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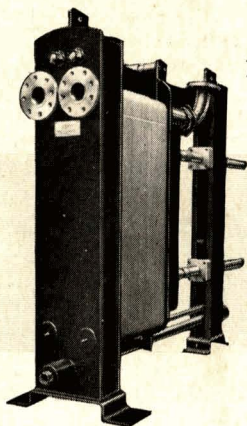
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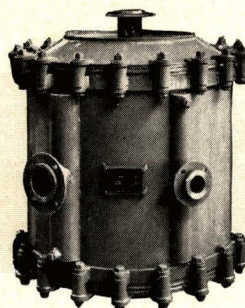
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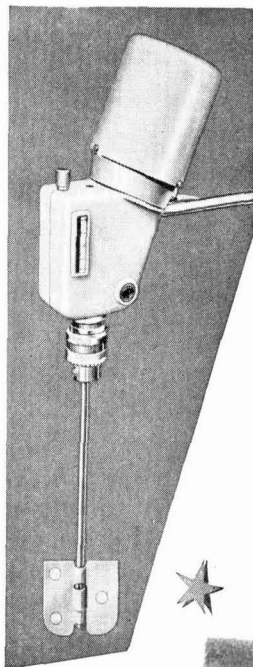
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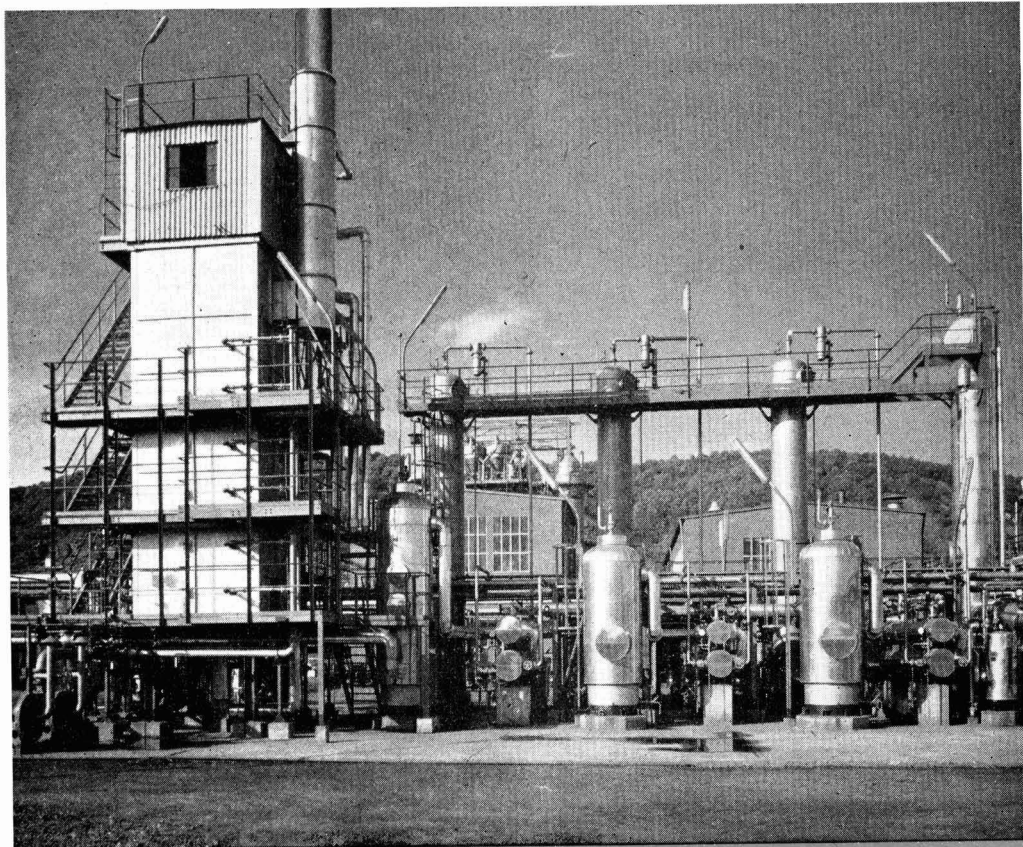
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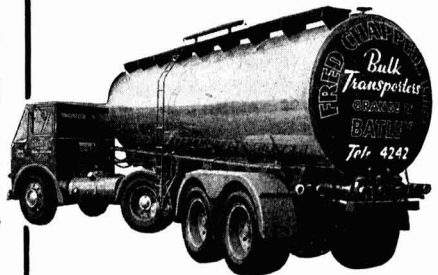
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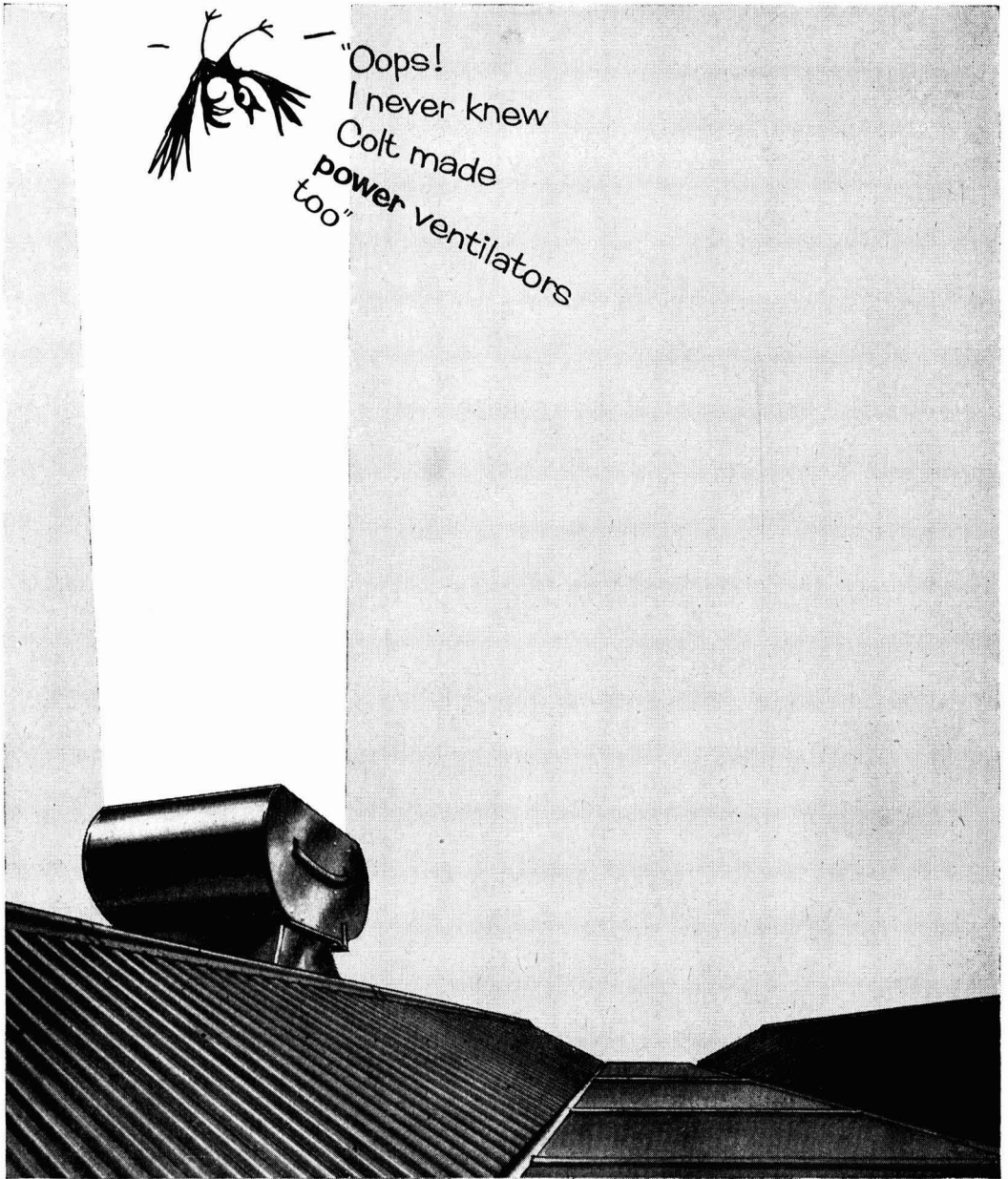
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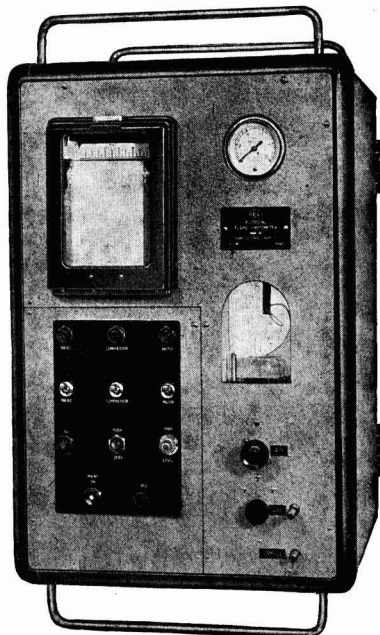
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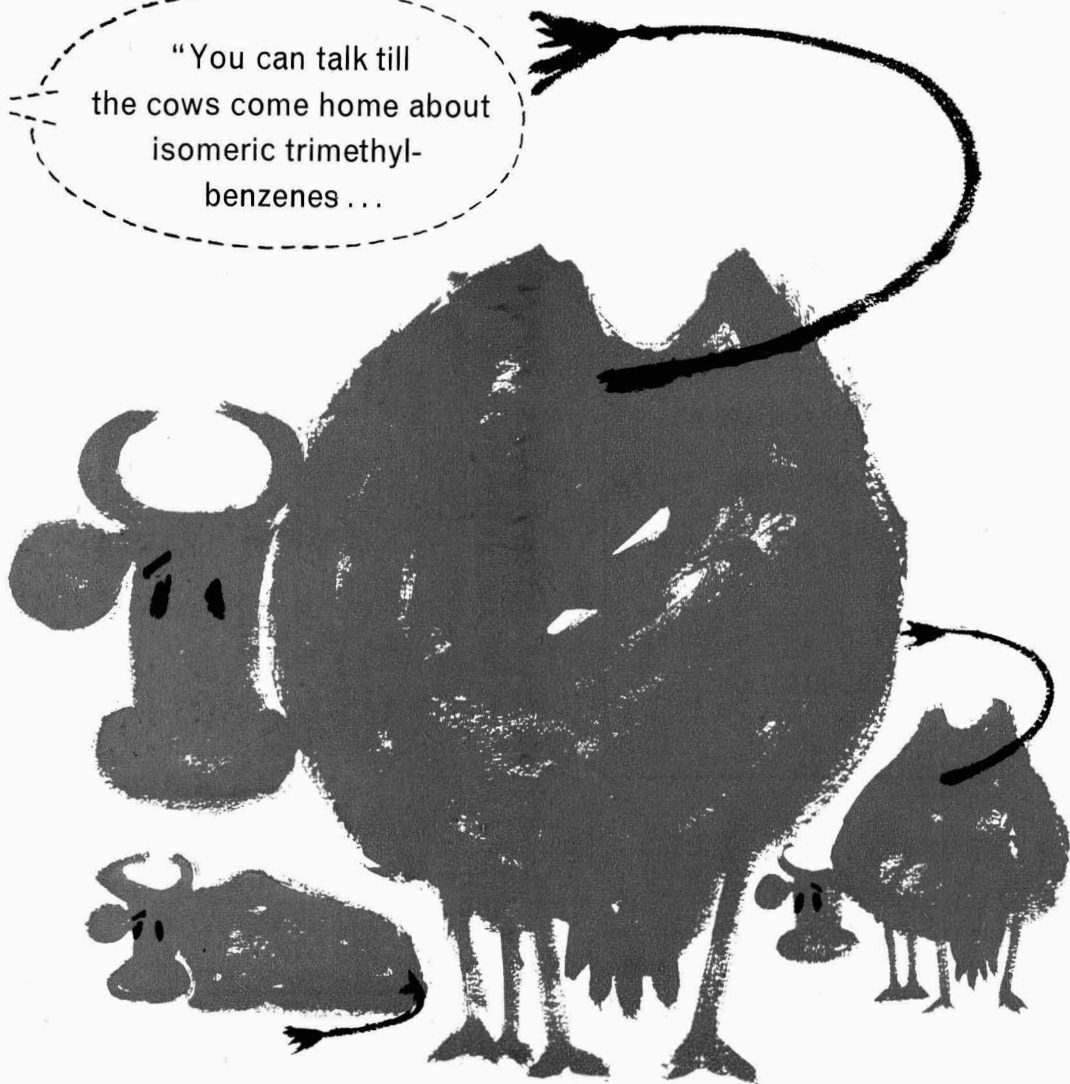
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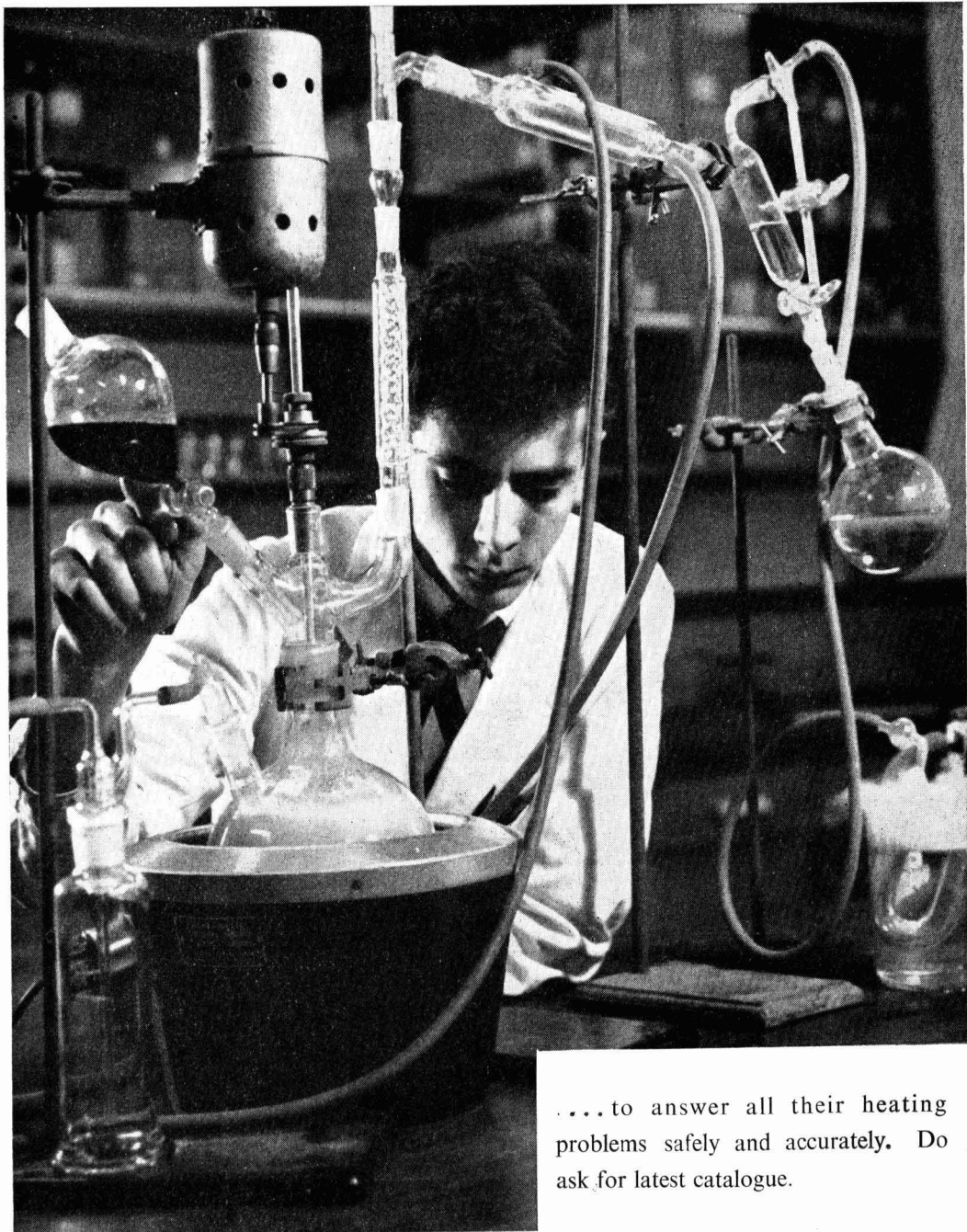
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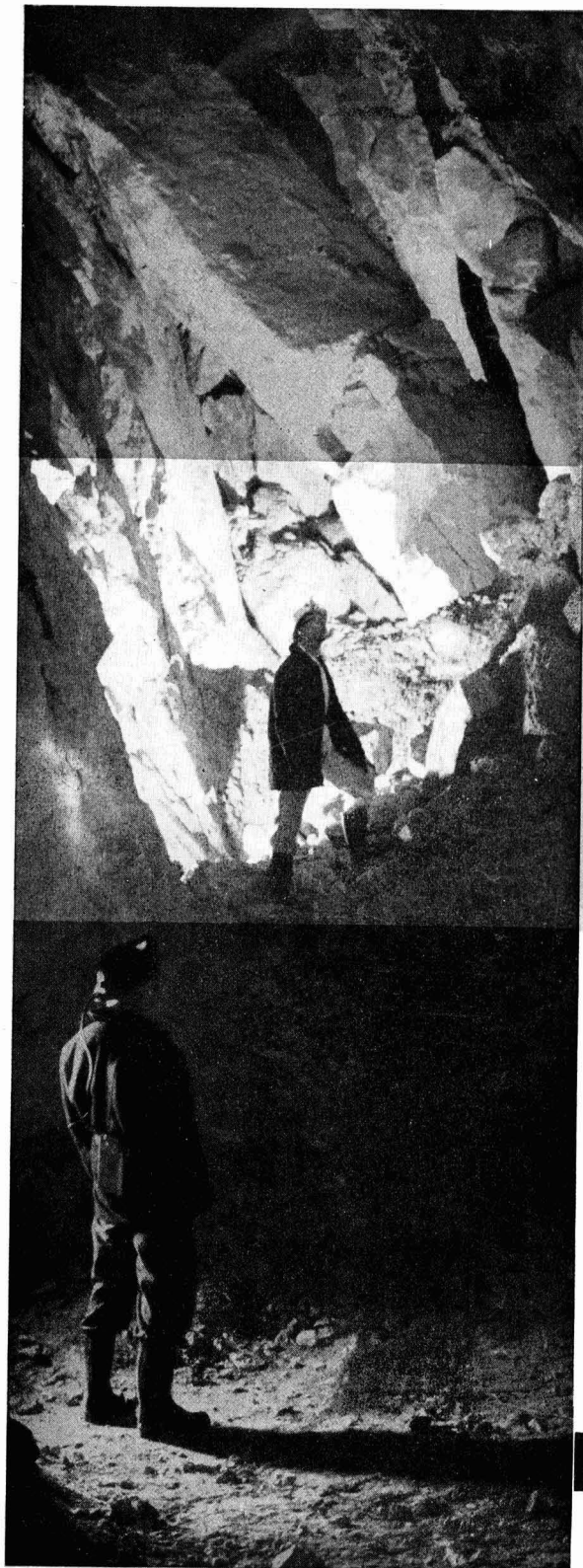
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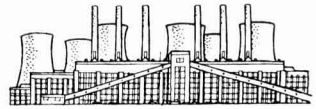
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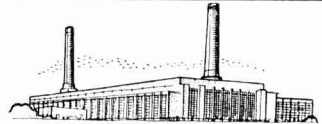
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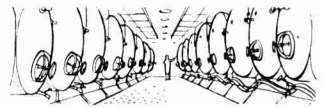
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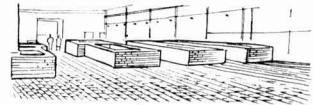
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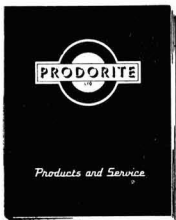
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EAGLE WORKS, WEDNESBURY, STAFFS., or Telephone Wednesbury 1821 (10 lines).

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CHEMICAL AGE

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ACETAL RESIN

ALTHOUGH more recently introduced than polycarbonates, a bigger future is predicted for polyformaldehyde, the latest of the engineering plastics. One big reason is price; from 7 March, Du Pont's acetal resin, Delrin, will be substantially cut by 15 cents to 65 cents/lb., compared with 95 cents/lb. when commercially introduced 13 months ago.

It is confidently expected that the price will eventually settle somewhere between 40 and 50 cents, thus opening up mass markets. Polycarbonates are currently quoted at \$1/lb., following recent price cuts by Farbenfabriken Bayer, but the price will not it is felt fall much below 70 cents/lb. over the next few years. Polycarbonates were first marketed by Bayer early in 1959.

The newcomer, acetal resin, is however attracting more attention. A number of companies, apart from the only commercial producers—Du Pont—are known to be keenly interested in the U.S., Japan, the U.K. and on the Continent. American Celanese are reported to have plans for commercial production at Bishop, Texas, and are said to have a pilot plant for market evaluation. Du Pont hold composition of matter patents in the U.S. and process patents in Europe. Celanese have been issued patents covering polyformaldehyde in France and Italy. They are expected to make an announcement in the near future.

Du Pont are producing Delrin at Parkersburg, West Virginia, with a plant capacity estimated at 30 million lb./year; by 1965 production will reach an estimated 100 million lb. From their initial commercial price of 95 cents, Du Pont have made three reductions, firstly to 88 cents, then to 80 cents in June of last year. The latest cut is by far the most significant and was made to help broaden the market, opening new fields of application. Sales in the U.K. are mounting and are well in the tonnage range. This year should see at least 200 applications at the commercial stage—the figure for the U.S. is 500.

For polycarbonates, General Electric have an output of 5 million lb.; to this must be added an undisclosed quantity from Mobay Products, U.S., affiliates of Bayer. Union Carbide Plastics are also at the development stage Columbia-Southern are another U.S. company interested in the field. Even so, U.S. market forecasts predict only 12 million lb. of polycarbonates by 1962, 30-50 million lb. by 1965 and 70-100 million lb. by 1970. U.K. sales are rising with new uses being found; a share of markets held by metals and methyl methacrylates is expected.

The big attraction of polyformaldehyde to chemical producers is that it competes not with plastics, but with die-cast metals, thus making it a true replacement for metals. Du Pont state that more than 80% of the material's potential applications involve replacing steel, brass, aluminium and zinc. Although heavy in comparison to most other plastics, Delrin is lighter than any of the die-casting alloys.

Representing a \$50 million Du Pont investment in research and development, it is a highly crystalline, high-melting polymer with a unique combination of mechanical properties. Extremely rigid without being brittle, it has a low coefficient of friction and high dimensional stability. These qualities are combined with good resilience and toughness. Doubtless the most unusual feature of this engineering plastics is that it retains those properties under adverse conditions of temperature and humidity, during

(Continued on page 284)

“Sensitive, Vigorous, Unpompous but Complacent—That’s I.C.I.” Says The Observer

“A LOOF, sensitive, paternal, provincial, vigorous, unpompous and complacent giant.” This compound of paradoxes sums up “the sensitive giant”—I.C.I., Britain’s largest manufacturing firm—in the last of *The Observer* series of articles on the new leviathans of U.K. industry. (See also ‘Distillates’.)

The provinces and a strong monopoly position are seen as the source of some of the company’s weaknesses. Insularity, complacency, an old-fashioned approach to organisation and filing, resentment of metropolitan, and particularly non-scientific, intruders, a conservative respect for hierarchies and an almost medieval attitude to women. “There is its defensive and self-laudatory attitude to publicity: I.C.I. are apt to regard anything less than unqualified praise (for instance, this article) as a stab in the back.”

While the article is something less than unqualified praise, it is probably the more valuable because of that fact. What emerges is an image of a giant, sensitive to public opinion, taking its responsibilities seriously, looking after its people with care, giving scholarships to universities and very anxious to do the right thing by the country.

The author, Mr. Anthony-Sampson, sees a post-war change in the personality of I.C.I. The old heavy alkalis and explosives industries have remained relatively static. New industries in plastics,

fibres, paints and drugs have taken I.C.I. much closer to the customer and made them more competitive. The change of chairman—from the scientist who became Lord Fleck to a financial dynamo, Paul Chambers—is seen as being not a drastic alteration in the character of I.C.I., but is thought to represent some shift of emphasis—away from the provinces and scientific specialists towards the City and finance. Courses in finance and taxation have been set up together with an investment committee, while more “outside” directors have arrived.

One of the new chairman’s tasks is seen to be keeping the organisation supple, devising new methods of communication, abolishing some meetings, creating others (the fortnightly board meeting for instance has been cut to a monthly occasion) and making most use of the company’s backbone—its 200 managers. Recent months have shown a trend towards decentralisation.

The author believes that other of the ‘new leviathans’, A.E.I. and Distillers, who have the same ‘group system’ of divisions under a loose central control, face the same problems. These giants are all “liable to stiffening of the joints complacency, inarticulateness, inbreeding or insulation”.

How I.C.I. develop in the future is still obscure, but Sampson says “gradually they are becoming less reticent, less withdrawn, more concerned with the external world”.

Outstanding Good Value of I.C.I. Shares

“WHILE it would be over sanguine to expect I.C.I.’s rate of earnings growth to continue at the pace achieved in 1959 and 1960 the prospect facing the group is one of continued expansion.” This observation sets the tone of a 34-page booklet issued by Spencer Thornton and Co., share brokers, of 8 Throgmorton Avenue, London E.C.2, which not only provides investors with a shrewd analysis of I.C.I.’s financial and commercial resources and prospects, but also an outline of the company’s activities.

Dealing with I.C.I.’s prospects for 1961, the booklet quotes the recent CHEMICAL AGE annual review and preview (14 January issue) on the U.K. chemical industry’s expectation of a 9% rise in home and export sales this year, and goes on to say that, while competition remains keen, the short-term outlook for efficient producers remains favourable. Looking further ahead, it is pointed out that there is unquestionably a steadily growing marking for I.C.I.’s numerous products, particularly the newer items such as Terylene and some of the plastics chemicals. “The U.K. chemical industry as a whole is expected to grow at a rate between 6% and 7% annually

and clearly I.C.I. should be capable of bettering the average performance.”

The survey uses the “gross investment method” to obtain some idea of what I.C.I. will be capable of earning in a good future year. It is estimated that the group will be spending about £220 million on capital account between 31 December 1960 and the end of 1964 and figures are tabulated for capital expenditure and working capital requirements over the 1953-1965 period. A further table gives calculated figures for I.C.I.’s cash generation in future years, based on the assumption of a 5% compound growth rate in net profits. This gives total capital requirements of £54 m. in 1961, £61 m. in 1962, £71 m. in 1963 and the same in 1964, leading to a cumulative surplus for those years of £37.5 m., £53 m., £60.5 m. and £63 m. respectively.

The survey concludes that, at the present price of around 70s, I.C.I. ordinary shares are selling at only 18 times estimated 1960 net earnings of 3s 10d/share and for a stock that appears to have a growth rate in the region of 8-10% this multiple is clearly too low. Finally, confidence is expressed in the “outstanding good value” of I.C.I. shares.

New Shell Lab. Will Study Effects of Chemicals on Man, etc.

A NEW research laboratory, the Tunstall Laboratory, has been opened by ‘Shell’ Research Ltd., near Sittingbourne, Kent. It will be concerned with the possible effects on man and other vertebrates of contact with products being developed by the Royal Dutch/Shell group of companies.

The laboratory has four divisions—pathology and pharmacology, physiology, chemistry, and biochemistry. Director is Dr. C. G. Hunter, D.S.C., M.D.(N.Z.), M.R.C.P. (Lond.), D.P.H., D.I.H., who is a former professor of physiological hygiene at the School of Hygiene and an associate professor, Banting and Best Department of Medical Research, Toronto University.

Glaxo Film Emphasises Research

RESEARCH is the emphasis of a new film, ‘Glaxo in Britain’, which tells the story of the development of Glaxo’s from manufacturers of dried milk to the complex, widespread organisation of today.

This film explains the development of the deep fermentation method, used initially for the manufacture of penicillin and eventually adapted for other processes, and also outlines the numerous chemical steps, worked out as a result of years of research, which led to the manufacture of cortisone and allied compounds from hecogenin provided by the sisal industry.

The film, which is 16 mm. in colour, runs for 39 mins., and is available on loan from Glaxo Laboratories Ltd., Greenford, Middlesex.

Bush Chairman Writes to Customers

WRITING to customers on the proposed merger with the Albright and Wilson Group, Mr. Eric Bush, chairman of W. J. Bush and Co. Ltd. states that his company had “willingly negotiated and completed” the agreement. If approved W. J. Bush would continue to operate under their own name and management, while sharing in all the advantages to be derived from membership of a larger group (see also p. 299).

Mr. Bush ends his letter by looking forward to continued pleasant business relations with customers and would appreciate orders and enquiries being addressed to W. J. Bush “exactly as they have been in the past”.

Acetal Resin

(Continued from previous page)

an extended time under stress and during exposure to most solvents.

Du Pont are now setting up facilities in the Netherlands for final processing and colouring of acetal resin imported from Parkersburg (CHEMICAL AGE, 8 October 1960, p. 588).

Project News

Progress at I.C.I.'s £15 Million Sevenside Plants

CONSTRUCTION work on the £10 million ammonia, ammonia products and fertiliser plant that **I.C.I. Billingham Division** will operate on Sevenside will start this year. This is stated by Dr. H. S. Hirst, leader of the team engaged in the general planning of the Sevenside project in an interview in the February issue of the *I.C.I. Magazine*.

This project is due for completion in 1963 and will produce 100,000 tons/year of ammonia, plus urea and fertilisers. A £5 million plant for the **Heavy Organic Chemicals Division** is due on stream by the end of this year. It will produce 35,000 tons/year of ethylene oxide, ethylene, glycol and derivatives, with EO plant design by Scientific Design.

Within 10 or 15 years it is expected that several I.C.I. Divisions will have plants on this 2,000 acre site, to the tune of an estimated £100 million. There will be 1,000 workers there by 1963, perhaps five times as many in 15 years. It is expected that behind each payroll worker will be £20,000 to £30,000 of capital spent.

Net steam requirements of the site are expected to be relatively small and steam raising will be provided by small oil-fired boilers, with power being bought at least in the early stages. There will, therefore, be no large power station for the time being.

U.S.S.R. Negotiate on Chemical Plants from U.K.

Now under negotiation in the U.K. are contracts for the supply to the U.S.S.R. of a number of complete plants for chemicals and plastics materials. The final contracts are likely to range between £10 million and £50 million each. Further details are not at present available, but Mr. V. A. Klentsov, president of **Technashimport**, the Soviet buying agency is in the U.K.

At the Soviet Trade Fair to be held at Earls Court, London, in July, a wide range of chemicals, plastics materials and synthetic fibres will be shown. It is also hoped to interest the British chemical industry in the purchase of Soviet process know-how.

Tonnox to be Piped to Rotherham Steelworks

ALREADY expanding their Brinsworth works, the **British Oxygen Co. Ltd.** now plan to add a 100-tons-a-day tonnage plant at the site. The oxygen will be piped to the Rotherham works of Steel Peech and Tozer Ltd., about half a mile away. This supply will meet the needs of new electric arc furnaces to be installed by the steel company.

The new large tonnage oxygen plant will provide cheaper oxygen-gas in the

heart of the Sheffield-Rotherham industrial area. British Oxygen say that it will bring nearer the time when pipeline supplies can be made available to other major users in this district.

Simon-Carves Get W.M.G.B. Contract for Otto Plant

SIMON-CARVES LTD. have been awarded a contract by the **West Midlands Gas Board** for both the supply and erection of an Otto continuous reforming plant to produce 5 m. cu. ft./day of town gas from commercial butane. The plant is to be erected at the Nechells Works, Birmingham.

Synthetic Rubber Dryers Contract for L. A. Mitchell

AS LICENSORS for C. G. Sargent's Sons Corporation, U.S., **L. A. Mitchell Ltd.**, 37 Peter Street, Manchester 2, have secured a contract for two large continuous dryers for synthetic rubber for **Chemicals and Synthetics, Bareilly, India**. The contract was placed through the **Lummus Co.** At the same time, Mitchell's will be supplying a large proportion of the agitation equipment used in the production of synthetic rubber.

These contracts follow similar orders for the International Synthetic Rubber Co. Ltd., Hythe, Shell and Shell affiliates on the Continent and Petroleos Mexicanos.

Esso Award Butyl Contract to Foster Wheeler

CONTRACT to construct the £4.3 million butyl rubber plant for **Esso Petroleum Co. Ltd.** at Fawley has been awarded to **Foster Wheeler Ltd.** Several major contracting companies had sub-

mitted tenders. It was predicted by 'Alembic' in our 4 February issue (p. 208) that the successful bidder would be announced shortly.

The new plant, which will produce 30,000 tons/year of butyl rubber, is expected to be completed by the end of 1962. It was originally estimated (*CHEMICAL AGE*, 20 August 1960, p. 277) that the plant would take between two or three years to build. Since the first announcement of the Esso project, **Polymer Corporation of Sarnia, Ontario**, have also declared their intention to build a butyl plant in the U.K.

Bechtel to Build Sarnia Benzene Plant

MAIN contract for construction of a 30 million gall./year benzene plant at **Imperial Oil's Sarnia, Ont.**, refinery has been awarded to **Canadian Bechtel Ltd.**, Toronto. Work will begin this spring and is due for completion in the autumn of this year. Estimated to cost \$5 million, the plant will be the largest in Canada and will bring Imperial's petrochemical investment at Sarnia to more than \$45 million.

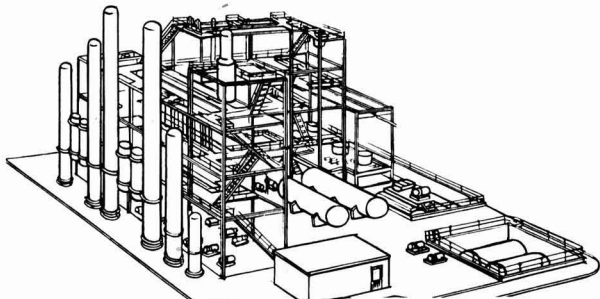
B.O.C. Open New Pakistani Oxygen, Acetylene Plant

NEW plant for **Pakistan Oxygen** designed to produce 3 million cu. ft. of oxygen and 500,000 cu. ft. of acetylene a month, was recently opened at Lahore by Mr. J. S. Hutchison, chairman of the **British Oxygen Co. Ltd.** Pakistan Oxygen also plan two more plants at Dacca and Rawalpindi.

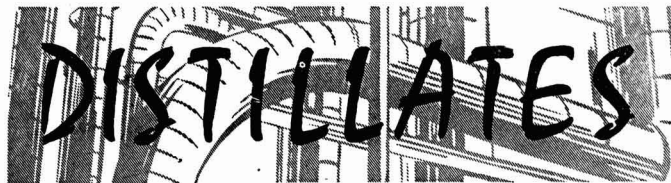
Indian I.C.I. to Develop 500-acre Site

A 500-ACRE site 50 miles outside Bombay is to be developed on a composite site basis by **I.C.I. (India)**. Already an alclians dye plant has been sanctioned there, but first construction work will deal with houses and office accommodation. **Alkali Chemical Corporation**, an I.C.I. (India) company, are to erect a second polythene unit at Rishra.

Model of Benzole Refinery that A.P.V. Will Build for Bitmac



Perspective view of distillation section of the new benzole refinery of **Bitmac Ltd.**, to be constructed by the **Chemical Engineering Division** of the **A.P.V. Company Ltd.** (see 'Project News', 4 February, p. 207)



★ A FEW years ago, U.S. chemical exports to Europe were hampered by dollar shortages. Now imports have reached astronomical levels, the Common Market taking in 1960 about \$365 million worth of U.S. chemicals, their exports to the U.S. amounting to only about \$145 million. Anglo-U.S. trade in chemicals has followed a similar pattern (see this journal 4 February, p. 205).

Apart from a howl of protest from U.S. producers at even a small increase in imports, there is a sales resistance in America to imported chemicals that does not exist in Europe, where imports from the U.S. are concerned. One U.S. importer attributes this to doubts about the service given by import houses. Mr. G. Ruebcke, president of Hostachem, distributors for Farbwerke Hoechst, recently warned chemical purchasing officers that it would be shortsighted for importers interested in long-term business in the U.S. market to make an enemy of American producers by under-selling, by unreasonable or ruthless price cuts.

Ruebcke sees the best opportunities for importers in the U.S. in selling advanced intermediates or finished goods, not bulk raw materials. For the statistically minded, U.S. chemical exports in 1960 were worth about \$1,700 million, against an import bill of only \$350 million. U.S. investment in West Europe's chemical industry will total about \$115 million this year, with a predicted 300% increase in three years.

★ THE Fisons saga is not over yet. Since my note last week about rumoured bids from Shell, I.C.I. and Distillers, the Stock Exchange has reacted to talk of further bids. Fisons again jumped 4s 6d on rumours of an I.C.I. bid and, more significantly, I.C.I. were marked down. Dow Chemical were also said to be possible bidders, but this was denied by the American company. Sir Clavering Fison also—and for the second time in two weeks—denied knowledge of any reason for the activity, following which Fisons' shares fell back.

The tables have turned on Fisons with a vengeance.

★ FATHER of the magnesium industry, Major C. J. P. Ball, D.S.O., M.C., has another honour to his credit. His outstanding services to the non-ferrous metals industry have been recognised by the Institute of Metals with the 1961 award of their platinum medal. Major Ball pioneered in the U.K. the first real usage of light magnesium alloys when with F. A. Hughes and Co., manufacturing chemists, in the 1920's.

Major Ball, believing that Britain could not afford to depend on imports of mag-

nesium, formed Magnesium Elektron Ltd. and saw the first unit go into production at the end of 1936. A second plant was added within two years and the Clifton Junction plant was doubled in 1940. By 1942, Magnesium Elektron opened on behalf of the Government another plant with a bigger capacity than the enlarged Clifton Junction works. During the war, with two of his staff, Major Ball went to the U.S. to supervise the building of the world's largest magnesium plant near Boulder Dam.

Despite post-war uncertainties regarding magnesium's future, Major Ball's faith in the material never faltered and his company bought much of the Government stockpile. He sponsored research into zirconium-magnesium alloys—now widely used throughout the world. M.E.L. now hold a unique international reputation in the magnesium industry, licensing many overseas companies for the processes involved.

★ ASKED to compose a scientific 'charm of powerful trouble,' most of those taking part in a competition set by 'Phulax' in the *M. and B. Laboratory Bulletin* were too full of the milk of human kindness. At any rate 'Phulax' did not award a first prize, but presented £2 2s to the following imaginative 'Quantum Song' by Robert Ward of Epsom:

Come, as we in orbit dance
Each invoking resonance,
Bombard the target with these articles:
Thirty fundamental particles;
A gamma sandwich; 'h' and 'c';
Heisenberg's uncertainty;
Personnel's contamination
Made foul by ion association;
Rake's half-life in fast decay;
Random-scattered β -rays;
And burning bright in our design,
A once forbidden spectrum line.

★ WITH the world-wide massive research aimed at finding a cure for cancer and the many top scientists engaged in the task, it seems likely that the coming few years will yield the long-sought breakthrough. Meanwhile the medical research authorities, who are pressing on with their vital work still receive a stream of alleged cures for the disease.

Most of these are put forward with all sincerity, but it would be wrong for scientists to divert their energies from carefully planned research programmes unless a so-called cure was backed by sound evidence by the claimant.

Such a cure is claimed by a Mr. A. J. Cullinane of Wareham who in his efforts to get an official investigation has the backing of Captain R. Pilkington, M.P.

for Poole. I learn that for six years Mr. Cullinane has without success tried to have his claim proved or disproved by scientists. Basis of the 'cure' is hydrogen peroxide, mixed with salt. Laporte Industries, one of the world's largest hydrogen peroxide producers, would doubtless be interested in such a development; but even if the claim were substantiated this could hardly mean a substantial commercial outlet.

★ WHETHER the much heralded article on 'I.C.I.—the sensitive giant' in *The Observer* last Sunday is regarded on Millbank as the 'stab in the back' that the author seems to expect, remains to be seen. But business friends unconnected with chemicals whom I have sounded agree with me that the image projected is not of a bungling bureaucracy but of a vast company keenly alive to its responsibilities, aware of its problems and trying to overcome them with vigour.

The unkindest cut, if it can be called that, was a hint that scientists might not have such a free rein in the future—I.C.I. employ 6,000 research workers and spend £14 million a year on research and development, more than all the universities put together—and that the 'organisation men' may not be winning over the eccentric researchers. I.C.I. owe their present strength and future growth to research; the men of finance in the company are hardly likely to forget this. In fact I expect the research and development bill to represent a bigger proportion of turnover in coming years.

★ DEVELOPMENT of industry in less advanced countries is most commendable, but in the case of the Peruvian anchovetas fishermen an increase over 10 years in their catch from 50,000 tons a year to 2 million tons has caused alarm in Government and F.A.O. circles, reports U.N.E.S.C.O. This catch has mostly been converted to fishmeal and exported.

But while man has been growing fat on this harvest of the sea not much has been left for the seabirds who have lived off these small fish for centuries. The result is a drastic cut in guano and a severe loss in terms of organic fertiliser to Peru's agricultural economy. Fishing has now been restricted and the guano-producing birds are coming back into their own. Whether guano deposits will ever again aspire to the heights that Alexander von Humboldt found 150 years ago—some deposits were 100 ft. thick—remains to be seen.

Perhaps this is why the Government has approved the plans of the Corporation de Reconstrucción y Fomento to build a 62,000 tonnes/year ammonium nitrate plant in Peru. The Ministry of Development and Public Works is to call for public bids for financing and constructing the plant.

Alembic

Chemical Industry in Europe

RAPID EXPANSION OF ECONOMY IN 1959 REVEALED BY O.E.E.C. REPORT

CHEMICAL production in all member countries of the Organisation for European Economic Co-operation except the Netherlands has risen faster than industrial production in general, according to the report of the Chemical Products Committee of the O.E.E.C.*

European economy passed through a period of very rapid expansion in 1959. Industrial production of member countries increased by 7% compared with 2% in 1958, this upward trend being particularly pronounced in the chemical industry where production increased by 13%. It has been estimated from figures relating to 11 member countries for 1958, that the chemical industry's share of the product of manufacturing industries of the O.E.E.C. countries combined is 10% at current prices.

The expansion of economy was marked by two very appreciable factors—comparative price stability and a very satisfactory external trade balance. European industrial output continued to rise during the first half of 1960, although at a lesser rate than the latter half of 1959. Consumer demand has generally continued to rise but most European countries have experienced a slower increase in export demand.

Chemical Turnover

The chemical industry's turnover for 1959 amounted to \$16,900 million (\$15,200 million), an increase of 11.5%. This is the highest percentage increase since 1954 (15%). The corresponding figures for the U.S. are \$25,000 million (\$23,000 million) and 11%.

Four member countries account for 85% of Europe's total output of chemicals: France with 17%, Germany 27%, Italy 14% and U.K. with 27%.

An attempt has been made to draw up an output survey for 1958. The survey is not yet ready for publication but some general conclusions may be drawn at this preliminary stage, although they should be treated with reserve.

One of the factors influencing the increased volume of chemical production is that it finds outlet in a wide range of industrial and private uses, and is not limited to one or two special sectors as are some other industries. There are four big groups of customers: direct consumption (24%), which includes governmental and private consumption and, therefore, reflects the consumers tendency to expand consumption of pharmaceuticals, toilet

and cleansing preparations, cosmetics and paints and varnishes; chemical industry (16%) in which petrochemicals are figuring increasingly; agriculture (11%) for which the consumption of chemicals increased five to six times faster than the agricultural production index over this period; and finally exports.

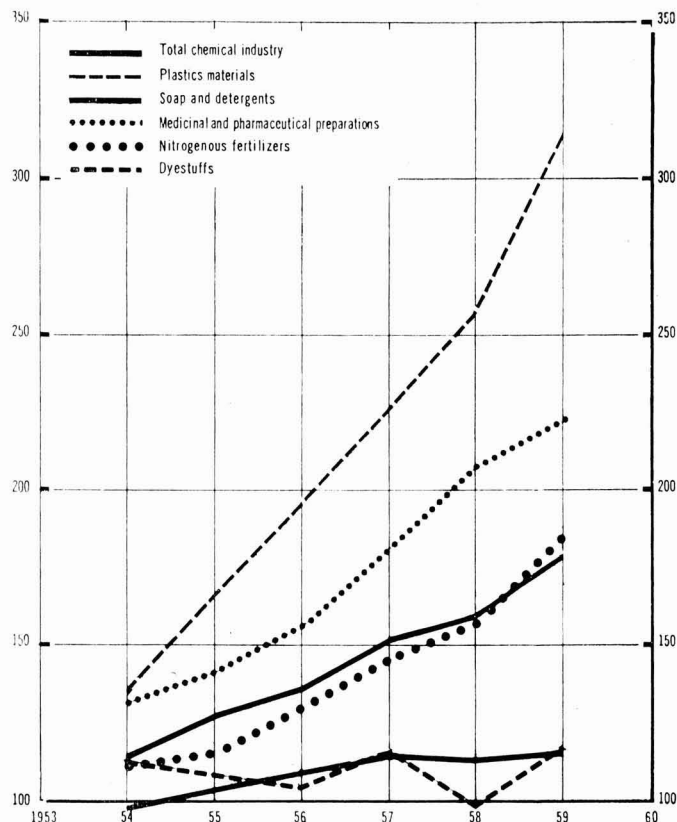
There are many reasons why the consumption of chemicals increases. Sometimes the underlying cause is the expansion of traditional demand, or the replacement of traditional materials, or the reason may be the need for an entirely new product. An example of the latter is a plastics material which may be put on the market to fill the need for a new construction or consumption

material, but it may also compete with the traditional materials such as glass, steel or timber and even in some measure replace them.

These reasons for chemical production increase obviously underlie changes in export demand also. The percentage of exports to total production output has risen from 10.5% in 1953 to 11.5% in 1958.

Total exports of chemicals by O.E.E.C. countries increased in 1959 to \$3,750 million an increase of 15% on 1958. The principal markets of all countries have expanded since 1953 and fairly often the exporting countries' main customers have not changed. Nevertheless many countries have opened up new markets over

Development of the Chemical Industry
1953=100



* The Chemical Industry in Europe, 1959-1960, January 1961. H.M.S.O., 17s. 6d.

the period. Furthermore, it is apparent that in most cases no market takes more than 10-15% of the total exports in a given group, although there are exceptions where countries have overseas connections.

The volume of trade is noteworthy in only five groups of the chemical industry. Miscellaneous chemical materials and products were involved in the greatest amount of trade with exports 20% and imports 23% up on 1958 of which about half were made up of plastics materials. The rise of exports to the U.S. was considerable (36%). The expansion of trade in the organic chemicals group was also spectacular, exports up by 20% and imports by 18%, intra-European trade being the most lively. Next in amount of trade came inorganic chemicals, then fertilisers and pharmaceutical and medicinal products.

A slight upward movement in the value added to the chemical industry in Europe has been discernible in recent years. The amount varies from country to country depending on the structure of the chemical industry and the method of calculation used but, expressed as a percentage of output, it is generally between 40 and 48%. The value can be estimated at slightly above \$7,400 million. The corresponding figure for the U.S. appears to be slightly over 53%. Among the reasons for this upward trend are the general tendency to produce more highly refined and complex products in line with the rising standard of living, industrial integration and production by bigger units, the switching to cheaper raw materials such as oil and natural gas and the increase in yield from the raw materials used.

Turnover and Value Added in O.E.E.C. Chemical Industry

Country	Turnover		Value Added	
	1958	1959	1958	1959
	\$ million			
Austria ..	192	216	[85]	[95]
Belgium ..	520	580	208	232
Denmark ..	123	[134]	54	[59]
France ..	2,595 ¹	2,895 ¹	1,015 ¹	1,155 ¹
Germany ..	4,060	4,490	1,988	2,165
Greece ..	[91]	[100]	[36]	[40]
Iceland ..	—	—	—	—
Ireland ..	[31]	[38]	[12]	[15]
Italy ..	[2,071]	[2,295]	890	986
Netherlands	567	606	192	195
Norway ..	[150]	[163]	[66]	[72]
Portugal ..	[52]	[59]	[20]	[24]
Spain ..	[50]	[60]	[20]	[24]
Sweden ..	290	300	139	[144]
Switzerland	342	389	[155]	[183]
Turkey ..	[40]	[40]	[14]	[16]
U.K. ..	4,010	4,570	1,769	2,018

¹ For purposes of comparison the exchange rate \$1.00=4.94 new francs has been used for both years.

No serious complaints of scarcity or surplus have been recorded in the chemical field in general for 1959. The supply of raw materials was also satisfactory with the exception of naphthalene and some intermediates such as maleic anhydride and phthalic anhydride which some countries have reported as scarce during 1959. Prices in the chemical industry moved less than the prices of commodities in general, and in fact chemicals are still growing cheaper by comparison with other commodities, a tendency which was equally marked in 1957 and 1958.

Total capital invested in chemical plants now in operation in Europe and

the U.S. is not known, but it is obvious that the U.S. has accumulated considerably more capital in its chemical industry than the European industry has, since the marked expansion which has taken place throughout the world during the past 20 years had an earlier start there. Investments in the nine member countries which account for approximately 95% of the value added amounted to about \$1,320 million in 1959.

Although the prices of chemicals show little or no increase compared with other commodities, the price of capital goods which form part of investment is rising as is also the cost of labour. Nor do raw materials show a downward trend which might compensate for the increasing costs. With these factors and heavy capital demands, it is understandable that

the chemical industry insists more than others on the need for a larger market.

The high rate of expansion in the chemical industry of the O.E.E.C. countries has continued during the first half of 1960—in fact an increase of 15% is shown in the production index over the first half of 1959—and most countries are optimistic that this very high rate of expansion will be shown for the whole year. It is expected that investments in most countries will be of the same order as in 1959. Germany and Norway, however, foresee a higher level of investment and the U.K. estimates that the investments for the first half of 1960 were a little lower. Many countries report considerable increase in both imports and exports, compared with the similar period of 1959.

Extended Petrochemical Capacities Expected to Give 3 m. Tonnes

KEY basic inorganic chemicals have all, with the exception of primary ammonia, shown an increase in output during 1959. Production of soda ash rose in all countries and in some cases the increase was considerable. Caustic soda production, after a year of stability in 1958, rose again in 1959, although developments varied from country to country. As the principal industries using chlorine are still developing considerably, production of chlorine continued to rise. However, the rate of growth, which is higher than most inorganic chemicals, seems to be slowing down.

The increase in production of calcium carbide was less marked, being only 3% after the considerable expansion of 1958. On the other hand, carbon black showed an increase in production of 14% in the four O.E.E.C. countries so far manufacturing this compound.

Production of sulphuric acid was up by 6% in Western Europe in 1959, after a very gradual rate of output during the two previous years. U.S. production, which had been falling since 1956, showed an even greater increase of 10%. The percentage of total sulphuric acid production taken by the fertiliser and textile industries fell both in Western Europe and in the U.S. whereas there was a sharp increase in consumption in metallurgy and other uses. Among the most important of the latter is the manufacture of titanium dioxide.

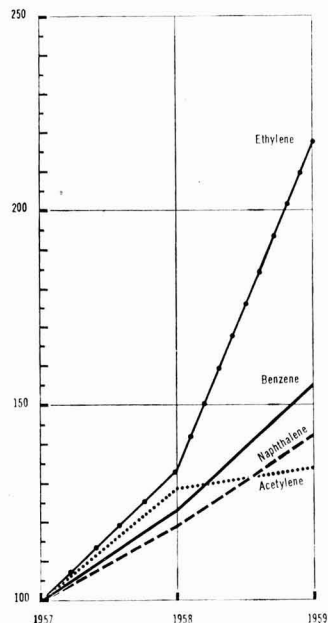
Organic Chemicals. It is difficult to assess the trend in the production of organic chemicals in O.E.E.C. countries since comparable data is not available for all countries, but that the output has risen particularly fast in 1959 is apparent from the indices of organic chemicals from some member countries, and it is unlikely that, were information available from all organic chemicals producers, the trend would be very different. Ethylene has shown by far the steepest rise in production, followed by benzene and then naphthalene.

Petrochemicals. There has been a considerable amount of activity in the petroleum chemical industry in Europe. Apart from the six countries already producing petrochemicals (Belgium, France, Germany, Italy, the Netherlands and the U.K.), three other O.E.E.C. countries have already established or are planning to set up petrochemical plants (Austria, Denmark and Spain).

O.E.E.C. countries invested \$270 million in their petrochemical industries in 1959 compared with \$226 million in 1958. Although this new investment will not have its full effect on output until 1960, production nevertheless rose exceptionally rapidly in 1959 to reach 1,160,000 tonnes (in terms of carbon

Trend in Consumption of Basic Materials

1957 = 100



content) compared with 813,000 tonnes in 1958, an increase of 40%.

In spite of the rapid progress in recent years, all producing countries still plan to extend their capacities considerably. Investments estimated at approximately \$840 million are expected to be made from 1960 to 1962. As a result of these new investments production is expected to rise by 1,875,000 tonnes annually to bring the total European production of petrochemicals up to an annual rate of about 3 million tonnes by the end of 1962.

There were falls in prices in several important products. In part this reflects improved efficiency and large scale production but it also derives from increasing competition.

Plastics Materials. Sales of plastics materials in O.E.E.C. countries rose more rapidly in 1959 than in recent years. They increased by 24% to reach 2,017,000 tonnes. Prices in general fell in 1959, although the trend varied from product to product and country to

country. Thermoplastic materials were particularly affected.

Most countries feel that the demand for thermoplastics is not yet satisfied as indicated by plans to install or extend capacity particularly for polystyrene and polythene. Less investment is being made in the capacity for the production of thermosetting plastics.

Fertilisers. A brief survey of the fertiliser situation in 1959 shows that the production of all three types of fertilisers rose in 1959-1960 but only for potash fertilisers was the rate of expansion more rapid than in 1958-59. Output of potash increased by 7% last year compared with 2% for the previous year. Consumption of potash fertilisers also rose more rapidly in 1959-60 than in 1958-59.

Exports of nitrogen were considerably higher in 1959-60 than in the previous twelve months; sales to non-member countries developed particularly rapidly. Potash exports, too, rose rapidly but little change is expected in 1960-61.

A.B.C.M. Hold Conference to Promote Chemical Exports

INDUSTRIALISED countries are very good markets and, indeed, at present appear to be the fastest growing markets for chemicals because of the general increase of chemical industries to 'take in each other's washing.'

This was one of the points made by Mr. F. J. Erroll, M.P., Minister of State, Board of Trade, when he opened an Export Promotion Conference, organised by the exports committee of the Association of British Chemical Manufacturers, in London on 10 February. The conference is the first of two—the other conference is to be held in Manchester 24 Feb.—and was attended by some 160 delegates.

Aim of the conference was to encourage small or non-exporters to play

their part in improving the performance of the industry. Papers which were read by members of the A.B.C.M. exports committee showed that additional profits could be earned by exports, and advice was given in developing overseas markets. An agent of a member firm spoke of his experience in selling U.K. chemicals in the Common Market—an area where future demand was likely to expand greatly and from which the U.K. might be excluded if Europe continued to be divided into two trading areas.

In his opening address, Mr. Erroll congratulated the chemical industry on its exports for 1960, which for the first time exceeded £300 m., and dwelt on the economic necessity of an increase in exports.

New Process May Extend Uses for Corn

THE current efforts in the U.S. to expand the market for corn products may take a significant turn if the new pilot plant process of A. E. Staley for separating amylose and amylopectin in fractions from ordinary corn starch proves sufficiently economical.

It is believed that amylose, the linear starch molecule similar to cellulose, should be at least as useful as cellulose, and amylopectin, the branched molecule, already has a 20 million lb. a year market in the food industry.

The Corn Industries Research Foundation and the Eisenhower commission on surplus corn utilisation, estimate that the corn surplus was 1,000 million bushels in late 1957.

Staley do not reveal how the process works but it is believed that a solvent type of extraction is used. The Dutch hot water process used to extract starch from potatoes has been tried by the U.S. Department of Agriculture but it has not proved feasible for corn.

Free World's Record Nickel Output

FREE world consumption of nickel in 1960 reached the record level of 500 million lb., or 15% higher than in 1959 states Mr. Henry Wingate, chairman, International Nickel Company of Canada. Main factor in this increase has been the use of more nickel in Europe, which in 1960 should account for 43.5% of free-world consumption; for the first time in many years consumption in the U.S. was below that of Europe, accounting for 43.5%. Largest increase in usage was in stainless steel, where a rise of 32% took place.

Free world production capacity should approach 600 million lb. by the end of 1961; this figure includes the new Inco Manitoba project due in operation early in 1961 with an annual capacity of 75 million lb.

Cotton and Rayon Research Merger

The merger of the British Cotton Industry Research Association and the British Rayon Research Association will take effect from 1 April. An application has been made to the Department of Scientific and Industrial Research for a grant to replace the existing grants of the separate associations. The annual expenditure will rise from about £490,000 to about £580,000 by 1965.

£400 for Polythene Idea

An employee on the I.C.I. polythene plant at Wilton has been awarded £400 for an idea which, according to Dr. R. G. Heyes, Plastics Division production director, will reduce costs in the field of reaction temperature measurement. The modifications suggested will result in expensive cable connected to high-temperature thermocouples being replaced by less expensive material.

New Chemical-resistant Lining Material

ARUBBER lining material that cold bonds itself to metal and other surfaces with field-applied cement has been developed by the Goodyear Tire and Rubber Co. at Akron, Ohio, U.S. It is claimed that the natural rubber covering, called Jade Green Armabond, will provide complete protection against impinging abrasion and most inorganic salts, alkalis and acids. Through its specially compounded tie gum backing, the natural rubber lining may be cold bonded to a wide variety of surfaces, including metal, fabrics, and other rubber compounds.

Field application of the material requires only cleaning of the surface to be covered and spreading of cement before the rubber is placed. The chemical cure resulting from the action of the cement is stated to give adhesion far in excess of common adhesive cements.

The new lining material is available at present only in the United States in gauges from 1/16 to 1/2 in. and in 48 in. widths.

Another recent development, introduced by the Chemical Division of Goodyear in the U.S., and available in the U.K. through Hubron Sales Ltd., Failsworth, Manchester, is an intermediate viscosity masterbatch which combines synthetic rubber and a reinforcing resin. Designed as a general purpose material, the new substance is especially suited to shoe soles and other light coloured compounds that require high abrasion resistance. Called Plioflex 224, it is claimed to exhibit good hardness and stiffness characteristics, excellent abrasion and tear resistance, tensile strength and mould flow properties.

DIRECT COMPUTER CONTROL FOR I.C.I.'s FLEETWOOD PLANT

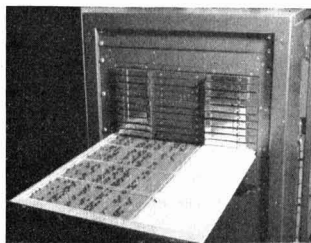
DIRECT computer control of a chemical process at their Fleetwood, Lancs. factory is planned by the Dye-stuffs Division of I.C.I. For this purpose they have ordered a computer system from Ferranti Ltd. which costs between £50,000 and £100,000 and will take over the functions of about 100 conventional control devices. The equipment is expected to be in operation by June this year.

Operations at Fleetwood include the production of diisocyanates, for which a major project is in hand. Also being built at Fleetwood is a 10,000 tons/year phosgene plant, due for completion shortly.

The computer control system to be used at Fleetwood is based on the Argus, special-purpose digital machine for industrial process control, which uses transistors throughout and, working in binary arithmetic, can perform 50,000 additions or 10,000 multiplications per second. A feature of the I.C.I. application is that the computer operates directly on the process, rather than adopting the more orthodox approach of operating through the agency of conventional controllers or in parallel with them, to guard against equipment failure. This approach is said to be facilitated by the 'docile' nature of the I.C.I. process.

The Argus computer uses electronic circuits based on solid state components. Binary serial/parallel fixed-point arithmetic is used and the word length may be either 12 or 14 bits. On 12-bit numbers, addition is carried out in 20 microseconds, multiplication in an average of 100 μ sec. and division in 200 μ sec.

The machine is programmed manually by inserting small ferrite pegs into holes drilled in printed circuits arranged in trays. Reading-out of the stored information is done by energising the printed



Typical programme for the Argus computer, as represented by the arrangement of pegs in the tray pulled out from the cabinet

conductors on one face of a tray, and the pegs cause currents to be induced in certain of the conductors on the other face, depending on the pattern in which the pegs are inserted. The high-speed working store is a magnetic-core matrix. Backing-up storage of 50,000 words can be provided by magnetic drum.

One special feature of the machine is a facility which enables the main programme to be interrupted at regular intervals to allow a special routine of instructions to be carried out—as may be required for regularly examining some quantity in the controlled process and taking necessary corrective action. Another facility allows for direct writing into or reading out of the magnetic-core store by independent equipment, such as magnetic tape units, which cannot be synchronised with the computer.

Peripheral equipment available enables all types of electrical signals to be selected and converted to binary form. It also provides output signals to fulfil all the control and data-logging requirements normally associated with the operation of industrial plant.

Precast Concrete Storage Buildings for Laporte Acids at Castleford

TWO precast concrete buildings have just been completed for Laporte Acids Ltd. at their Hunslet works, Castleford, Yorks. The company are principal suppliers of sulphuric and hydrochloric acid, Glauber's salt, iron sulphate and sodium hyposulphite to the Leeds industrial area.

The new drum store is 90 ft. by 50 ft. and 13 ft. to the eaves with a smaller building 16 ft. 6 in. wide coupled to it. Roof sheeting is in natural corrolplast and Robertson Thain vents are fitted to the ridge. The second new building, a further storage shed, is 75 ft. by 50 ft. by 16 ft. to the eaves. Vertical corrugated asbestos sheeting has been fitted 11 ft.

down from the eaves, across one 50 ft. end and one 75 ft. side.

Foundations were prepared by Laporte Acids Ltd. and the buildings supplied and erected by E. Tyler and Co. Ltd. of Tonbridge and Manchester.

U.K. Aerosol Production in 1960

U.K. production of aerosol in 1960 is estimated by members of the British Aerosol Manufacturers' Association at at least 40 million units. The figure of 25 million units given in CHEMICAL AGE, 28 January, p. 180, referred to 1959 production and not 1960 as stated.

F.A.O. Issue Report on Radioactive Materials in Food

SECOND report in the F.A.O. atomic energy series, 'Radioactive Materials in Food and Agriculture' is available from H.M. Stationery Office, price 7s 6d. The publication contains a summary of the conclusions and recommendations of an expert committee of F.A.O.

The committee was set up in response to a recommendation of the European Commission on Agriculture and to a resolution of the United Nations Scientific Committee on the Effects of Atomic Radiation. Its terms of reference were: to review present knowledge of the behaviour of radioactive substances in terrestrial and aquatic food chains; to indicate possible improvements in surveys of radioactive substances in food and agricultural materials; and to make recommendations regarding research on food chains.

Anglo-Portuguese Trade Agreement

SULPHURIC acid, hydrochloric acid, caustic soda, calcium carbide and acetylene are among the chemicals to be included in the Anglo-Portuguese trade agreement signed as a result of discussions between U.K. and Portuguese trade delegations. £210,000 worth of chemicals and allied products are to be exported from the U.K. to the Portuguese overseas provinces (except Macao) in 1961.

Exports to Mozambique during 1961 are to include insecticides and similar products (£3,000) and Perspex (£5,000). Perspex to the value of £5,000 is also to be exported to Angola.

Plastics Theory and Practice Discussed at R.I. Meeting

The first Swinburne Award Address was delivered by Prof. Geoffrey Gee, F.R.S. at the Royal Institution, Albermarle Street, London W.1. on 16 February.

The address on 'Plastics in Theory and Practice' surveyed some of the scientific problems underlying plastics technology dealing with three aspects: production of a polymer; processing; and properties of the finished article.

The address was followed by the presentation of the Swinburne Gold Medal, which is awarded for outstanding contribution to plastics.

Guide to Petrochemicals in Europe

Brief descriptions of the 400 leading chemical and petroleum companies in 18 countries of West Europe are given in 'Petro-chem Guide to Europe', published by the Noyes Development Corporation, 38 East 57th Street, New York 22, N.Y. (price \$12). Data are given as to affiliates, subsidiaries and participations in joint ventures, plus a listing of European universities and institutes engaged in chemical research.

Pakistan to Provide R900 Million for Chemical and Petrochemical Plants

INSPECTION of the Warsak Dam project by Queen Elizabeth and the Duke of Edinburgh, during the Royal Tour in Pakistan, emphasised the country's reliance on outside aid in the development of large engineering and industrial schemes. The dam was completed by Canadian engineers under the Colombo Scheme.

While the Royal Party was in the hilly northern area of West Pakistan there came, too, the announcement by Pakistan's Russian Ambassador that a treaty would shortly be signed with the Soviet Union, for Russian assistance in the exploitation of oil. Help had also been offered in other scientific and technical spheres, including atomic energy.

The full extent to which Pakistan would embrace offers of help in the development of her chemical industries is not entirely clear although West Germany is known to be particularly interested (see CHEMICAL AGE, 21 January, p. 150). However, the signs suggest she might be quite willing. Her Government is known to feel that there are substantial potentialities, and the importance attached to expanding or establishing chemical and petrochemical plants is apparent by the provision of R900 million for this purpose in the second Five Year Plan.

This allocation is higher, by about 30%, than for any other group of industries. It is also considered modest, compared with needs and possibilities, but is limited by foreign exchange difficulties. Pakistan is clearly anxious to develop her chemical industries.

Mineral Reserves

Raw materials such as natural gas, coal, gypsum and other minerals are available in adequate measure. Oil may now shortly be added to this list. Preliminary Soviet investigations suggest there are valuable reserves, although these are almost certain to be deep.

Official statements indicate that although certain basic chemicals, including sulphuric acid, soda ash, and caustic soda are already manufactured, quantities are insufficient.

Soda ash production is barely enough to meet the needs of West Pakistan, and East Pakistan is wholly dependent on imports. Present plans include the establishment of a soda ash plant based on sea water at Gharo, in West Pakistan, with a capacity of about 65,000 tons a year. Part of the production will be processed into caustic soda, and it is hoped that the remainder will satisfy domestic demand until the second plan period ends in 1965. A caustic soda plant using the electrolytic process will also be built in West Pakistan, with a yearly output of around 20,000 tons. A similar 6,000-ton plant is proposed for East Pakistan.

Chlorine from the electrolytic plants

will be used for hydrochloric acid, liquid chlorine, bleaching powder, p.v.c. and D.D.T.

A valuable pointer is a Government statement that private foreign investment has an important part to play in establishing optimum capacity in some of the chemical industries.

Despite foreign exchange limitations, Pakistan's imports of drugs, antibiotics

materials for the pharmaceutical industry.

The production of polythene from natural gas or molasses is also included in the second Five Year Plan. The country has ample natural gas, and large quantities of molasses from its sugar refineries are also not profitably used.

A beginning with petrochemical industries will be made by building a carbon black plant based on natural gas at Sui. Foreign investment will assist in this. About 70 million cu. ft. of gas per day will be used and it is estimated that this will produce about 36 million lb. of carbon black a year, most of which will be available for export.

The proved natural gas resources in East Pakistan at the moment are almost exclusively given up to cement and fertiliser production. Hopes of finding further deposits are considered good, which should permit expansion into other fields of production.

It is already known that there are abundant natural gas reserves in West Pakistan and the plan thus makes provision for setting up many new units at a cost of R33 million. The Government has also made it clear that this figure may be increased if warranted by the feasibility of individual projects.

Products which are at present being considered include acetylene, to be processed into acrylic fibres and p.v.c.

The Government hopes that overseas private capital will be forthcoming to finance the foreign exchange component for such petrochemical plants, plastics and fibre plants.

It is also considered that the wealth of non-metallic minerals known to exist in West Pakistan can form the basis for new and important chemical industries.

**From the Benn Group
Staff Correspondent
with the Royal
Tour**

and fine chemicals are around R60 million each year. The only basic manufacture of drugs in the country is in one new factory producing penicillin.

Under the second Five Year Plan firms now processing and repacking imported pharmaceuticals will be encouraged to undertake basic manufacture of drugs from indigenous raw materials and imported intermediates. Reliance will be placed on world-wide manufacturers of repute to create this manufacturing capacity.

A factory is to be set up in East Pakistan to produce substantial quantities of sulphur, anti-T.B., and anti-malarial drugs. It is hoped that the establishment and expansion of basic chemical plants, oil refinery, and a coal carbonisation plant will be able to provide some of the raw

New Method for Determination of Water in Plastics Materials

PRESENCE of water in plastics can have deleterious effects for a number of reasons. For example, polythene containing carbon black may absorb moisture, which will give rise to extrusion problems, such as bubbling, during subsequent processing.

Methods involving the use of drying procedures for determining water in plastics are unsatisfactory since they do not distinguish between water and any other volatile material which may be present. However, a method of determining the amount of water present is described by V. W. Reid and L. Turner of Petrochemicals Ltd. in *The Analyst*, January 1961.

Water present on the surface of polymer granules can be determined readily by titration with Karl Fischer reagent but it is necessary to determine the

total water present including that absorbed into the granules. The method described also involves use of the Karl Fischer reagent. It consists in passing a stream of dry nitrogen over the sample, which is passed into a Fischer cell, where the water is titrated with Karl Fischer reagent.

The method has been found particularly useful in determining the water content of polythene which has been stabilised with carbon black. The method has been regularly applied for two years, during which time several hundred determinations have been made on a variety of plastics materials. The results obtained over this period indicate that the reproducibility of the method to be of the order of $\pm 10\%$ of the water content determined when this is in the region of 0.0 to 0.5%.

In Parliament

Health Ministry Talks Are Pending on Drug Costs

FURTHER negotiations with the pharmaceutical industry on drug prices were impending, and would involve some discussion of costs, the Minister of Health told the House of Commons last week, during a reading of the National Health Services Bill, which will raise the N.H.S. prescription charge to patients to 2s. In the course of the long and stormy debate which ensued, several-years-old charges of excessive profits and wasteful sales promotion expenditure were again levelled at the pharmaceutical industry by Opposition spokesmen.

Some of the points raised are answered in a letter from Mr. A. Duckworth, secretary of the Association of British Pharmaceutical Industry, which appeared in the *Daily Telegraph* in answer to a previous correspondent. Mr. Duckworth points out that, despite rising costs, the prices of individual drugs have remained remarkably steady since the Health Service began; the increase in the drug bill has been due mainly to the introduction of many new and necessarily expensive drugs. Research by the industry, which results in a steady flow of improvements, cost £6½ m. in 1959.

On the question of brochures and samples sent to doctors, Mr. Duckworth maintains that this is a necessary service of information which costs only a small proportion of the total value of the drugs, and is offset by savings in manu-

facturing costs which result from planned production at an economic level.

A further point made by Mr. Duckworth is that the existence of a flourishing export trade benefits the Health Service by reducing unit costs and spreading the load of research and overhead expenditures. Last year pharmaceutical exports reached a record £44.4 m.—a sum approaching the value at the manufacturer's level of sales to the pharmaceutical services of the Health Service, which in the current year is about £55 m.

128% Rise in Use of Oil for Gas Making

Use of refinery gas and oil for gas making in 1961 is expected to total 1,150,000 tons, compared with 1,030,000 tons in 1960, 890,000 tons in 1959, 750,000 tons in 1958, and 450,000 tons in 1957. This was stated in the House on Monday by Mr. R. Wood, Minister of Power, who also said that gas industry research on oil gasification was expected to cost £176,000 in 1961-62, compared with an estimate of £290,000 for 1960-61 and £227,000 for 1959-60.

In reply to another question Mr. Wood said he had not yet received detailed proposals for importing methane gas although certain information had been given to him. He was expecting proposals which he would consider very carefully.

I.U.P.A.C. Sponsors International Meeting on Microchemical Techniques

AN International Symposium on Microchemical Techniques will be held on 13-18 August 1961 at Pennsylvania State University. The symposium is to be organised by the Metropolitan Microchemical Society under the sponsorship of the International Union of Pure and Applied Chemistry. Further information can be obtained from Mr. H. J. Francis, Jr., vice-chairman of the symposium, c/o Pennsalt Chemicals Corporation P.O. Box 4388, Philadelphia 8, Penn.

Mass Spectrometry

A conference on mass spectrometry is to be held at Oxford University, under the auspices of the Institute of Petroleum from 12 to 15 September, 1961. Papers dealing with any aspect of mass spectrometry will be welcomed, but special sections will be held dealing with resolution mass spectrometry, the mass spectrometry of organic compounds and the mass spectrometry of inorganic solids.

Authors who wish to present papers at the Conference are asked to send full abstracts by 28 February to Dr. R. R.

Gordon, chairman, Mass Spectrometry Panel, Coal Research Establishment, Stoke Orchard, Cheltenham, Glos.

Instrumentation Conference

The Society of Instrument Technology and the Birmingham Productivity Association are holding a one-day conference at the Birmingham College of Technology, Gosta Green, Birmingham, on 29 March. This Conference is aimed at the small to medium sized manufacturer, and the object is to show the various aspects of instrumentation which will increase productivity profitably.

An Instrument Exhibition will also be held. Hon. Secretary is Mr. D. Smith of I.C.I. Metals Division, Kynoch Works, Witton 6, Birmingham.

Will

Mr. B. F. Howard, late president of Howards and Sons Ltd., Ilford, and a former member of the Council of the Royal Institute of Chemistry, who died on November 19 last, aged 80 years, left £93,367 net (duty paid £40,354).

Canadian Process Uses Uranium as Steel Alloy

SCIENTISTS of the Canadian Ministry of Mines have developed a process for using uranium as an alloying addition to steel. The proportion is 1 lb. of uranium to 1 ton of steel. The alloy shows improvement in strength, resistance to corrosion and properties at high temperatures, it is stated, without substantial cost increases. Inexpensive mill and low alloy steels can be used as a starting point.

The method, which has been patented and is available to the steel industry, has been developed as a result of 14 months research by the physical metallurgical division of the Mines Department.

Preliminary research on the use of uranium as an alloying material for steel has been done by the U.S. Bureau of Mines as well as in Canada, and there has been a previous claim that the addition of a small quantity of uranium to steel increases its resistance to failure by fatigue. Further work on the subject will be included in the work of the Uranium Research Foundation, whose formation by Canadian producers has lately been announced.

Ramsay Fellowships for Advanced Chemistry Students

The Trustees will consider in June applications for a Ramsay Memorial Fellowship for Advanced Students of Chemistry. Value of the fellowship will be £700 a year, to which may be added a grant for expenses of research not exceeding £100 a year. The fellowship will normally be tenable for two years. Further particulars can be obtained from the joint hon. secretaries, Ramsay Memorial Fellowships Trust, University College London, Gower Street, London W.C.1.

Fertiliser Statistics

The striking advance in U.K. fertiliser consumption during the 1959-1960 fertiliser year (the subject of a special report in the *CHEMICAL AGE*, 'Annual Review' number of 14 January) is confirmed in 'Fertiliser Statistics 1960' issued by the Fertiliser Manufacturers' Association. This includes tables comparing, for the past three years; acreage of the main crop groupings; consumption of inorganic fertilisers; compound fertiliser consumption; average concentration of all compounds consumed; and the proportion of total nutrients consumed in straight and compound form.

Computers in Chemical Engineering

A one-day symposium on "Computers for the Chemical Engineer" is to be held at Birmingham University on 28 March 1961, by the Birmingham University Chemical Engineering Society, Graduate Section, and the Graduates and Students Section of the Institution of Chemical Engineers, Midlands Centre. The papers are of a descriptive nature. The morning session covers the principles of computers and their application to plant management and research. The afternoon papers show the use of computers in process control.

Overseas News

GOVERNMENT 'GO-AHEAD' WILL SPEED PLANS FOR JAPANESE PETROCHEMICAL COMPLEX

COMBINED petrochemical complex of Maruzen Oil and Shin Nippon Chisso Hiryo Co. at Goi, Japan, is to be accelerated following Government approval of plans. Maruzen Oil are to use the Lurgi sand-cracking process to produce 44,000 tons/year ethylene and 22,000 tons of propylene; 23,000 tons of the ethylene will go for production of higher alcohols (West German process) and 21,000 tons for Shin Nippon Chisso to produce acetaldehyde (Aldehyd GmbH process).

Shin Nippon Chisso will use the propylene for the production of 13,000 tons/year polypropylene under AviSun licence. S.N.C. will also produce 10,000 tons/year acetic acid, 6,000 tons of acetic esters, 10,000 tons of octanol, 15,000 tons of DOP (dioctyl phthalate) and DOA (dioctyl adipate), 5,000 tons of polybutene (to be produced under Cosden licence from isobutene), and 6,000 tons a year of dodecyl alcohol.

Government approval of the polypropylene project carries the condition that AviSun will be responsible if they fail in the patent court action that is being brought against them by Montecatini (C.A., 29 October, p. 731). AviSun are bearing a guarantee fund of \$1,200,000.

Firestone Sell Polydiene Know-how to Japanese Firm

Firestone Tire and Rubber are to supply know-how under a 10-year contract for the production of polybutadiene and polyisoprene to Asahi Kasei Chemical Co. for \$500,000, plus a royalty of 0.75 cents/lb. of polymer. Plants with capacities of 20,000 tons/year capacities will be built either in Kawasaki or Tokyo-China and are scheduled for completion by March 1963. It is stated that an isoprene monomer plant with an annual capacity of 10,000 tons will be completed by June 1964.

Monsanto Chemical to Raise Polythene Capacity

Plastics Division of Monsanto Chemical Co. is to raise its capacity for high-pressure polythene by 30% to 130 million lb./year at Texas City. Completion of the extension is scheduled for early 1962.

Electro-chemical Industry Potential in Northern Rhodesia

The report on the development of manufacturing industry within the Federation of Rhodesia and Nyasaland, issued recently by industrial consultants, considers that the Lusaka-Kafue area of Northern Rhodesia is (subject to assessment of raw materials) potentially the

most suitable area in the Federation for the establishment of a new electro-chemical industry, including nitrogenous fertilisers and explosives, acetylene and its derivatives and possibly, at a later date, plastics.

On the Copper-belt a gradual build-up of engineering and workshop services is foreseen, primarily to serve the expanding mining industry.

New Plasticiser Plant For Denmark

Production has begun at the new plasticiser plant of Scandiflex A/S. The plant, which has a capacity of 5,000 tons a year, is manufacturing mainly phthalates and adipates for the p.v.c. industry.

United Carbon Black Plant for Venezuela

Venezuela's first carbon black plant, South America's sixth, is to be built by United Carbon of Venezuela C.A., jointly owned by United Carbon, U.S., Manufacturas de Papel C.A., Inversiones Dosco S.A. and Grupo Técnico de Promoción Industrial C.A. Site is Valencia and the \$3 million plant will have an initial capacity of 20 million lb./year when it comes on stream late this year.

The South American carbon black scene will eventually look like this:

	Million lb./yr.	Status
Argentina		
Cabot	30	Early 1962
Petroquímica Argentina	20-25	
Bolivia		
Bolivian Oil	17	End-1961
Brazil		
Colloidal Carbon	33	?
Columbian Carbon	50	On stream 1961
	25	
Venezuela		
United Carbon	20	End-1961
	195-200	

U.S. Anti-knock Producer to Use Italian Know-how

The new U.S. entrant to the anti-knock field, Stepan Chemical, whose plans envisage sales of more than \$20 million a year, will base their production on an agreement with Societa Lavorazioni Organiche Inorganiche (S.L.O.I.), Italian producers of anti-knock additives. The European company will have a minority interest in the new plant, which will be built at Northfield, Ill., to produce tetraethyl lead and tetramethyl lead.

Celanese to Use German Acetaldehyde Process

American Celanese will be the first U.S. firm to use the Wacker process, licensed from Aldehyd GmbH (jointly

owned by Hoechst and Wacker Chemie) for a new plant which will produce an estimated 100 million lb. of acetyl chemicals a year at Bay City, Texas. The process produces acetaldehyde by air oxidation of ethylene. The plant should be completed by the spring of 1962. In addition to acetaldehyde, the main product, 2-ethylhexanol, will also be produced.

Currently Celanese have two other acetyls plants. That at Bishop, Tex., is based on vapour-phase oxidation of propane and butane, while the Pampa, Tex., unit uses liquid phase oxidation of butane and pentane.

Chemico Process For Japan's Largest Acid Plant

The Chemico contact process is to be used by Dowa Mining Co., Japan, for a sulphuric acid plant with a daily capacity of 600 tons. Japan's largest acid unit currently produces 200 tons/day. Acid will be supplied to the Yawata Iron and Steel Co and to Kyushu Chemical Co., a new company formed to produce ammonium sulphate.

Swedish Firm to Raise P.V.C. Output by 50%

Superfosfat A/B, Sweden, are to increase their output of p.v.c. by more than 50% to 25,000 tons/year by end-1962. This is part of a major expansion of plastics production; Superfosfat are associated with the petrochemical complex which is being built at Stenungsund, where they will operate a high-pressure polythene plant in conjunction with Union Carbide. Ethylene will come from a new Svenska Esso refinery.

U.S. Senators Urge Sale of General Aniline

Four Senators from the States of New York and New Jersey, have laid a plea before Congress that the General Aniline and Film Corporation, confiscated by the U.S. Government in 1942 as enemy property, should be sold. The sale is demanded regardless of the outcome of the court case being carried out in the U.S. by Interhandel, Basle. Some 93% of General Aniline shares is owned by the U.S. Government, Senator K. Keating, New York, has stated that the apparently endless legal battle and the placing of the company under the U.S. Department of Justice had led to the company's potential not being developed to the full and the possible rate of growth not being reached.

SunOlin Ethylene and EO Plant Under Construction

Construction is under way on the \$20 million ethylene and ethylene oxide plant adjacent to the Sun Oil Co. refinery at Marcus Hook, Pa, for which engineering and construction contracts were awarded the SunOlin Chemical Company (jointly owned by Olin Mathieson and Sun Oil).

Scheduled for completion late this year, the new plant will have a capacity of 225 million lb. of ethylene and 55 million lb. ethylene oxide a year. It will also produce 12 million cu. ft. of high-purity hydrogen a day, and up to 1

million cu. ft. of carbon monoxide a day. Included in the expansion programme is a multiple pipeline system that will cross the Delaware River to New Jersey.

Carbon Chemicals Plant for Yugoslavia

A large-scale plant for carbon chemicals is to be erected in the Yugoslav republic of Slovenia. The plant will be attached to the brown coal mining centre of Velenje. The Yugoslav Investment Bank has made a loan of some Dinars 20 million available for the project. Further projected for the area is a network of pipelines for the transportation of waste gases from the coal processing plant to various centres in Slovenia.

Enjay Chemical to Raise Ethylene Capacity 35%

Enjay Chemical are to expand their ethylene capacity at Bayway, N.J., by 35% to 175 million lb./year by mid-1962. This extra capacity, which will raise the company's total ethylene potential to 845 million lb./year, is earmarked for the polyolefins plant of Hercules Powder, at Parlin, N.J., capacity of which is being increased from 60 million to 80 million lb./year.

Dominion Tar to Raise Phthalic Capacity to 30 m. lb.

Dominion Tar and Chemical Co. are to build a new phthalic anhydride plant adjacent to the present facility in Toronto. The plant is expected to be in operation by the end of this year and will cost about \$3,500,000. The plant will use naphthalene as a raw material: the oxidation units will be of the fluid bed catalyst design.

Completion of the new plant will bring Dominion Tar's phthalic capacity up to 35 million lb./year.

Breach of Contract Alleged on Ammonium Nitrate

A suit alleging breach of contract against Chemical and Industrial Corporation in building ammonium nitrate plants has been filed in the U.S. Court by Commercial Solvents. It is claimed that the plants used the Commercial Solvents process, but that C.S. have not been receiving royalty payments, a condition of the agreement.

Hercules Chemical to Set up Finnish Subsidiary

Hercules Chemical Corp. are to establish a subsidiary and erect a plant in Finland. The formalities are expected to be completed by the end of March.

Uric Acid Plant for Mexico

The Mexican Government has granted permission to the Sociedad Mexicana de Crédito Industrial to build a uric acid plant at Salamanca, in the State of Guanajuato. Annual capacity of the plant, which will be fed from the local ammonia works of the State oil company, Pemex, will stand at 57,000 tonnes. Of the initial capital of the operating company of 81,500,000 pesos, some

47,500,000 pesos are expected to be spent on the equipping of the plant. It is likely that non-Mexican interests will have an interest in the Salamanca plant.

P.V.C. Expansion in South Africa

Output of p.v.c. in South Africa will be trebled, and the range of grades widened to meet the country's full requirements, when extensions to the Corvic plant now in progress at African Explosives and Chemical Industries' Umbogintwini factory comes into operation early this year. Output of Welvic p.v.c. compound will also be increased.

A.E. and C.I. are planning still further extension of the Corvic plant, to increase output of p.v.c. to five times the present figure.

New U.S. Process for Allyl Esters

A new process for diallyl phthalate and diallyl isophthalate has been developed by Borane Chemicals Corporation, who are using it on a 250,000 lb./month plant at Montebello, California. The process is based on allyl chloride which is reacted directly with the appropriate acid at moderate pressures to give esters. Yield is said to be better than with the more expensive route to allyl esters, that based on allyl alcohol.

Consolidated Mining Urea Fertiliser Plant

The new \$5 million urea fertiliser plant of Consolidated Mining and Smelting, which are controlled by the Canadian Pacific Railway, has started production at Calgary, Alberta. The new plant, the first in Western Canada, uses local natural gas as its raw material and has a capacity of 100 tons per day.

U.S. Production of Carbon Black

Production of carbon black in the U.S. last year totalled 2,052 million lb. (1,967 million lb.), of which 1,760 million lb. (1,646 million lb.) was in the form of furnace black and 292 million lb. (321 million lb.) was channel black.

Polymer Rubber Plant for Strasbourg

Some 10,000 tonnes of special synthetic rubber types are to be produced annually from mid-1962 at a plant to be built near Strasbourg by Polymer Corporation (SAF), a company that has been formed in Strasbourg last week-end with a capital of N.Fr.26,800,000 by Polymer Corporation Ltd., Canada, and the Banque de Paris et des Pays-Bas. of France. Construction will start this summer.

£2 m. Synthetic Glycerine Plant for Japan

Japan's first synthetic glycerine plant, to be built near Kawasaki at a cost of some £2 million by Nippon Yushi Kogyo K.K., will have an initial capacity of 3,000 tonnes/year with provision for ultimate expansion to 10,000 tonnes/year. Propylene will be used as the starting material and the process will use the chlorohydrin route. The plant is expected to be in operation by the end of this year.

Sumitomo Acquires French Aluminium Fluoride Process

Process for the manufacture of aluminium fluoride has been acquired from Pechiney, France, by Sumitomo Chemical Co., Japan, for a consideration of \$138,900. This is a newly developed continuous process of the dry, fluidised type said to use less heat and to give better yields compared with the wet, batch-type, process.

Kefauver Committee to Study Heavy Chemical Prices

Senator E. Kefauver's sub-committee will in its final investigation of the U.S. drug industry hear proposals to increase competition in pharmaceuticals; a new study will be started on counterfeit drugs. According to *Chem. & Engng. News*, 6, 39, 31, the committee is also to examine pricing policies in the heavy chemicals industry, the use of consent decrees in settling anti-trust suits and investigate possible monopolistic practices in the nickel industry.

Norsk Hydro's Increased Output and Sales—New Nitrogen Fertilisers Record

OUTPUT of nitrogen fertilisers by Norsk Hydro-Elektrisk Kvaestofaktieselskab in Norway reached a new record of 257,000 tons during the year 1959/60 as against 243,000 tons for the previous year. This was revealed in the company's annual report (see also 'Commercial News', p. 299), according to which production of nitrate of lime amounted to 1.16 m. tons and ammonium nitrate 48,000 tons, these figures also being higher than the previous year's.

Output of urea continued to grow and passed the 73,000 tons mark from 58,000 tons for 1958/59. Nearly 1,000 tons of 'nitrogen solutions' were sold to the U.S. during the year.

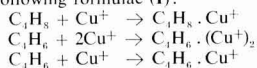
A 50% increase in capacity gave output of magnesium a rise from some 9,600 tons to 14,000 tons/year, including metal, alloys and anodes. Total production of p.v.c. emulsions and suspensions amounted to 6,200 tons compared with 5,400 tons previously. A product new to the company's range—a copolymer of vinyl chloride and vinyl acetate—was perfected and put into production. Formic acid production rose from 2,000 to 3,250 tons. Production of calcium carbide in excess of the company's own requirements was mainly sold in the U.K.

Some Kr.53.8 m. was spent on new investments during the year.

Leuna Extract Butadiene to 99.3% Purity by Direct Gaseous-liquid Process

AT the VEB Leuna-Werke 'Walter Ulbricht' chemical works in East Germany, butadiene has been concentrated to 99.3% purity by a direct gaseous-liquid process from a n-butene-butadiene mixture feed. This is stated by Leuna chemist Otto Benn (*Chemische Technik*, No. 12, 1960).

Basing detailed tests on the cuprous-salt-solution extraction process of the Standard Oil Development Co., Leuna have proved that copper-ammonium-acetate solutions are most suitable for the isolation of butadiene from mixtures with other hydrocarbons of the C_4 fraction. The solution used by the East German works is of 3.3 mole/litre $Cu-I$, 6.0 mole/litre acetic acid and 11.0 mole/litre ammonia. The mechanism of the absorption reaction has not yet been determined, though loose additive compounds are believed to be formed to the following formulae (1):



Phillips Process

The copper-ammonium-acetate solution is used similarly to the furfural or acetone solutions in the extractive distillation process developed by Phillips Petroleum Co. For the separation in gaseous form of the n-butene-butadiene mixture resulting from the dehydration processes of either Standard Oil Co. of New Jersey or Phillips Petroleum, the mixture is fed from below and at about 0°C into an absorber, this being charged from above by the copper lye. As top product n-butene, with 1.3% butadiene, escapes and is returned after an NH_3 washing process to the feedstock, the lye then containing mainly butadiene and with a small quantity of n-butene. The Leuna system then uses three pre-desorbers with temperatures of, respectively, 18°, 25° and 35°C and with back-feeds into the absorber to produce a copper solution free of n-butene for leading into the main desorber. At 85°C the then 98%-pure butadiene is washed out of the lye, freed of ammonia and distilled. The resultant highly-concentrated butadiene is passed on for subsequent polymerisation to the plant of VEB Chemische Werke Buna.

The author recommends the copper-ammonium-acetate process for C_4 mixtures with low butadiene concentrations, while the extractive distillation method is said to be suitable for other n-butene-butadiene mixtures. The C_4 fraction of the Houdry-process dehydration gas, consisting of an n-butane-n-butene-butadiene mixture, is separated exclusively with cuprous lye.

For the actual initial dehydration of n-butene, Leuna uses a calcium-nickel-

phosphate catalyst with a life of some four years. This, used at 630°C, results in a reaction gas analysis of 24% butadiene, 41% n-butene, 3% C_1 , C_2 and C_3 cracking gas, 30% hydrogen and 2% CO_2 . This compares with a result with Catalyst 1707 (2), working at 650°C, of 13% butadiene, 47% n-butene, 6% C_1 , C_2 and C_3 cracking gases, 27% hydrogen and 7% CO and CO_2 .

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1. S. M. Ellis, Thesis, 1940, Dept. of Chem. Eng., Mass. Inst. of Technology: 'Absorption of diolefines from olefines'.
2. K. K. Kearby, *Ind. Eng. Chem.*, 1950, 42 (2), 295-300.

Soviet Polyacetone Resin may be Similar to Du Pont's Polyformaldehyde

POLYMERISATION of acetone has been studied at Moscow University by Academician V. A. Kargin, who has used the method of combined condensation of the molecular beams of monomer and catalyst—in this case vaporized metallic magnesium on a strongly-cooled surface. The polymer obtained is a white solid, soluble in acetone. The question now arising is whether polyacetone resin will be a reality in the not too distant future.

Stabilisation of the end product is now being attempted since the polyacetone derived is unstable at room temperature and liquefies rapidly. The most stable specimens have a life of 10 to 12 hours in the absence of oxygen and moisture. Traces of vinyl acetate have been found to increase the life of the new polymer to some extent.

Meeting of E.F.T.A. Plastics Associations

PLASTICS manufacturers' associations in the countries of the European Free Trade Association attended a meeting at the instigation of the British Plastics Institute Federation in London on 16 February. This is the first time such a conference has been held.

The purpose of the meeting was to discuss the present working of the E.F.T.A. agreement so that any problem or shortcomings meriting a uniform approach to E.F.T.A. governments would come to light.

The delegates, who came from Austria, Denmark, Norway, Portugal, Sweden, Switzerland and the U.K., were entertained by the British Plastics Federation to a dinner at the Washington Hotel, London, on 15 February.

It is believed that the polyacetone can be stabilised by blocking the active ends of growing polymer chains. Should such a resin development be produced by crystallisation, it would be similar to E.I. du Pont de Nemours' own problem with Delrin resin. (Some \$50 million was spent on developing a polyformaldehyde resin: see p. 283.) Hydrolytic attack disintegrates the polymer, but Du Pont solved the problem of water spilling off the polymer by capping the active ends—either by making an ether with methanol and an acid, or an ester with acetic anhydride. This makes the molecule stable and, say Du Pont, each chain contains more than 1,000 formaldehyde units.

There are marked economic advantages in using acetone as the building block material as it costs about 8 cents (7d) a lb. in tank loads, delivered.

Achema Year Book in Two Parts

FOR the first time the *Achema Year Book 1959-61*, a European catalogue of chemical plant, apparatus and instruments, has been published in two volumes. This is due to its considerably enlarged scope. It is edited by Dr. H. Bretschneider on behalf of Dechema, Deutsche Gesellschaft für chemisches Apparatewesen, Frankfurt 7.

The *Year Book* introduces the Achema Congress, 1961, the congress and exhibition of chemical engineering which is held every three years and which this year will be held from 9 to 17 June in Frankfurt.

Vol. 1 in 666 pages gives reports on 106 European institutions in 12 countries which are engaged in education and research in chemical engineering and chemical technology. It also contains progress reports from 147 firms in the plant manufacturing industry. This sec-

tion is printed in four languages—English, French, German and Spanish.

Vol. 2, in 496 pages, gives the names of more than 1,200 exhibitors at Achema, 1961, with their products and stand numbers. A special section lists names of suppliers for more than 7,000 items of complete plants, equipment, machinery, instruments, construction materials, etc. This volume is published either as an English, French, German or Spanish edition. There is also a biography of the founder both of Dechema and Achema, Dr. Ing. e.h. Max Buchner, written by his daughter.

The *Achema Year Book* is more comprehensive than its predecessors and forms an invaluable guide to chemical engineering in Europe, as well as to suppliers of a wide range of plant and equipment.

UPWARD TREND IN HOME AND EXPORT SALES FOR ITALIAN CHEMICAL INDUSTRY IN 1960

THE satisfactory trend of production in Italy's chemical industry that was evident in 1959 has continued in 1960, becoming even more pronounced where some products are concerned. This may be attributed not only to a further increase in exports but also to the favourable situation of the home textile, paper, metallurgical and other chemical-consuming industries.

Inorganic. Mounting demand from consuming industries has led to increased production of sulphuric acid. Considerable increases in synthetic ammonia output are also reported, with greater production of nitrogen fertilisers, nitric acid and urea. The calcium carbide industry was very active, acetylene being used to greater extent than in 1959. An increase in the production of sodium carbonate is reported, while exports of this product also increased, although the total remains on a modest level.

Competition in Caustic

Home sales of caustic soda produced by the milk-of-lime process are suffering from increasing competition from electrolytically produced caustic, but there has nevertheless been an increased output due to improved exports. Sales of electrolytic caustic have been aided by a heavier demand from the man-made fibres, cotton and other industries as well as by a favourable export market; there have been corresponding increases in production of chlorine and chlorinated products. Demand for liquid chlorine has expanded greatly, mainly due to the needs of the producers of polyvinyl chloride and other synthetic resins. Production and consumption of calcium chloride remained on the same level as in previous years.

Demand for sodium sulphide increased in some sectors but diminished in others and, thus, was not able to absorb the output, which was similar to that for 1959.

Organic. Methanol production continued to expand; while exports declined to some extent this was more than offset by expansion of home demand. The same is more or less true of formaldehyde. Considerable increases in the production of acetic acid and acetic anhydride accompanied a particularly brisk demand from the man-made fibres and dyeing industries.

Satisfactory trends are reported in the production of esters of acetic acid used as solvents, and also of derivatives of ethylene and propylene used for anti-freeze and other purpose compounds.

Further expansion has taken place in the consumption of phthalic anhydride owing to increased demand from producers of plasticisers and polyester resins. Initially, production of this chemical was hampered by a shortage of naphthalene

but now, for the first time in Europe, phthalic anhydride is being produced from ortho-xylene, at a plant at Scan-zorosciate (Province of Bergamo). Expansion in home demand led to shrinkage of exports of phthalic.

The production of maleic anhydride expanded, covering the increased demand from the home market and providing a margin for exports.

There was a further pronounced improvement in the production and consumption of synthetic resins and plastics materials, polyvinyl chloride and polystyrene being outstanding. Italian imports

in this sector are continuing to dwindle while exports, particularly for p.v.c., polythene, polystyrene, urea-based moulding resins, continue to expand.

In the tar and benzole distillation sector, there was a pronounced improvement in demand for benzene, naphthalene, acid products, phenols, lampblack and coumarone resins.

The tanning extracts industry continued to struggle against difficulties. Imports increased by over 30% in 1960 while the aggregate capacity of the existing plants was utilised only to the extent of 55-60%. To make things worse, there was a 15-20% drop in prices.

Pharmaceuticals. Output tonnage recorded in 1960 was only slightly larger than the 1959 total. In value, this output totalled some 198,000 million lire, or only about 2½% more than in 1959. No accurate 1960 export-import figures for this industry are yet available, but it is known that the adverse balance of 4,000 million lire recorded in 1959 was somewhat reduced in 1960.

Underwater Tests for Radioactive Waste

A CONTRACT has been awarded by the U.S. Atomic Energy Commission to Pneumo-Dynamics Corp. of California to conduct sea tests of containers used to confine low level radioactive wastes during descent to 1,000 fathoms.

The tests are designed to determine the structure and behaviour of the various types of containers now used for disposal. Through the use of recently perfected underwater photographic tech-

niques it should be possible actually to 'see' how the container withstands the increase in pressure as it sinks through the water.

Types of containers to be tested include 55-gall. drums with the wastes imbedded in concrete inside the container; 55 gall. drums encased in concrete; and concrete shapes of various sizes. Most of these will be actual containers used by A.E.C. licensees and contractors.

Gentle and Versatile U.S. 'Robot' Has Electrically Actuated Joints

STRONG enough to lift a lead brick and delicate enough to replace a light bulb, the Mobot Mark II remote-handling machine is designed as a substitute for human operators in dangerous—e.g. radioactive or high-temperature—areas. It can twist its six-foot steel arms with remarkable flexibility, each arm having three joints, while soft inflated pads on its 'hands' can be controlled by the operator. With a television picture

of the operation transmitted to the control console, the operator can direct the operation from more than 100 ft. away.

Unlike predecessors with hydraulic 'muscles', the Mobot's joints are moved by electrical actuators precisely controlled by the operator. The machine was developed by the Hughes Aircraft Co., Los Angeles, parent organisation of Hughes International (U.K.) Ltd., Glenrothes, Fife.



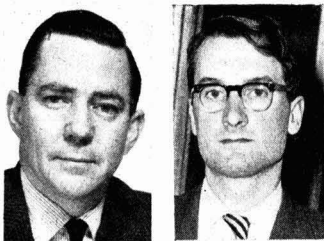
Light touch of the Mobot Mark II is illustrated by this photo, in which the machine prepares to pour liquid chemical from one flask to another

● **Mr. J. Creek, M.A.**, sales director of Fibreglass Ltd., has been appointed deputy managing director in addition. He became sales manager in 1952 and was appointed a director in 1954.

● **Mr. R. P. Newman, A.M.I.Mech.E.**, has been appointed head of the members' service department of the British Welding Research Association in succession to **Mr. P. H. R. Lane**, who has been appointed director of research of the Drop Forging Research Association. **Mr. T. R. Gurney, M.A., A.M.I.C.E.**, will succeed Mr. Newman in charge of B.W.R.A. fatigue researches.

● **Mr. Norman Hinton**, finance director of Simon-Carves Ltd., is visiting India, where he will discuss the probable formation of a new Simon-Carves company, an autonomous subsidiary that would prepare technical drawings and carry out heavy engineering contracts obtained in the sub-continent.

● **Dr. E. W. Bolle-Jones, M.Sc., Ph.D.**, who was with Agricultural Marketing Division of Shell International Chemical Co., has joined the European staff of the Sulphur Institute as assistant to the vice president, **Dr. R. Leclercq**. He will assist **Dr. Lerlercq** in the development of an expanded European research programme dealing with the uses of sulphur and sulphur products. He will be located in the institute's London office, which has its temporary address c/o Hughes and Hughes (Consultants) Ltd., 197 Knightsbridge, London S.W.7. From 1952 to 1957 **Dr. Bolle-Jones**, a British subject, was with the Rubber Research Institute of Malaya, part of the time as head of the Soils Division. He joined the Shell International Chemical Co. in 1958. As a member of their Agricultural Marketing Division, he has been studying trends in fertiliser usage, needs of underdeveloped areas and the development of new types of fertiliser materials. He has also been concerned with the development of new insecticides. From June 1959 to February 1960, **Dr. Bolle-Jones** was on leave from Shell to serve under the Colombo Plan in Indonesia, where he helped to set up a plant nutrition research unit at Bogor, Java.



Dr. E. W. Bolle-Jones (left) and Dr. J. Marten

● **Dr. James Marten, Ph.D., A.R.I.C.**, has been appointed chief chemist of Technicon Instruments Co. Ltd., London, the U.K. subsidiary of Technicon Controls Inc., U.S., manufacturers of the AutoAnalyser system of automated and continuous chemical analysis.

PEOPLE in the news

● **Mr. K. Grant and Mr. A. F. Wainwright** have been appointed directors of Peter Brotherhood Ltd., Peterborough, manufacturers of steam turbines, compressors, cooling towers, etc.

● **Dr. W. D. Scott**, managing director of B.T.R. Industries, has been elected chairman of the B.T.R. subsidiary, Artrite Resins, and **Mr. G. Alder** becomes its managing director.

● **Mr. Fred E. Wintzer**, who has been appointed marketing manager for plastics of Du Pont de Nemours International S.A., Geneva, was marketing manager for Butacite polyvinyl butyral resin in the polychemicals department of E.I. du Pont de Nemours at Wilmington.

● **Dr. A. C. Filson, Ph.D.**, an Australian, has joined Beck Koller and Co. (England) Ltd. and is in charge of all divisions of technical service. He was previously head of the plastics research division of the Metal Box Co. Ltd.

● **Dr. A. D. Lees** will become a managing director of I.C.I. Nobel Division at the beginning of April following the retirement at the end of March of **Dr. James Craik** and the appointment of **Dr. J. M. Holm** to succeed him as division chairman, **Dr. Lees**, who will be a managing director jointly with **Mr. Leslie Hall**, has been Nobel Division production director since April 1957.

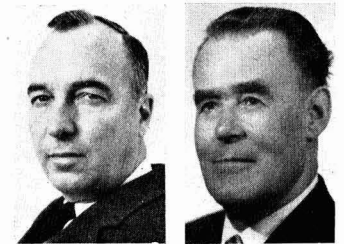
● **Dr. T. W. T. Baillie** has been appointed works manager and **Dr. R. D. Thrower** production manager of Carbide Industries Ltd., Northern Ireland. **Mr. W. C. Stewart**, formerly with I.C.I. Plastics Division, has been appointed research and development manager, and **Mr. J. F. Lawden** has become works analyst.

● **Dr. R. Whiteley, B.Sc., Ph.D.**, section manager at No. 3 olefin works, Wilton, has been designated manager of the new I.C.I. Heavy Organic Chemicals Division plant at Sevenside. **Mr. E. F. A. Banwell, B.Sc.**, of the oil works at I.C.I. Billingham Division, has been appointed engineer of the new H.O.C. Division Sevenside plant. Date of these appointments has not been fixed.

● **Mr. J. R. Rowlands**, a director of Henry Simon (Holdings) Ltd., has been

appointed a director of Simon-Carves Ltd., Cheadle Heath, Stockport. **Mr. G. P. Bridges**, has retired from the Simon-Carves board.

● **Mr. Joseph W. Smith** has been appointed director of contract operations for Kellogg International Corporation, London, a subsidiary of M. W. Kellogg, New York. Mr. Smith assumes the duties of **Mr. B. W. Jesser** who has been named assistant vice-president and director of engineering of M. W. Kellogg in New York. Mr. Smith will direct all operations of contracts awarded the London company for the engineering and construction of refineries, petrochemical and chemical plants. An assistant vice-president of M. W. Kellogg, Mr. Smith's former position was director of construction. He administered Kellogg's worldwide construction activities and was responsible as well for the effective integration of these activities with engineering and other Kellogg contract services.



J. W. Smith (left) and Dr. A. J. Amos

● **Dr. A. J. Amos, Ph.D., B.Sc., F.R.I.C.**, has been nominated by the council, Society for Analytical Chemistry, as president-designate to take office at the annual meeting in March. In partnership with **Dr. D. W. Kent-Jones** in an analytical and consulting practice that has a world reputation in cereals, vitamins, bread, confectionery and foodstuffs in general, **Dr. Amos** has been hon. treasurer of the society for four years. S.A.C. representative on the Chemical Council and a member of the Analytical Methods Committee, he was vice-president in 1953 and 1954. A governor of the National College of Food Technology, he was chairman of the Pure Food Centenary committee in 1960 and chairman of the Food Group, Society of Chemical Industry in 1954-56. Joint author of 'Modern Cereal Chemistry', **Dr. Amos** is a Freeman of the City of London.

● **Mr. J. McKell, C.A.**, has joined the board of both Quickfit and Quartz Ltd. and Q.V.F. Ltd. Both firms are members of the Tilling Group, of which Mr. McKell is a senior executive.

● **Mr. Glanvill Benn**, chairman of Benn Brothers Ltd., publishers of CHEMICAL AGE and other trade and technical journals, was elected to the reconstituted council of the Advertising Association at the recent annual meeting. **Commander A. O. Gillett**, a director of Benn Brothers, was elected to the council

(Continued on page 300)

แผนกหนังสือพิมพ์ กรมวิทยาศาสตร์

กระทรวงอุตสาหกรรม

TRADE NOTES

Delrin Price Cut

To broaden the market and open new application fields for their polyformaldehyde, Du Pont de Nemours International S.A., Geneva, have cut the price of Delrin acetal resin by 15 cents/lb., to 65 cents/lb. delivered at main European ports (see also p. 283).

More than 80% of the material's potential applications involve replacement of steel, brass, aluminium, and zinc. Since introduced commercially a year ago, it has been adopted for more than 500 commercial applications ranging from car parts to fishing reels.

Davy-Ashmore Export

The recently formed Davy-Ashmore subsidiary, Davy-Ashmore Export Co. Ltd. (C.A., 4 Feb., p. 207) will operate from offices at 15 Portland Place, London W.1 (telephone: Langham 5588).

New Goodyear Rubber

A new styrene-butadiene synthetic rubber has been developed by the Chemical Division of Goodyear Tire and Rubber Co., U.S. Claimed to have outstanding physical properties and be of an exceptional light colour, the rubber is stabilised with a non-staining, non-discolouring anti-oxidant. The new material, Plioflex 1510, is said to have features when compounded not normally associated with a low viscosity rubber.

The compound at the present is only available in the U.S., but it may be marketed in the U.K. at a later date.

Data on Polybutenes

Technical information, samples and commercial quantities of Indopol polybutenes are offered by Kingsley and Keith (Chemicals) Ltd., U.K. distributors of these polybutenes, increased quantities of which are now available with the bringing on stream of a new plant at the Wood River, Illinois, facilities of Amoco Chemicals Corporation, U.S. This new plant increases the manufacturing capacity by 60%.

Indopol polybutenes are liquid polymers made from butylene in 10 viscosity grades between 40 and 20,500 S.S.U. at 210°F. Principal uses are in caulks, automobile and refrigerator sealants and as intermediates for lubricating oil additives.

New Epoxide Resin

A new polyfunctional solid epoxide resin which has been produced by Leicester, Lovell and Co. Ltd., North Baddesley, Southampton, is thought to represent a significant break-through in epoxides and is claimed to give marked improvement in thermal, electrical and chemical resistance, and to make possible faster curing cycles owing to its abnormally high reactivity. The resin is stated to cost no more than an ordinary epoxide based on bisphenol-A.

The resin has already been used for

some industrial applications such as the matched-die moulding of glass-reinforced motor-car components, and the production, via 'pre-preg', of tubing. An epoxy value at least equal to that of the best liquid bisphenol-epoxide resins is claimed for this new solid resin.

The company are producing the new resin as an addition to their range of Epophen resins.

Changes of Name

Audley Engineering Co. Ltd., the valve manufacturers, are changing their name to Audco Ltd. with effect from 1 March.

H. and E. Lintott Ltd., Horsham, electro-mechanical engineers specialising in a wide variety of high-quality, light and heavy precision manufacture for the nuclear and general engineering industries, have changed their name to Lintott Engineering Ltd. The company is a member of the Ayling Industries Group.

pH Meters

Some interesting general facts about pH measurement, as well as details of the company's wide range of pH meters, are contained in an illustrated catalogue from Electronic Instruments Ltd., Richmond, Surrey. Simultaneously with pH meter development E.I.L. have devised and manufactured a wide range of electrodes using specially produced pH glasses; these electrodes vary from small ones used in medical research to comparative giants for use in industrial chemical reservoirs. A few of these, along with other accessories, are also illustrated.

Epoxy Flooring Material

A new flooring composition, Epiflor, a combination of special resins and aggregate, gives a coloured, non-slip topping $\frac{1}{8}$ in. thick, which is resistant to chemicals, oils and acids, and is claimed to have exceptional abrasion resistance. The manufacturers, Tretol Ltd., The Hyde, London N.W.9, state that it is especially suitable for use in chemical plants, plating shops, pickling shops, laboratories, food factories, paper mills, tanning plants and phosphating shops.

New Telephone Number

Telephone number of the Extrusion Division of High Duty Alloys Ltd., has been changed to Workington 2581/6.

Vyon Overseas Agents

Porous Plastics Ltd., formed in 1960 to handle the manufacture and marketing of Vyon porous plastics—made from Ziegler-type high density polythene—have appointed their first two overseas agents, who will explore new applications and develop sales in their respective countries. They are: Guardian Chemical and Equipment Co. Ltd., P.O. Box 392, Station 'O', Montreal 9, P.O., Canada,

and Industrial Composizioni Stampate, Via Guastalla 2, Milan (241), Italy.

Applications for Vyon include air and liquid filtration, air fluidised powder conveying, electrolytic diaphragms, orthopaedic splints and appliances, and filters and silencers on pneumatic equipment.

Magnetic Crack Detection

A new range of magnetic inks and powders for magnetic crack detection is being offered by Southern Tools Ltd., 22 Upper Mulgrave Road, Cheam, Surrey, who are manufacturers of penetrameters for industrial radiography. Two inks are available: black/grey high sensitivity and fluorescent; they are supplied in concentrated form in quantities to make 1 gallon.

DIARY DATES

MONDAY 20 FEBRUARY

S.C.I. with **C.S.** & **R.I.C.**—Aberdeen: Univ. Chem. Dept., 8 p.m. 'Some problems in chemistry of the gallotannins', by Prof. R. D. Haworth.
S.C.I.—London: 14 Belgrave Sq., S.W.1, 5.30 p.m. 'Experimental design in pesticide research', by Prof. T. A. Bennet-Clark.

TUESDAY 21 FEBRUARY

I.Chem.E.—Manchester: Coll. of Science & Tech., 6.30 p.m. 'Floating cap trays for absorption & distillation', by W. S. Norman.
S.C.I.—Birmingham: Birmingham & Midland Inst., 6.30 p.m. 'Jubilee Memorial Lecture: Polymer science in the university', by Prof. G. Gee.
S.C.I.—Edinburgh: Univ. Chem. Dept., 4.30 p.m. 'Some problems in chemistry of the gallotannins', by Prof. R. D. Haworth.
S.C.I.—Grangemouth: Maharrata Restaurant, 7.30 p.m. 'A.g.m. of Stirlingshire Section, followed by 'Petroleum refining: a chemist's view of today & tomorrow', by E. le Q. Herbert.
S.C.I.—London: 14 Belgrave Sq., S.W.1, 6.30 p.m. 'Magnetic resonance studies on high polymers', by Dr. D. C. Libby.

WEDNESDAY 22 FEBRUARY

S.C.I.—London: 14 Belgrave Sq., S.W.1, 6.15 p.m. 'Microbiology of deep frozen foods', by Dr. H. Rachel White, Dr. B. J. Wagg & Miss M. Boothroyd.

THURSDAY 23 FEBRUARY

C.S.—Bristol: Univ. Chem. Dept., 6.30 p.m. 'Simplest type of chemical reaction', by Prof. T. L. Cottrell.
C.S.—Liverpool: Univ. Chem. Dept., 5 p.m. 'Chemical control of plant growth', by Prof. R. L. Wain.
C.S.—London: Burlington Hse., Piccadilly, W.1, 10.30 a.m. Day symposium on 'Terpene chemistry'.
Fertiliser Soc.—Burlington Hse., Piccadilly, W.1, 2.30 p.m. Francis New Memorial Lecture, by H. Stevensen-Nielsen.
Inst. Metals—London: 17 Belgrave Sq., S.W.1, 6.30 p.m. 'Theory of alloys of copper', by Prof. W. Hume-Rothery.
O.C.C.A.—London: 26 Portland Pl., W.1, 7 p.m. 'Pigments in corrosion prevention', by Dr. N. R. Barucha.
R.S.—London: Burlington Hse., Piccadilly, W.1, 4.30 p.m. 'Some recent developments at the N.P.I.', by Sir Gordon Sutherland.
S.C.I. with **C.S.** & **R.I.C.**—Belfast: Chem. Lecture Theatre, Queen's Univ., 7.45 p.m. 'Principles of radiation chemistry & possibilities of its industrial application', by Prof. F. S. Dainton.
S.C.I. with **C.S.** & **R.I.C.**—Bristol: Univ. Chem. Dept., 6.30 p.m. 'Simplest type of chemical reaction', by Prof. T. L. Cottrell.

FRIDAY 24 FEBRUARY

C.S.—Birmingham: Univ. Chem. Dept., 4.30 p.m. 'Structure of bacteria', by Prof. J. Baddiley.
C.S.—Cambridge: Univ. Chem. Labs., 8.30 p.m. 'Recent advances in chemistry of D vitamins', by Prof. B. Lythgoe.
C.S.—St. Andrews: St. Salvador's Coll. Chem. Dept., 5.15 p.m. 'Some problems in structural chemistry of polysaccharides', by Prof. E. L. Hirst.
C.S.—Southampton: Univ. Chem. Dept., 5 p.m. 'Spectroscopy of benzene', by Dr. D. H. Whiffen.
S.A.C.—London: Burlington Hse., Piccadilly, W.1, 6.45 p.m. 'A.g.m. of Microchemistry Group.'

Commercial News

Albright—W. J. Bush

According to the formal notice of the £8,500,000 cash and share offer by Albright and Wilson for W. J. Bush, the terms assure Bush ordinary shareholders an increased income for 1961 equivalent to 16½%, against 12½% paid or proposed by Bush themselves for 1960. Besides this, ordinary shareholders will receive 4s a share in cash, and "A" holders will exchange non-voting shares for voting stock.

Albright's foreshadow ordinary dividends totalling at least 20% for 1961 on the capital as increased through the present offer, which is open for acceptance until March 7. Bush are to carry on under their own name. Their chairman, Mr. Eric Bush, will join the Albright board upon the offer becoming unconditional.

Blythe Colour Works

Group net profit of Blythe Colour Works for 1960 was £192,972 (£174,438) after tax of £189,250 (£164,011). Final dividend of 6d per 4s share is declared, making 1s (equivalent to 10.8d).

Bowmans Chemicals

Profit of Bowmans Chemicals Ltd. for the year ended 31 October was a record. Trading profit totalled £54,688 (£22,007). Tax took £33,519 (£12,157) and net profit was £24,976 (£12,298). A final dividend of 7½% is declared, equivalent to 11.35% on the new capital (7.69%).

In his annual report, Mr. J. A. E. Howard, chairman, says the company expects very shortly to start investing capital in diversifying the product range. The new lactic acid plant has given increased production and higher purity with lower costs. Coupled with an increased efficiency this has enabled the company to cut prices and expand sales, particularly exports. In the current year, business has continued at about the same level and profits for 1960-61 are expected to be about the same or slightly better.

Hilger and Watts

Hilger and Watts, scientific instrument manufacturers, have announced a final dividend of 10% making 15% (12½%) for the year ended 30 September 1960 on increased capital. Group net profits showed a decrease from £126,575 in 1959 to £83,346, and the parent company's profit also decreased from £122,798 to £73,602. This fall in profits was mainly due to delays in achieving certain planned programmes.

Monsanto Chemicals

Group net profit of Monsanto Chemicals Ltd. for 1960 was £1,700,342 (£1,693,266). Dividend is maintained at 15%, with an unchanged second interim of 6d. Trading profit rose from £4,525,026 to £4,835,359, but this was offset by increased depreciation and obsolescence provisions and heavier

- Albright Forecast 20% Total Dividend
- More-than-doubled Profit for Bowmans
- Monsanto Sales Hit Record £20.7 million
- Canadian Industries Income Up 5%

taxation.

Parent company's net sales increased from £18,427,505 to £20,761,862, exceeding £20 million for the first time. Net income, after tax, was £1,416,569, against £1,336,424.

Sir Miles Thomas, chairman, referring to the second half of 1960, says that although the company increased its turnover, the recession in durable consumer goods induced by the credit squeeze had its inevitable effect, particularly in plastics and the range of products for the motor industry.

Nevertheless, he points out, during the year as a whole new high figures were again established by the company for both sales and profit. The high export proportion of sales was well maintained at 35% in extremely competitive and difficult conditions.

Aquitaine

Turnover in 1960 of Societe Nationale des Petroles d'Aquitaine was about N.Fr.301 million (N.Fr.162 million) or £21.9 million (£11.8 million). The Lacq refinery in January treated 460 million c.m. of raw gas (297 million) and produced 88,000 tonnes of sulphur (55,700 tonnes).

Canadian Industries

Consolidated sales of Canadian Industries Ltd. and subsidiaries in 1960 totalled \$170,737,000, an increase of 12%. Consolidated earnings, after allowing for dividends on preferred stock, were 74 cents a common share (70 cents); dividends on common stock totalled 50 cents a share (same). Income from operations was 10% higher than the 1959 figure, despite a larger provision for depreciation and costs associated with the start-up of new plants. However, after claiming maximum capital cost allowances, the resulting provision for income taxes was 19% higher and net income at \$6,575 was 5% up on 1959.

Exports of Terylene and polythene were more than doubled, although prices obtained in foreign markets were relatively low. Domestic sales of C.I.L. products increased, particularly paints, ammonia and Terylene. Lower sales of sulphuric and nitric acids and explosives resulted from reduced business with the mining industry, notably the uranium mines. A penterithritol tetranitrate plant at Beloeil, Quebec, and a caustic potash plant at Cornwall, Ont., were completed in 1960.

Commercial Solvents

Net profit of Commercial Solvents Corporation over 1960 is expected to be

equal to \$1.65 a share (\$1.02), despite an anticipated fall in turnover from \$70 million to \$65 million as the result of the taking-over of certain of the company's operations by the Chatham Chemical Corporation.

Diamond Alkali Co.

Diamond Alkali Co., U.S., report 1960 sales of \$138,300,000 (\$137,900,000) and a net profit of \$11,740,000 (\$11,330,000) or \$3.87 (\$3.79) per share.

Dixon Chemical

Dixon Chemical and Research Inc., U.S. producers of sulphuric acid, have entered the field of specialty coatings, sealing compounds and chromic acid by contracting to purchase all of the capital stock of Better Finishes and Coatings Co. and their subsidiaries. Better Finishes produce a variety of industrial and maintenance coatings, such as urethanes, epoxies, vinyls and alkyds. Dixon recently introduced a new aluminium sulphate plant while the affiliated Dixon Chemical Industries will come on stream with a hydrofluoric acid plant at Paulsboro this summer.

Dow Chemie AG

Dow Chemie AG, the Swiss subsidiary and one of the major holding companies of Dow Chemical, Midland, Mich, are to raise their capital from S.Fr. 25 million to S.Fr.60 million.

Fertilizers and Chemicals

Sales of Fertilizers and Chemicals Ltd., Haifa, for the year ended 31 March last totalled £25.9 million (£22.3 million), of which exports took £1.7 million (£1.3 million). Gross profit was £6.6 million (£5.3 million) and net income £3.5 million (£2.6 million). Production was valued at £23.6 million (£21.1 million). Sales in 1960-61 are expected to rise to £28 million.

In 1959-60 fertilisers accounted for 60% of total sales, compared with 90% in 1956; the balance being industrial chemicals, intermediates and detergents. The ammonia plant extension was operated to full capacity; a new granulation and compound fertiliser plant nearing completion should be on stream soon.

Hoechst

Group turnover in 1960, excluding foreign affiliates, of Farbwerke Hoechst is DM2,680 million (about £227.9 million) compared with DM2,220 million in 1959. Turnover of foreign affiliates, after deduction of deliveries from the parent group, totalled DM270 million. During

1960, DM417 million was invested at home and DM80 million in home and foreign affiliates.

I.C.I.A.N.Z.

Group profit of Imperial Chemical Industries of Australia and New Zealand (Pty.) Ltd. for the year ended 30 September was a record £A3,082,007 (£A3,077,969), after tax of £A2,451,332 (£A2,603,588) and depreciation of £A2,489,347 (£A2,128,018). Dividend is 10% (same).

Competition from imports is expected to continue this year; where necessary to maintain sales, prices have been cut. All chemical plants were operated at a high level and sales of industrial chemicals again increased.

Italian-U.S. Agreement

Snia Viscosa and Ledoga, both of Italy, have signed an agreement with Chas. Pfizer, New York, giving the latter a one-third interest in L.I.R.C. (Laboratori Italiani di Ricerca Chimica), a company set up in Milan in 1956 for commercial utilisation of itaconic-acid. L.I.R.C., who will now expand their activities on a world-wide scale, produce Dialux A and Dialux C, two thermoplastic resins derived from itaconic acid.

Jordanian Phosphate

The Jordanian Phosphate Co. have asked permission of the U.S. Development Fund to sell 180,000 of their 1,000,000 one-dinar shares to the Jordanian Government. The Government already holds 300,000 of the shares.

Monsanto Chemical

Capital expenditure by Monsanto for 1960 will total about \$75 million, according to the company's vice-president. In addition, research expenditure for the year will total \$30 million. Overall, the company expects to have spent \$108 million on new plant and equipment in 1960, when the company's share of capital outlays by subsidiaries is included.

National Distillers

National Distillers and Chemical Corporation, U.S., last year had a net profit of \$21,400,000 (\$26,300,000) or \$1.92 (\$2.36) per share, after sales of \$580,200,000 (\$578,300,000).

Norsk Hydro

Annual report of the Norwegian chemical and fertiliser concern, Norsk Hydro, reveals that total sales of all products reached Kr.562 m. as against Kr.515 m. in the previous year. Exports accounted for Kr.395 m. of the total. Net profit was Kr.20.6 m. and a dividend of 9%, as against 8% in the previous year, was proposed.

Output tonnages—see 'Overseas News', p. 294.

Reichhold Chemie AG

Reichhold Chemie AG, Hamburg, announce a turnover for 1960 of over DM42 million, or 25% above 1959. Investments in 1960 were DM4 million,

while a further DM12 million is expected to be invested in the coming two to three years, partly in expansion of the main Hamburg production unit.

Saint-Gobain

Saint-Gobain are raising their capital from N.Fr.387,600,000 to N.Fr.516,800,000. New shares with a face value of N.Fr.75 are being issued at a ratio of three to one and at a unit rate of N.Fr.180.

Schering AG

Schering AG, Berlin, have increased their capital from DM 14 million to DM 84 million. The new shares are being issued at 150% of face value to shareholders, on a one-for-six basis. The company proposes to invest some DM 35 million over the current year.

Union Carbide

Union Carbide, U.S., recorded in 1960 sales of \$1,548,200,000 (\$1,531,300,000). After tax of \$130,600,000 (\$163,500,000), net profit totalled \$158 mn. (\$171,600,000), or \$5.25 (\$5.70) a share.

INCREASES OF CAPITAL

CHEMICALS TRADING CO. LTD., 18/20 Creechurch Lane, London E.C.3. Increased by £5,000 beyond the registered capital of £10,000.

DU PONT DE NEMOURS (NEDERLAND) N.V., The Hague. Capital has been increased from Fl30,200,000 to Fl41,200,000 (approximately from £3 million to £4 million).

ROWE INDUSTRIES (KIRKBY) LTD., chemical manufacturers, etc., Acornfield Road, Kirkby, near Liverpool. Increased by £25,000 beyond the registered capital of £40,000.

NEW COMPANY

FLUID POWER LTD. Cap. £5,000. Inventors, designers, manufacturers of and

dealers in pumps, compressors, accumulators, pressure vessels and other machinery connected with the generation, control, supply, distribution and application under pressure or otherwise of gases, and liquids, etc. Subscribers: D. A. Larner (mechanical engineer) and A. P. Larner, both of 126 Kew Road, Richmond, Surrey.

People in the News

(Continued from page 297)

as a representative of the Periodical Proprietors' Association. Reorganisation of the association means that the council now represents all interests of Britain's £400 million advertising business.

● The composition of the U.K. Advisory Council on Education for Management has been announced. **Mr. J. W. Platt**, a director of Shell Transport and Trading Co. Ltd. and formerly a managing director of the Royal Dutch Shell Group, is to be chairman. Representatives of professional institutions and industrial organisations, etc., include **Mr. E. Le Q. Herbert**, president, Royal Institute of Chemistry, and managing director of Shell Refining Co. Ltd., for the R.I.C.; **Sir Leonard Owen, C.B.E.**, member of production, U.K. Atomic Energy Authority, for the Institution of Civil Engineers; **Sir Ewart Smith, F.R.S.**, formerly a deputy chairman of I.C.I., for the Institution of Mechanical Engineers; and **Dr. E. G. Edwards**, principal, Bradford Institute of Technology, for the Association of Principals of Technical Institutions.

● **Mr. A. D. Lidderdale, M.I.Mech.E., M.I.Prod.E.**, has been appointed general manager of Leybold-Elliott Ltd., the new company recently formed by Elliott Brothers (London) Ltd., a member of the Elliott-Automation Group, and Leybold's of Cologne.

Market Reports

NO EASING IN NAPHTHALENE SUPPLIES

LONDON Trading conditions in the industrial chemical market have been steady with no marked expansion in any section. Intake of the routine soda products and potash chemicals against contracts continues to cover good quantities, and in other directions the movement is unchanged on balance. Prices generally are steady at recent levels.

The demand for fertilisers has considerably increased during the past two weeks, while firm conditions continue in the coal tar products market. Cresylic acid and the creosote oils in good call and the supply position of the naphthalenes and the pyridines is not easier.

MANCHESTER From the point of view of additional business, fairly satisfactory trading conditions have been reported for heavy chemical products; leading industrial outlets are calling for steady deliveries of alkalis and other lines against contracts. Export move-

ments of dyestuffs, pigments and plastics materials keep up reasonably well. Prices generally are steady to firm. The light and heavy tar products are mostly going steadily into consumption, and in the market for fertiliser materials there has been a brisker demand for compounds, superphosphates and nitrogenous materials.

SCOTLAND Although the week opened briskly with a good volume of business to report, there was a slight falling off towards the end. Most of the usual range of day-to-day chemicals were demanded, and quantities showed little change and again mostly against spot requirements. There is still a good volume of enquiries for the overseas market and these have been varied. The position of agricultural chemicals is still seasonably quiet, although, as already reported, interest is growing in forward requirements.

Bookshelf

DEVELOPED AND EXPANDED INDEX OF ORGANIC REACTIONS

NAME INDEX OF ORGANIC REACTIONS. By *J. E. Gowan* and *T. S. Wheeler*, Longmans, London, 1960. Pp. v+293. 50s.

The first edition of this book proved deservedly popular; this second edition is considerably expanded and developed and should be of even greater value. The body of the work consists of brief notes on over seven hundred organic reactions, listed alphabetically under the name of the investigator generally associated with the process. The entry consists of a brief statement of the nature of the reaction, usually in one or two sentences, with equations and, where appropriate, structural formulae. The entry concludes with one or more references to original papers, review articles, and frequently to certain key works of reference such as Robinson-Rodd, Gilman, and 'Organic Reactions'.

Naturally, in a work of such a scale, individual workers may notice one or two instances where the most recent reference is not given—as for example the Harries ozonide reaction—but such instances are rare and do not seriously detract from the real value of the book. These are useful cross-references between related reactions and a most valuable innovation is a brief type of reaction index. The layout of the book, and the setting of the structural formulae are excellent, and the alphabetical index on the upper corner of each page is to be highly commended. Altogether a book to be recommended to all organic chemists.

► Spectroscopy

NMR AND EPR SPECTROSCOPY. By *NMR/EPR Staff of Varian Associates*. Pergamon Press, London, 1960. Pp. viii + 288. 80s.

Since the end of the 1939-45 war many new exciting techniques have been developed in the realm of spectroscopy. Chief among these have been high resolution nuclear magnetic resonance and electron paramagnetic resonance spectroscopy which utilised the magnetic properties of nuclei and electrons to yield an insight into the structure of molecules and valence bonds.

Throughout this period Varian Associates have been the leading firm in the commercial production of high-performance NMR and EPR spectrometers.

This volume is divided into three parts: an introduction of 80 pages deals with the necessary background and fundamental theory of both methods; part 2 (110 pages) deals comprehensively with high resolution NMR spectroscopy

and part 3 in a similar fashion with EPR spectroscopy. Included in these sections are details of some of the valuable laboratory sessions which form an essential part of the course.

This comprehensive well-indexed book is undoubtedly an asset for the general reader.

► Ceramic Glazes

CERAMIC GLAZES. By *F. Singer* and *W. L. German*. Borax Consolidated, London, 1960. Pp. viii + 112.

This well-produced paper-backed handbook is a complete revision by *W. L. German* of *Singer's* previous book of the same title. Some material covered in *Singer's* 'Low Solubility Glazes' has also been included. The author has written for potters and students and teachers of pottery. Consequently there is very little about the fundamental chemistry and physics of glazes. The book is for the technician rather than the technologist. It should prove very useful. The classification of glazes is considered first, then the raw materials, the preparation of a glaze and its application and its melting. The major classes of glaze are then treated under the headings of lead glazes, leadless glazes, vapour glazing, opaque glazes, matt, crystalline and lustre glazes. Finally, the author considers glaze fit, defects, testing and the effect of glazing on mechanical strength. In the discussion of composition every effort is made to point out the properties conferred by each constituent of the glaze. There are very full appendices—more or less one for each chapter. A wealth of material is attractively presented in a small compass.

► Rare Earths

ANALYTICAL CHEMISTRY OF THE RARE EARTHS. By *R. C. Vickery*. Pergamon Press, Oxford, 1961. Pp. viii + 139. 40s.

It is claimed by the author that this third volume on special aspects of chemical analysis is the first of its kind devoted specifically to the detection and estimation of the lanthanides. This is understandable when it is realised that the larger part of the references drawn on relate to material published in the last ten years or so following the successful development of ion-exchange methods of separation of natural and fission-product rare earths.

The first five chapters deal with ordinary chemical operations—sample

decomposition, qualitative reactions, separation procedures, gravimetric and volumetric estimation methods. These pages contain a profusion of new and valuable information and in many instances procedures are described in detail. Spectrophotometric analysis based on absorption bands and on absorption spectra developed by the formation of coloured dye complexes, emission spectrography, X-ray absorption and emission spectrophotometry occupy three more chapters which are extremely well written; the author has handled this largely new material in a most competent fashion. Lastly there is a chapter on radiochemical techniques, which includes short appendices on abundances and on the polarographic determination of europium and ytterbium, the only two of these elements which can, so far, be determined satisfactorily by this method.

In terms of size this book can be considered expensive but those who are concerned with the analysis of these elements will find it money well spent. Furthermore those who teach advanced methods of analysis, especially with the aid of spectrometers, will find it will initiate a number of profitable exercises and techniques.

► Vitreous State

MODERN ASPECTS OF THE VITREOUS STATE, VOLUME I. Edited by *J. D. Mackenzie*. Butterworths, London, 1960. Pp. viii + 226. 50s.

The traditional attachment of chemists to compounds of invariant composition and clearly defined properties may account for the lack of interest that they have shown in glasses. A simple definition of a glass, such as the editor gives in the first chapter, takes up several lines. Even this is not universally accepted and so the title refers to the vitreous state. The neglect by physicists is less understandable but it may be one aspect of the neglect of classical physics. Whatever the reason, there are very few books about glass; the present one will be very welcome and its successors will be eagerly awaited.

The editor has stuck to the 'Modern aspects' of his title; there are few recipes. A short introduction on 'General aspects' (*J. D. Mackenzie*) is followed by roughly equal chapters on 'X-ray diffraction studies' (*S. Urnes*), 'Crystallisation kinetics and glass formation' (*D. Turnbull* and *M. H. Cohen*), 'Constitution of phosphate glasses' (*A. E. R. Westman*), 'Nuclear magnetic resonance absorption in glass' (*P. J. Bray* and *A. H. Silver*), 'Infra-red studies of glass' (*I. Simon*), 'Nature of the glass transition and the vitreous state' (*J. H. Gibbs*), 'Structure of some inorganic glasses from high-temperature studies' (*Mackenzie*). There are full subject and author indices. It can be seen from the latter that few scientists have done sufficient research on the vitreous state to warrant many references to their work. This series should encourage more prolonged intensive studies of a field that offers much of interest.

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.

AMENDED SPECIFICATIONS On Sale 22 March

Oxacyclobutane polymers. Hercules Powder Co. 758 450
Polymerisation of acetylenic compounds. Imperial Chemical Industries Ltd. 802 510
Phenothiazine derivatives. Farbenfabriken Bayer AG. 808 049
Separation of hydrogen from gaseous mixtures containing hydrogen. Johnson, Matthey & Co. Ltd. 827 681

ACCEPTANCES

Open to public inspection 29 March

Catalysts and catalytic conversion processes. British Petroleum Co. Ltd., Yeo, A. A., and Turner, R. 863 852
Apparatus for purifying crude benzene. Koppers GmbH, H. 863 812
Heating system utilising catalytic combustion. Weiss, G. 864 064
Methods of manufacturing cellular rubber from latex and products obtained therefrom. Soc. Auxiliaire de L'Institut Francais Du Caoutchouc. 864 122
Manufacture of phosphorus-containing ethylene imine type compounds. Farberwerke Hoechst, AG. 864 021
Manufacture of unsaturated aliphatic-diols. Ciba Ltd. 864 261
Process for the production of water or hydrogen enriched with deuterium. Uhde GmbH, F. 864 026
Corrosion inhibitors. Albright & Wilson (Mfg.) Ltd. 864 027
Hydrocarbon radiochemistry. Esso Research & Engineering Co. 864 225
Process for resolving an azeotrope consisting of methanol and a tri-borate ester of methanol, or consisting of ethanol and a tri-borate ester of ethanol. American Potash & Chemical Corporation. 864 226
Disazo-dyestuffs derived from cyanuric chloride and process for their manufacture. Ciba Ltd. 864 227
Azo-dyestuffs derived from cyanuric chloride and process for their manufacture and use. Ciba Ltd. 863 754
Process for producing azo-dyestuffs insoluble in water on the fibre. Farberwerke Hoechst AG. 864 228
Polymerisation of lactams. Monsanto Chemical Co. 863 859
Steroids and the manufacture thereof. Upjohn Co. 863 777, 863 778, 863 779, 863 780, 863 781, 863 782
Process for the manufacture of polymer compositions. Farberwerke Hoechst AG. 863 860
Isomerisation processes and catalysts useful for same. Kellogg Co., M. W. 863 800
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Acyl derivative of esters of citric acid. Miles Laboratories Inc. 863 792

Metallisable mono-azo dyestuffs. Holliday & Co. Ltd., L. B. 863 861, 864 093
Steroid recovery process. Pfizer & Co. Inc., C. 864 094
Ion-exchange materials. Imperial Chemical Industries Ltd. 863 862
Trisubstituted ureas and compositions containing same. Monsanto Chemical Co. 864 095
Steroid compounds. Searle & Co., G. D. 864 307
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Government Reveals Policy on Scottish Shale Oil Plants

The West Lothian shale oil reserves do not justify development and expansion, in the view of the Government, and unemployment arising through the closing of shale oil plants must be met by development of other industries. The Secretary of State for Scotland has given this decision, following a protest from West Lothian County Council against declassification of the area as a depressed area. Fear expressed by the county is that further closings may be necessary.

The Government has indicated that some alternative form of aid may be given in place of duty preference, which will end not later than 31 December 1964. This decision indicates clearly that Government policy is now to replace the chemical and shale oil activities in this area by alternative employments and to regard the continuing activity as a potentially declining industry, rather than a potentially expanding one.

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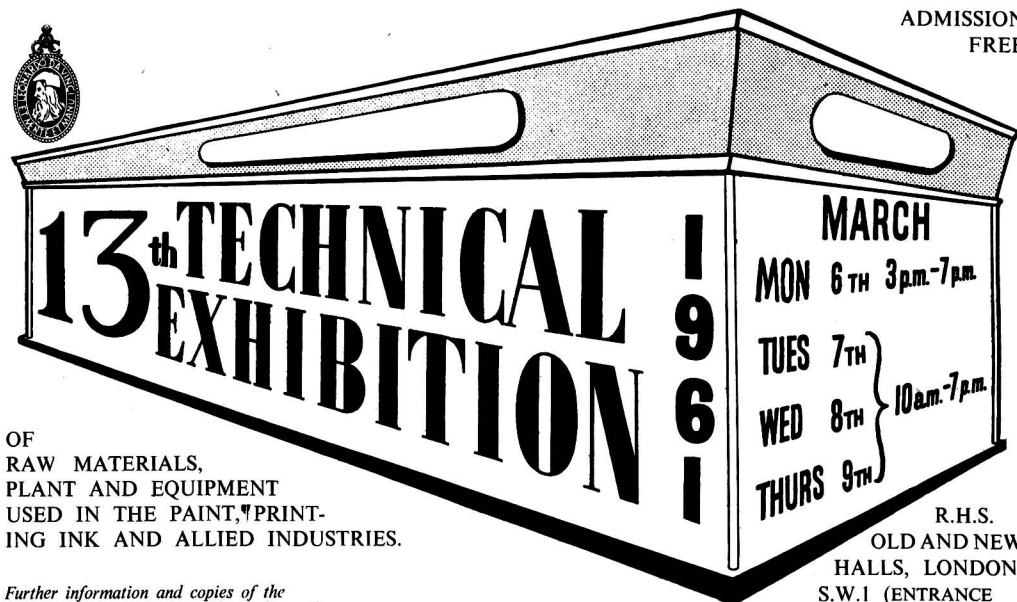
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Continued from page 306

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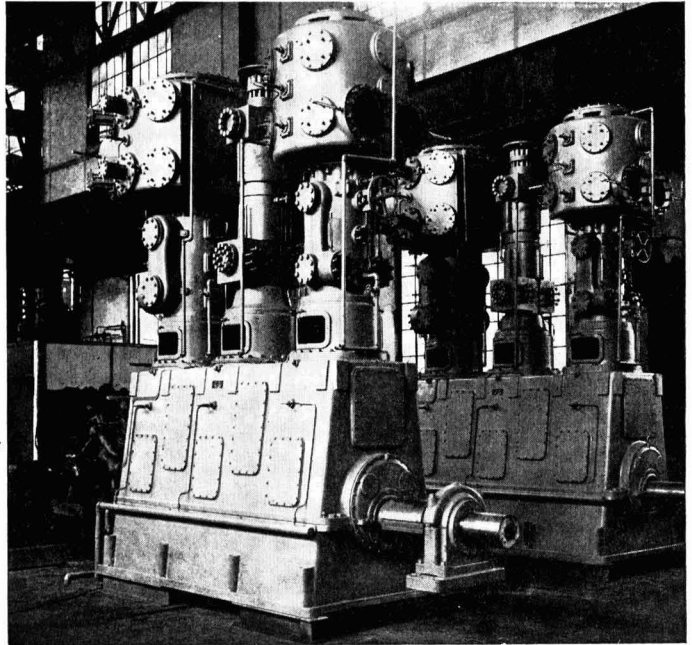
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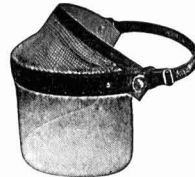
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