is the first to include the full net profit of Chemstrand.

Péchiney

Péchiney announce a turnover for the second half of 1960 amounting to N.Fr.499 million, compared with N.Fr.404 million.

INCREASE OF CAPITAL

GREEFF-CHEMICALS HOLDINGS LTD., Garrard Avenue, 31/45 Gresham Street, London E.C.2. Increased by £500,000 beyond the registered capital of £1 million.

NEW COMPANIES

BERK PHARMACEUTICALS LTD. Manufacturing, pharmaceutical, research, diagnostic, consulting and development chemists, etc. Directors: W. G. Loos, C. H. Tanner (directors of F. W. Berk and Co. Ltd., etc.). Reg. office: Berk House, 8 Baker Street, London W.1.

Market Reports

FERTILISER TRADE NOW MORE ACTIVE

LONDON Home trade demand for industrial chemicals continues along steady lines with contract delivery specifications covering good quantities. Borax and boric acid are in good request at the higher prices now ruling, and there has been a steady inquiry for hydrogen peroxide and formaldehyde. The call for supplies for the textile and plastics industries has been sustained.

Export inquiry remains good but buyers are seeking keen quotations. Prices throughout the home market are little changed and the undertone is steady.

More active conditions have been reported in the fertiliser market while the position of the coal tar products is unchanged with available supplies of most items finding a ready outlet.

MANCHESTER The Lancashire cotton textile and allied industries are accounting for reasonably good deliveries of bleaching, dyeing and finishing chemicals and most other industrial outlets are maintaining their requirements at around recent levels. Fresh business on the Manchester market has been moderate, the bulk of it relating to prompt or near deliveries. A steady to firm price undertone continues. Most of the by-products are finding a ready outlet and some improvement in the offtake of fertiliser materials has again been experienced.

SCOTLAND There has not been much change generally during the past week in the Scottish market and from most sections of industry the report is of a good steady volume of business. Apart from the general range of caustics, hypos and acids there was a good demand for auxiliary chemicals. For the most part prices have remained unaltered.

In regard to agricultural chemicals some interest has been shown in the nature of enquiries for forward requirements.

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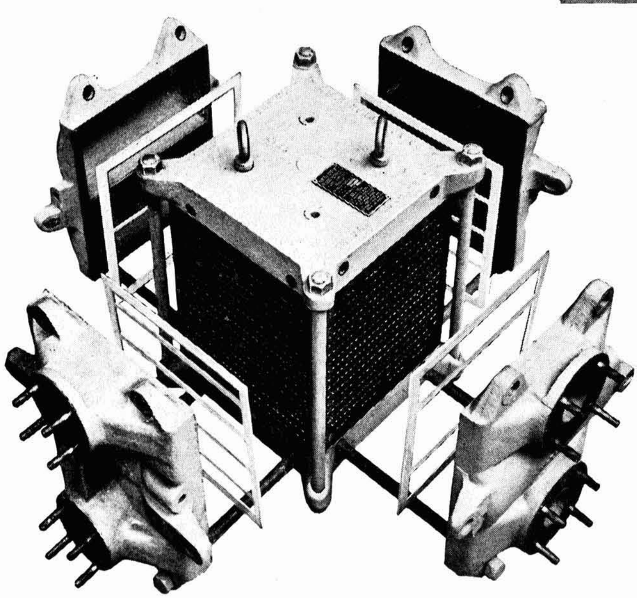

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TRADE NOTES

Polycarbonate Price Cuts

Reductions in the prices of Makrolon polycarbonates, produced by Farbenfabriken Bayer, are announced by R. H. Cole and Co. Ltd., 2 Caxton Street, London S.W.1. New prices per lb. for grade S (injection moulding and G.P. extrusion) and grade E (film extrusion and bottle blowing) are now as follows: Minimum 10,000 kg delivered, 7s 3d; min. 5,000 kg d/d, 7s 7d; min. 2,500 kg d/d, 8s 1d; min. 1,000 kg d/d, 8s 3d; under 1,000 kg, d/d, 8s 7d.

Surcharge for standard colours (at present only in grade S) up to 4,999 kg is 6d/lb. and over 5,000 kg, nil; for specially matched colours in minimum 2,000 kg is 10d/lb. per colour and for lots over 5,000 kg is 6d/lb. per colour.

New Epoxy Resin

Newly added to the range of Epophen resins produced by Leicester Lovell and Co. Ltd., North Baddesley, Southampton, is a polyfunctional solid resin said to be a significant advance in the chemistry of epoxies. It is claimed to have an epoxy value at least equal to the best liquid bisphenol epoxy and to show a marked improvement in thermal, chemical and electrical properties. High reactivity makes possible rapid moulding cycles.

Change of Name

Chemical Projects Ltd., Parkfield Works, Stockton on Tees, have changed their name to Chemical Works Projects Ltd.

Durez Resins in Floor Polishes

Durez Plastics Division of Hooker Chemicals Corporation has issued a new handbook on Durex resins in polymer-type floor polishes. It contains the latest U.S. information on polishes and polish formulations, and is supplementary to the Durez publication, 'Resins for wax emulsions'. Copies of the handbook, samples of the resins recommended, data sheets and prices may be obtained from the U.K. distributors, Omni (London) Ltd., 35 Dover Street, London W.1.

New Workshops

Adequate stocks of stainless steel are said to be available from a new works opened by Leonard Smith (Engineers) Ltd., 12 High Street, Gillingham, Kent. The new works also provide facilities for fabrication in stainless steel, nickel, aluminium and welding to Class 1 standard.

Electromagnetic Flowmeters

The latest catalogue to be issued by Fischer and Porter Ltd. is a comprehensive manual on obstructionless flowmetering. In 165 pages it includes complete specifications of the Fischer and Porter electromagnetic flowmeter primary instrument and a selection of secondary indicators, recorders, integrators and controllers, together with price lists and comparison data with other methods of flowmetering. As the electromagnetic flowmeter is a comparatively recent development the authors have endeavoured to give as much useful information as possible, covering the whole subject from basis principles to typical specifications. Copies are available from Fischer and Porter Ltd., Workington, Cumberland.

Silicone Alkyds

Silicone alkyds, Heydolac 305 and 346, plus a silicone modified epoxy ester, Heydolac 400, for which excellent heat resistance, colour retention, weathering properties and adhesion are claimed, are now being produced by Universal Synthetic Co. Ltd., 86 Bow Road, London E.3, by arrangement with Midland Silicones Ltd.

Guide for Triton Surfactants

Rohm and Hass Co. have prepared a new booklet, 'Triton-Alkylphenol Surfactants', intended essentially as a basic guide for chemists and formulators to assist in the selection of the proper nonionic surfactant for production development. It is important that the surfactant be selected to meet the needs of the particular application, but so many different types of surface-active materials are now available that users may be confused as to which product will best fit the individual need. Enquiries should be addressed to Charles Lennig and Co. (Great Britain) Ltd., 26-28 Bedford Row, London W.C.1.

Vinyl Acetate Price

Price of vinyl acetate monomer produced by British Celanese Ltd. has been reduced by £2 10s per ton.

London Sales Office

Black Automatic Controls Ltd., a member of the Eliott-Automation Group, are opening a sales office at 11 Tothill Street, London S.W.1 (Whitehall 5814), under Mr. H. G. Higginson, general sales manager, to enable full technical sales service to be made in London. Black manufacture solenoid operated valves, pressure and flow switches and recently introduced a constant flow valve.

Change of Address

Texas Instruments Ltd. have moved to Manton Lane, Bedford (Bedford 67466).

Teflon Price Cut

Prices of Teflon fluorocarbon resins were recently reduced for the eleventh time since they were introducd commercially in 1944. The new reductions announced by Du Pont de Nemours International S.A., range from 35 cents to $2 per pound of resin. Price of the basic Teflon t.f.e. resin, which once sold for $18/lb, is now $3.25/lb. Teflon 100 f.e.p. fluorocarbon resin, a new melt processible material introduced commercially last year, was reduced by $2/lb. to $9.60/lb.

Mining Machinery Offer

Several gas engine driven generating sets of 550 to 780 kva capacity, a number of large diesel alternator sets, a 500 h.p. Nordberg hoist, several hundred items of mining plant, conveyors, and 42 miles of pipeline are being offered for sale by George Cohen (East Africa) Ltd. following their purchase of the entire plant, machinery and buildings of Uruwira Minerals Ltd., the Tanganyika lead, copper and silver mining concern. Enquiries are being invited by George Cohen Sons and Co. Ltd., 600 Wood Lane, London W.12.

Scopacron Prices Cut

Styrene Co-Polymers Ltd. have announced significant reductions in the prices of their Scopacron range of thermosetting acrylic resins.

French Products

The French company, Societe pour l'Application des Industries Metallurgiques et Chimiques (A.M.C.), 9 Avenue Franklin D. Roosevelt, Paris 8, are offering the following products for export: barium sulphate (natural), in cake or powder form; zinc oxide; and crushed mica. Literature, samples and prices are available to interested firms.

DIARY DATES

MONDAY 13 FEBRUARY

C.S.—Cambridge: Univ. Chemical Lab., 5 p.m. 'Some aspects of aromatic reactivity', by Dr. C. Eaborn.

C.S.—Durham: Univ. Science Labs., 5 p.m. 'Very fast chemical reactions', by Prof. G. Porter.

R.I.C.—Dartford: N.W. Kent Coll. of Tech., 7 p.m. 'Reaction mechanisms', by Prof. E. D. Hughes.

S.C.I.—Leeds: Houldsworth School of Applied Science, 6.30 p.m. Yorkshire Section, a.g.m.

TUESDAY 14 FEBRUARY

C.S. with S.C.I. & R.I.C.—Belfast: Univ. Chem. Dept., 7.45 p.m. 'Recent advances in i.r. spectroscopy', by Dr. I. J. Bellany.

C.S.—Dundee: Queen's Coll. Chem. Dept., 5 p.m. 'Transition—metal complexes derived from cycloheptatrine', by Prof. P. L. Pauson.

Plastics Inst.—Edinburgh: N. Brit. Hotel, 7.30 p.m. 'Chemical resistance of rubber & plastics', by B. J. Habgood.

R.I.C.—Norwood: Tech. Coll., 6.30 p.m. 'Work of a public analyst', by T. McLachlan.

S.C.I.—Belfast: Univ. Chem. Lecture Theatre, 7.45 p.m. 'Recent advances in i.r. spectroscopy', by Dr. L. J. Bellany.

S.C.I.—London: 14 Belgrave Sq., S.W.1, 6 p.m. 'Occurrence of fire side corrosion in modern steam generators', by W. O. Jarvis & Dr. D. B. Leason.

WEDNESDAY 15 FEBRUARY

C.S.—Billingham: Tech. Coll., 8 p.m. 'Some developments in analytical chemistry', by Prof. R. Belcher.

R.I.C. & S.C.I.—London: Univ. Coll., Gower St., W.C.1, 6 p.m. 'Some recent advances in inorganic chemistry', by Dr. J. S. Anderson.

Plastics Inst.—Newcastle upon Tyne: Eldon Grill, Grey St., 7 p.m. 'Impressions from America', by C. T. Graham.

S.A.C.—London: Burlington Hse., W.1, 7 p.m. 'Use of enzymes in analysis', by C. J. Threlfall.

S.C.I.—Cardiff: Univ. Coll., 7 p.m. 'An introduction to ion exchange', by Permutit Co.

S.C.I.—Billingham: Tech. Coll., 8 p.m. 'Some developments in analytical chemistry', by Prof. R. Belcher.

THURSDAY 16 FEBRUARY

C.S.—Glasgow: Univ. Chem. Dept., 4 p.m. 'Physical adsorption', by Prof. D. H. Everett.

C.S.—Hull: Univ. Chem. Dept., 5 p.m. 'Mechanism of some organometal substitutions', by Sir Christopher Ingold.

Plastics Inst.—London: R.I., 21 Albemarle St., W.1, 6.30 p.m. 'Swinburne address', by Prof. G. Gee.

C.S. with R.I.C. & S.C.I.—Edinburgh: N. Brit. Station Hotel, 7.30 p.m. 'Some aspects of chemistry of iso-quinoline alkaloids' by Dr. K. W. Bentley.

S.C.I.—Liverpool: Donnan Labs., 7.30 p.m. 'Palm oil industry', by W. D. Raymond.

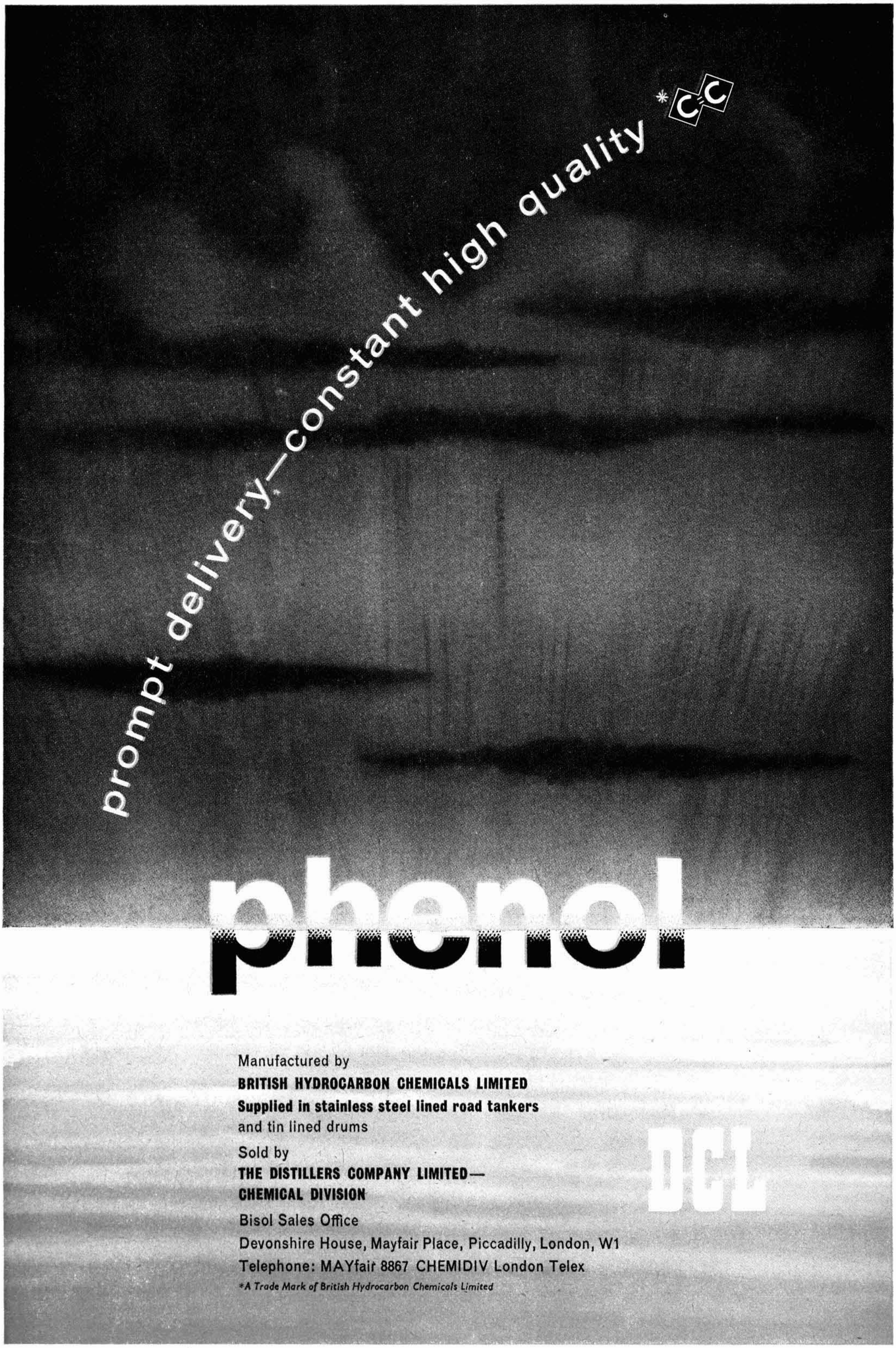
S.A.C.—Birmingham: General Hospital, Steelhouse Lane, 6.30 p.m. 'Use of vapour-phase chromatography', by Dr. C. S. Knight.

FRIDAY 17 FEBRUARY

C.S.—Newcastle upon Tyne: King's Coll. Chem. Dept., 5.30 p.m. 'Synthetic fused silica', by Dr. H. K. Jack.

SATURDAY 18 FEBRUARY

S.C.I.—London: 14 Belgrave Sq., S.W.1, 6.30 p.m. 'Patent protection for chemical inventions', by T. A. Blanco White.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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 22 March

Production of foamed elastomers. Dunlop Rubber Co. Ltd. **863 466**
Manufacture of graft copolymers. B.X. Plastics Ltd. **863 211**
Process for the production of boron trihalides. Borax Consolidated Ltd. **863 507**
Polymerisation process. Food Machinery & Chemical Corp. **863 573**
Process for the preparation of starch derivatives capable of swelling in cold water. Meijer's Fabrieken Voor Verpakte Artikelen N.V., O. J. **863 574**
3-Mercapto-phenthiazine derivatives and salts thereof. Sandoz Ltd. **863 546**
3-Mercapto-phenthiazine. Sandoz Ltd. **863 547**
Pigment dispersants. Union Carbide Corp. **863 412**
Morpholino and piperidino polysulphides selenides and/or tellurides. Goodrich Co., B. F. **863 577**
Process for the manufacture of high melting linear polyesters of aromatic dicarboxylic acids. Farbwerke Hoechst AG. **863 704**
Synthetic rubber adhesives. B.B. Chemical Co. Ltd. **863 308**
Preparation of graphitic oxide from graphite. Hoyt Metal Co. of Great Britain Ltd. (National Lead Co.). **863 578**
Luminescent materials. Philips Electrical Industries Ltd. **863 705, 863 615**
Method of recovering methyl borate from admixture with methanol. Callery Chemical Co. **863 315**
Process for polymerising lower olefins. Farbwerke Hoechst AG. **863 416**
Steroids and the manufacture thereof. Upjohn Co. **863 489**
Thiol-sulphoxides, their preparation and use as intermediates. Fisons Pest Control Ltd. **863 370**
Steroids and the manufacture thereof. Upjohn Co. **863 313**
Polymers of cyclic dienes and process of preparing them. Du Pont de Nemours & Co., E.I. **863 373**
Steroids and the manufacture thereof. Upjohn Co. **863 710**
Process for purifying crude benzene. Scholven-Chemie AG, and Koppers GmbH, H. **863 711**
Manufacture of aliphatic fluorine compounds. Farbwerke Hoechst AG. [Addition to 770 640.] **863 545**
Process for the preparation of previously unknown mercapto phenothiazine derivatives substituted in the 3-position. Sandoz Ltd. **863 548**
Stabilised Karl Fischer reagent. Pharmacia AB. **863 374**
Manufacture of piperazo-[c]-pyridazines. Ciba Ltd. **863 217**
Polyolefin purification. Union Carbide Corp. **863 218**
Polymerisation of ethylene. Snia-Viscosa Soc. Nazionale Industria Applicazioni Viscosa. **863 376**
Process for preparing polymers of bis(2:3-epoxy-cylclopentyl) ether. Union Carbide Corp. **863 714**
Alpha-mercaptoisobutyric acid. Soc. Italiana Prodotti Scherring. **863 509**
Compositions of vinyl polymers. General Anilin & Film Corp. **863 379**
Organic phosphorus compounds and process for their manufacture. Ciba Ltd. **863 380**
Manufacture of unsaturated ethers of aminotriazine formaldehyde condensation products and oxidative drying compositions containing such ethers. Ciba Ltd. **863 275**
Oxo synthesis and catalysts therefor. Ethyl Corp. **863 277**
Production of tetracyclines from 5a (11a)-dehydrotetracyclines. American Cyanamid Co. **863 418**
5a (11a)-Dehydrotetracyclines and the 4-epimers thereof. American Cyanamid Co. **863 419**
Preparation of tetracycline, 4-epitetracycline and 5a-epitetracycline. American Cyanamid Co. **863 420**
Concentration of potash ores. American Metal Climax Inc. **863 278**
Acylpipidines. Ciba Ltd. **863 715**
3-Mercapto-phenthiazine derivatives and their preparation. Sandoz Ltd. **863 549**
Process for concentration of potash ore. International Minerals & Chemical Corp. **863 324**
Process and apparatus for recovery of solid olefin polymer from solution. Philips Petroleum Co. **863 650**
Transparent thermoplastic composition. Distillers Co. Ltd. **863 279**
Phosphonic and thiophosphonic acid esters. Farberfabriken Bayer AG. **863 434**
Process for the manufacture of benzene 1:3-disulphonic acid. Farbwerke Hoechst AG. **863 511**
Process for producing azo-dyestuffs insoluble in water on textile materials of aromatic polyesters. Farbwerke Hoechst AG. **863 329**
Granular fertilisers. Imperial Chemical Industries Ltd. **863 387**
Highly complex compounds. Metallgesellschaft AG. **863 491**
Tetrahydropapaverine derivatives and their preparation. Allen & Hanburys Ltd. **863 717**
Stabilisation of monochlorbutenes. Distillers Co. Ltd. **863 718**
N_1 N - Dimethyl-2-phenyl - 2 - benzayloxymethyl - butyl amine. Lepetit S.p.A. **863 223**
Cross linked filled polymeric compounds. Cabot Inc., G. L. **863 681**
Substituted urea derivatives, process of preparing them and herbicidal compositions containing them. Geigy AG, J. R. **863 443**
Composite materials. Imperial Chemical Industries Ltd. **863 224**
Pharmaceutical compositions comprising 2-phenylbenzamide and derivatives thereof. Imperial Chemical Industries Ltd. **863 719**
Stabilisation of polymers. Imperial Chemical Industries Ltd. **863 225**
Converter for liquefied gases. British Oxygen Co. Ltd. **863 682**
Benzothiadiazine derivatives and their preparation. Abildgaard, K. [trading as Lovens Kemiske Fabrik Ved. A. Kongsted.] **863 474**
Production of conjugated diolefins. British Hydrocarbon Chemicals Ltd. **863 330**
Vinyl alcohol-crotonic acid copolymers. Air Reduction Co. Inc. **863 228**
Treatment of ores or like materials. Compagnie des Metaux d'Overpelt-Lommel et de Corphalie. **863 331**
Method for the separation of aromatic, especially high aromatic and carcinogenous hydrocarbons. Imperial Chemical Industries Ltd. **863 394**
Modified linear polyethylene. Distillers Co. Ltd. **863 395**
Epoxidation. Union Carbide Corp. **863 446**
Bleaching compositions. United States Borax & Chemical Corp. **863 288**
Light-polarising film materials and process of preparation. International Polaroid Corp. **863 531**
Purifying piperazines by distillation. Wyandotte Chemicals Corp. **863 498**
Metal composition having improved oxidation- and corrosion-resistance and magnetic characteristics, and method of preparing same. Soc. Metallurgique-d'Imphy. **863 730**
Organic compounds related to heparin. Uclaf. **863 235**
Piperazine derivatives and process of preparing same. Abbott Laboratories. **863 236**
Method of dispersing additives in solid polymers. Philips Petroleum Co. **863 732**
Oxygen-cured polymers, builders' materials containing the polymers, and process for making same. Mitsubishi Chemical Industries Ltd. **863 237**
Method of producing bis-(carboxyphenyl)-alkanes. American Cyanamid Co. **863 423**
Preparation of calcium carbide in a shaft furnace. Stamicarbon N.V. **863 191**
Process for the production of drinking water from salt water. Metalurski Institut. **863 348**
Stabilisation of hydrogen peroxide. Columbia-Southern Chemical Corp. **863 502**
Linear polyureas. Grace & Co., W. W. **863 297**
Process for the production of boron compounds. Olin Mathieson Chemical Corp. **863 503**
Halogenated cyclobutane derivatives. Dow Corning Corp. **863 721**
Ethylenically unsaturated hydrocarbon polymers and copolymers containing phenolic groups and a process for their production. Farbenfabriken Bayer AG. **863 504**
Process for purifying aqueous effluents. Sandoz Ltd. **863 399**
Orientated polyacrylonitrile film and process of manufacture. Du Pont de Nemours & Co., E. I. [Addition to 760 076.] **863 425**
Cyclopentanophenanthrenes. Ormonoterapia Richter S.p.A. **863 400**
Hydroxy - alkyl-4-piperazinyl-alkyl - thiaxanthenes. Pfizer & Co. Inc., C. **863 699**
Aryl ether compounds and means of obtaining same. University of Kansas Research Foundation. **863 197**
Steroids. Ormonoterapia Richter S.p.A. **863 522**
Steroids and the manufacture thereof. Upjohn Co. **863 661, 863 662**
Fluorine-containing organosilicon compounds. Midland Silicones Ltd. **863 722**
Polymeric amidoximes. Gevaert-Photo-Producten N.V. [Addition to 786 960.] **863 533**
Propylene polymer oils. Esso Research & Engineering Co. **863 405**
Amino,2-acylphenol ethers. Thomae GmbH., K. **863 702**
Processes for the protection of fibrous cellulosic material from attack by microorganisms. Ciba Ltd. **863 514**
Production of thiocarbonyl fluoride. Du Pont de Nemours & Co., E. I. **863 406**
Process for the production of aminoethyl ethers and the resulting products. Geigy AG, J. R. **863 242**
Acylphenothiazines. Searle & Co., G. D. **863 243**
Phosphoric acid catalyst and a process for the conversion of organic compounds therewith. Universal Oil Prducts Co. **863 539**
Sulphonyl-ureas and preparations containing them. Farbwerke Hoechst AG. **863 451**
Formaldehyde. Borden Co. **863 687**
Method of producing chlorofluoro-derivatives of aliphatic hydrocarbons. Wasag-Chemie AG. **863 408**
Production of boric acid. United States Borax & Chemical Corp. **863 541**
Salts of β-aminoethyl dithiocarbamic acid. Chemische Werke Albert. **863 252**
Catalytic isomerisation. Engelhard Industries Inc. **863 688**
Hydrogenated polymers. Phillips Petroleum Co. **863 256**
Production of fluorocarbons and sodium. Du Pont de Nemours & Co., E. I. **863 602**
Oxidative dehydrogenation of organic compounds. Phillips Petroleum Co. **863 453**
Preparation of organic monoborate salts. United States Borax & Chemical Corp. **863 689**
Compositions comprising polymeric a methylstyrene. Soc. des Usines Chimiques Rhone-Poulenc. **863 690**
3-Mercapto-phenthiazines. Sandoz Ltd. [Divided out of and Addition to 863 547.] **863 550**
3-Mercapto-phenthiazine derivatives and salts thereof. Sandoz Ltd. [Divided out of 863 546.] **863 551, 863 552**
Vinyl alcohol-crotonic acid copolmers. Air Reduction Co. Inc. [Divided out of 863 228.] **863 229**
Curing of sulphur vulcanisable rubbers. B.B. Chemical Co. Ltd. [Divided out of 863 308.] **863 309**

U.K. Drug Exports a Record

Exports of British drugs and medicines reached a record figure of over £44 million in 1960, an increase of £3.4 million over 1959. Figures published by the Board of Trade show that Australia was the best market for drugs (£4.0 m.), followed by Nigeria (£2.8 m.). Exports to the Common Market countries, excluding Luxemberg, were £3.4 million as compared with £2.7 million in 1959.

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PATENTS & TRADE MARKS

THE PROPRIETORS of British Patent No. 718,413 for "IMPROVEMENTS IN AND RELATING TO THE CONTINUOUS DISTILLATION OF TARS", desire to enter into negotiations with a firm or firms for the sale of the patent or for the grant of licences thereunder. Further particulars may be obtained from Marks & Clerk, 57 & 58 Lincoln's Inn Fields, London, W.C.2.

PATENTS & TRADE MARKS: continued

THE PROPRIETORS of British Patent No. 787,688 for "PROCESS AND APPARATUS FOR THE EVAPORATION OF HETEROGENEOUS LIQUID MIXTURES", desire to enter into negotiations with a firm or firms for the sale of the patent or for the grant of licences thereunder. Further particulars may be obtained from Marks & Clerk, 57 & 58 Lincoln's Inn Fields, London, W.C.2.

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SITUATIONS VACANT: continued

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