Chemical Age

incorporating

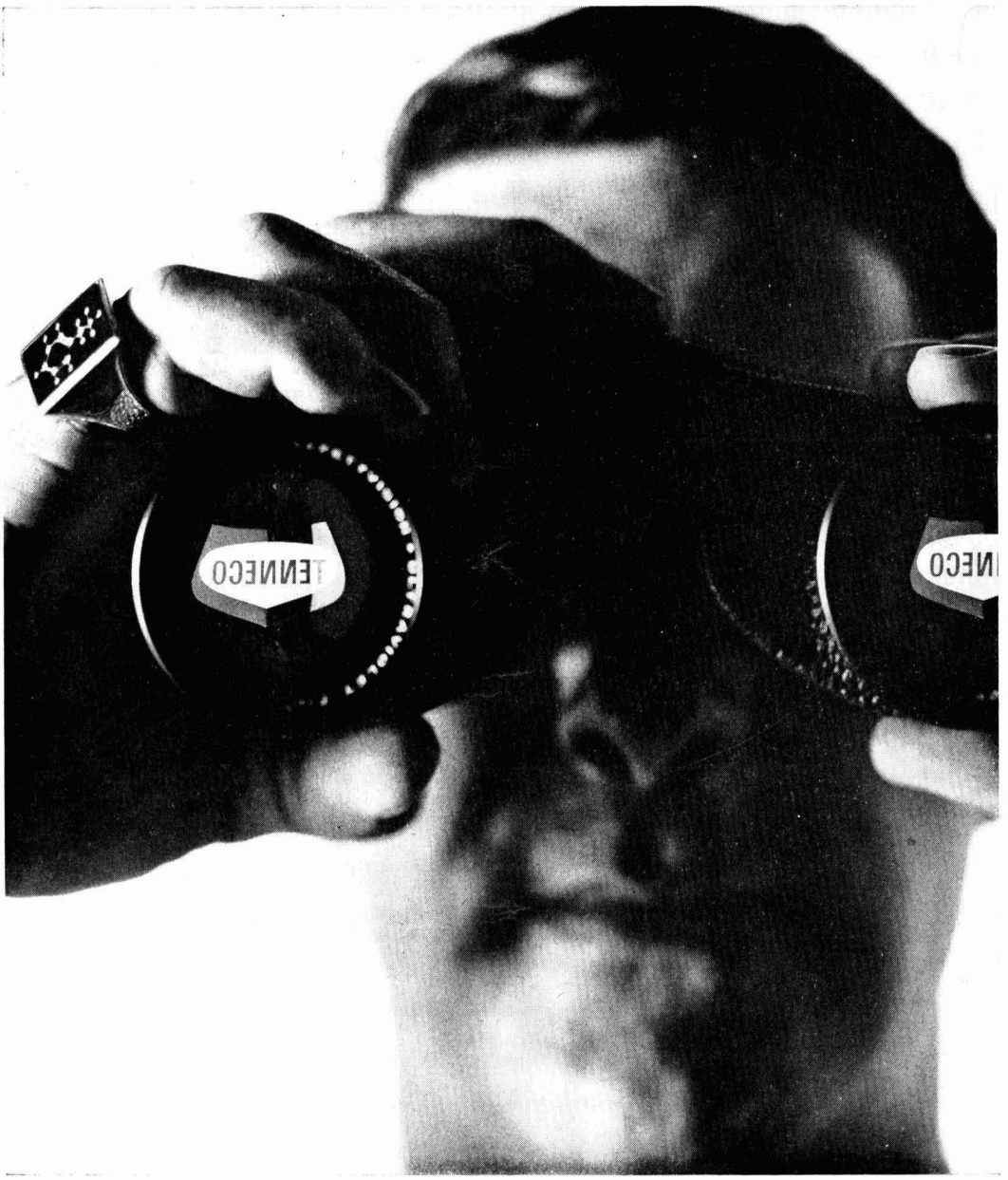
PETROCHEMICALS and POLYMERS

VOL. 86 No. 2209 11 NOVEMBER 1961

INDEX TO ADVERTISERS

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

(*Continued on page 740*)



Tenneco takes a long look at petrochemicals

In the days ahead many new petrochemicals will be developed. . . . We're preparing now to meet your needs of tomorrow. Backed by the resources of one of America's great industrial leaders—Tennessee Gas Transmission Company—we have the capital, the brainpower, the reserves and, above all, the will to create them. • A new world of petrochemical magic lies ahead. And Tenneco Oil Company will help bring it to you. When you need petrochemicals, THINK TENNECO.

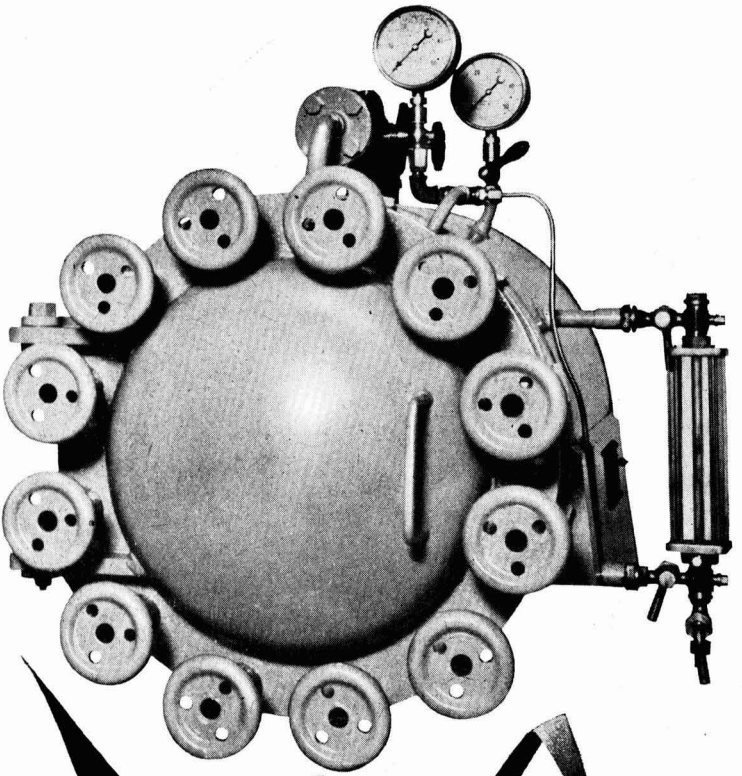
TENNECO

THINK TENNECO

TENNECO OIL COMPANY
PETROCHEMICAL SALES
P.O. BOX 18, HOUSTON 1, TEXAS, U.S.A.
A SUBSIDIARY OF TENNESSEE GAS TRANSMISSION COMPANY
CABLE ADDRESS: TENNGAS — HOUSTON, TEXAS

INDEX TO ADVERTISERS

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



HERE'S AN INTERESTING PLANT

PRODUCED BY LENNOX

In their 50 years and more of producing equipment for the Chemical Industry, Lennox Foundry have met some highly individual demands. "Specialised unit plants", they call them, designed for a very specific purpose. This, bear in mind, is in addition to the mainstream of their activities which is the manufacture of plant for a wide range of less unorthodox processes.

Experience of this length and breadth in the world of chemical engineering is embodied in every piece of equipment that Lennox provide. It might be a complete plant or simply a single item such as a Pump or a Valve, a Pipe or a Fitting, a Nozzle for mixing or a Dish for etching—all these and more of the apparatus that industry needs are supplied by Lennox and thus backed by the 'know-how' and skill that ensure satisfaction.

And much of it in Tantiron, which is the original and still the finest acid-resisting ferrous metal in the world.

Lennox introduced this high grade silicon iron in 1910. Since that time, constant improvement in casting techniques has widened the scope of its application. Today castings of the finest quality—from the simplicity of a length of pipe work to the intricacy of an absorption tower—are serving every sphere of industry where corrosion and erosion are encountered. If yours is such an industry—Steel, Gas, Petroleum, Textiles, Chemicals—get in touch with Lennox —they're bound to produce something that will interest you.

Lennox

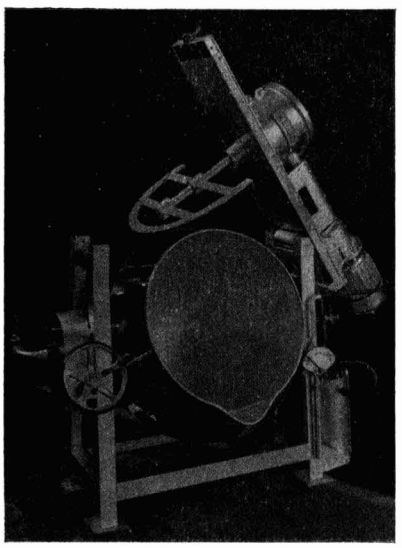
LENNOX FOUNDRY COMPANY LIMITED

Chemical Engineers

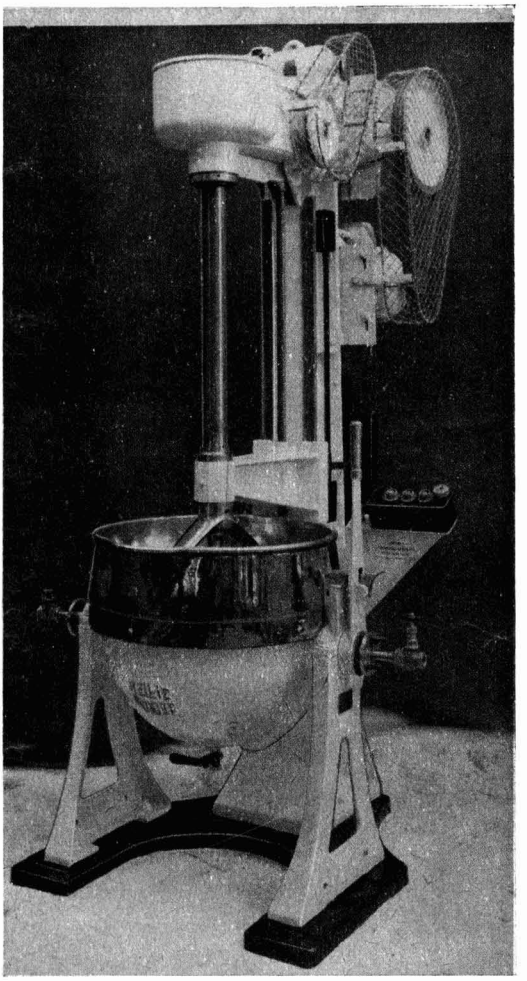
Tantiron Foundry, Glenville Grove, London, S.E.8.
Tel: TIDeway 2401/2 Telex: Equifex Green, London.

AP10

Heavy Duty Hydraulic Mixing Machine for caramel, nougat, etc., 1½ to 3 cwts. capacity, Type 16 PD.



This Mixing Machine has Pan lined with Pure Silver. Type 23 PJ.



Mixing Machine for caramel, etc., 1½ cwts. Type 7 PD.

Illustrated here are only a few of the many types of Mixing Machines that are being produced by Kellie of Dundee.

For almost fifty years, Robert Kellie & Son, Limited, have been supplying the Food, Baking & Confectionery Trades with Mixing Machines, of all types, fabricated in Stainless Steel, Copper Alloys, Aluminium and other metals. Designed to meet individual requirements, these mixing machines are in service in many of the leading factories in Britain and abroad.

If your manufacturing process involves mixing of any kind . . . viscous or non-viscous, food, chemicals, liquids, cereals, light or heavy duty . . . Call in Kellie of Dundee . . . they are the specialists . They have been producing high quality mixing machines at economical prices for almost half a century.

Write or telephone now for details of the Kellie Technical Consulting Service. It is free and without obligation.

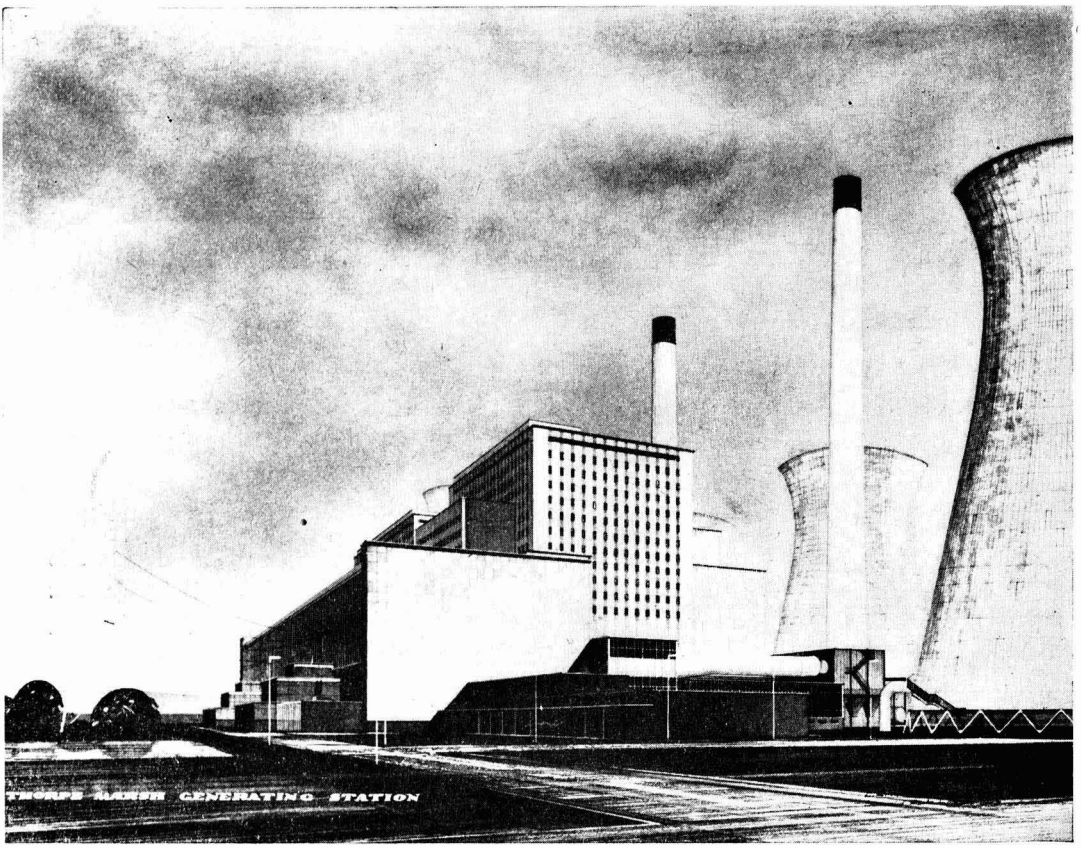
KELLIE

FOR MODERN FOOD PLANT

ROBERT KELLIE & SON LTD.

THE DUNDEE FOUNDRY · DUNDEE · SCOTLAND

Telephone: Dundee 25687/8 *Telegrams & Cables: KELLIE, DUNDEE*



THORPE MARSH

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

The Neckar Water Softener Co. Ltd. is engaged in providing the water softening plant at this station.
Neckar has the knowledge and experience to supply deionisation water treatment plants for installations such as this and for all other purposes.

NECKAR

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

Telegrams : Neckarist Sowest London

VOL. 86 No. 2209
NOVEMBER 11 1961

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

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

Director N. B. LIVINGSTONE WALLACE

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

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

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

IN THIS ISSUE

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

Chemical Age
incorporating
PETROCHEMICALS and POLYMERS

BOUVERIE HOUSE · 154 FLEET STREET · LONDON · EC4

DECISION ON METHANE

BARELY had the Minister of Power informed the House of Commons of the decision to approve the Gas Council's plan to import methane from the Sahara on long-term contract before outraged voices were raised in protest. Sharp criticism came from the N.C.B., while the National Union of Mineworkers looked at the decision with "disgust". However it does not seem likely that the coal industry's hostility to the scheme will reach serious proportions.

It is clear that the cause of the present controversy springs from the different attitudes of the N.C.B. and the Gas Council towards methane. The N.C.B. regards imported methane as competitive with Lurgi gas; the Gas Council does not. The N.C.B. is placing great hopes on the present joint study of Lurgi plant prospects and Lord Robens, N.C.B. chairman, expressing his disappointment with the methane decision, felt that the Minister should at least have waited until the Lurgi investigation committee presents its report in two or three months time. However, Sir Henry Jones, Gas Council chairman, believes that the long-term effects of the methane scheme will be to the coal industry's benefit as well as the gas industry's.

A good proportion of the imported methane will be used in the new Midlands Lurgi plant. It would seem that, in combining Lurgi gasification with enrichment by imported gas of high calorific value, the Gas Council will be ensuring the economic success of large-scale Lurgi plants. Whatever the conclusions drawn from the current Lurgi process investigation (for which, as noted in CHEMICAL AGE, 23 September, p. 431, three well-known contracting firms have been commissioned), it has already been made clear from previous Lurgi experiments that gas-making plants based on this process can only prove marginally profitable. The establishment of a methane distribution grid may well help to ensure the operation of Lurgi plants on a firm economic basis. The Gas Council's action in establishing an alternative raw material to coal—and one with which the by-product coke disposal problem does not occur—is unassailable on economic grounds. And, as Sir Henry Jones has pointed out, a prosperous and expanding gas industry will be able to consider realistically the place which coal should take in its future plans for gas production.

Now that the Gas Council's methane scheme has the Government's go-ahead, what of the further long-term prospects for large-scale importation of methane, either for gas production or for chemical synthesis? The Gas Council at present has no plans to sell methane for synthesis, and indeed the scheme envisages a regular importation of methane—58 cargoes a year to be brought by the two special ships together—being steadily taken up and processed by the area gas boards on the methane distribution network. This seems to leave no possibility of any surplus as the scheme stands at present. However, one new scheme often leads to another and since substantial quantities of crude oil are imported for refining and chemical processing, there seems no reason why methane should not similarly be imported now that the Gas Council is showing the way. Nor is there any obvious reason why the Sahara should be the only source of methane.

(Continued on page 764)

I.C.I. SEEK POLYTHENE ANTI-DUMPING DUTY

Imported material said to sell at 4d lb below domestic price in U.S.

THE U.K. polythene producers are likely to follow the lead of I.C.I.'s Plastics Division in deciding to ask the Board of Trade to impose an anti-dumping duty against low-priced imports from the U.S. As CHEMICAL AGE went to press, we learned that the I.C.I. move had the full support of Monsanto Chemicals Ltd., while Union Carbide Ltd. declared themselves in full sympathy and are now considering the matter; they are also likely to approach the B.o.T.

Shell Chemical Co. Ltd. are not affected by the present situation since their current pilot-plant production is of

U.K. POLYTHENE

	1960	1961
	Tons	*Tons*
Capacity	147,000	175,000
Production	119,000	115,000*
Imports	8,866	7,200*

* 'Chemical Age' estimates

U.S. POLYTHENE—1*

	1960	1961	1965
	In million lbs.		
Production ...	1,325	1,450	2,300
Consumption ...	1,196	1,380	1,865

U.S. POLYTHENE—2*
Capacity in 1962

Low-density	1,945
High-density	658
All polythene	2,603

* 'Chemical and Engineering News' estimates

the order of 1,000 tons/year high-density material produced under Ziegler licence. Owing to strikes among contractors' labour their new Carrington polyolefins plant is not likely to be on stream until early next year and will produce both high and low-pressure polythene as well as polypropylene. They will give further consideration to the question when in production of low-density material.

When I.C.I. cut their prices by 3d-4d/lb. at the beginning of August it was stated that the new prices of around 1s 7d/lb. were equivalent to those of any overseas producer and would enable U.K. converters to meet competition from low-priced imports.

U.S.-produced polythene is now being offered in the U.K. at around 1s 7d/lb. and lower in some instances, despite a 10% tariff and freight costs. On this basis U.S. domestic price would be below 1s 4d/lb., instead of around the actual U.S. price of about 1s 11d/2s per lb.

With these facts in mind, British polythene producers are certain they can establish a case for anti-dumping duties. One producer told CHEMICAL AGE on Tuesday "There is no doubt at all that this would seem to be a serious case of dumping". On Wednesday, I.C.I. stated they were preparing a case for an anti-dumping duty and that this would be ready for presentation within two weeks.

The Board of Trade are notably reluctant to impose duties against dumped goods and have done so only in relatively few cases. Even then the process of investigation takes months rather than weeks. Some observers feel that action could well have been taken about two months ago, but it is felt that by avoiding hasty action, I.C.I. have strengthened their case.

French action

Another factor that has strengthened the U.K. producers' arguments in favour of a special duty is the decision taken by the French Government on 3 November to impose an anti-dumping duty of NF 70/100 kg on low-density polythene produced by the Spencer Chemical Co. of Orange Tex. This duty is in addition to an external tariff of 22% on polythene, more than double the U.K. tariff of 10%. This high anti-dumping duty indicates the extent to which U.S. producers are prepared to lower their prices in order to capture European markets. It is, however, now feared that the new French measures may have the effect of diverting supplies to the U.K.

Spencer Chemical's capacity for low-density polythene is estimated at 125 million lb/year.

U.K. polythene capacity at the end of 1960 stood at 147,000 tons/year and by the end of this year will amount to 175,000 tons. Production in 1960 totalled an estimated 119,000 tons and in this year is expected to total less than 115,000 tons. For the first six months of this year, U.K. polyolefin production reached an estimated 61,700 tons, of which 56,000 tons were polythene.

U.K. imports of polythene resin totalled 8,866 tons last year, compared with 9,674 tons in 1959. Of the 1960 total, 7,233 tons came from the U.S. and 1,633 tons from West Germany. U.K. exports of polythene resin in 1960 are estimated to have exceeded 52,000 tons.

U.S. capacity in 1962 will reach an estimated 1,945 million lb. for conventional material and an estimated 658 million for high-density polythene. Production of all types is expected to total 1,450 million lb. this year, a 9% rise on 1960. Consumption this year is expected to reach 1,380 million lb. comprising 1,120 million lb. of conventional and 260 million lb. of linear material. U.S. consumption for all types is estimated to reach 1,865 million lb./year by 1965 or 800 million lb. higher than the estimated 1962 capacity for all types.

These facts are causing much concern in Europe for it is clear that with large increases in capacity still planned, U.S. capacity five years from now is still likely to be at least 1,000 million lb./year ahead of consumption. It is felt that only firm anti-dumping action now is likely to prevent the U.K. industry being subjected to long-term cut-price competition of increasing severity which would seriously undermine their activities. As one producer told CHEMICAL AGE, "this company would find it cheaper to import low-priced U.S. material and market it under our own name rather than to continue trying to make a profit out of selling polythene in to-day's market at 1s 7d/lb."

Belgian and French firms link to avoid wasteful nitro-fertiliser capacities

THE Belgian nitrogenous fertiliser producers, Carbochimique S.A., Brussels, have signed an agreement with three other West European nitro-fertiliser manufacturing interests. These are: The French group to which belong Soc. de Produits Chimiques d'Auby and Union Francaise d'Engrais et Produits Chimiques and the Belgian firms: S.A. Produits Chimiques et Metallurgiques du Rupel and S.A. Pour la Fabrication des Engrais Azoté.

The agreement, which is between Carbochimique and the various companies mentioned and not between these concerns themselves, will come into operation in mid-1962. Under the arrangement with the French companies, Carbochimique will supply this group with a range of nitrogenous compounds, while the French firms will drop certain expansion plans.

The agreement with Rupel foresees joint production and sales of ammonium phosphate and ammonium phosphate complex fertilisers. That with Engrais Azoté foresees joint ammonia operations at Tertre and Houdeng, aimed at the best possible organisation of capacities and "the avoidance of unnecessary expansion of current capacities".

Wills

Dr. M. H. C. Williams, medical officer to the Dyestuffs and Pharmaceutical Divisions of I.C.I., an active member of the Commission on Cancer Control and chairman of the Committee on Cancer Prevention of the International Union against Cancer, who died as the result of a motoring accident on 9 July, aged 44 years, left £25,321 net (duty paid £1,435).

Project News

U.S. companies want I.C.I. synthesis gas process

FIFTEEN companies, mostly in the U.S., have been "pestering" **I.C.I. Billingham Division** for licences to operate the new synthesis gas process which the division is installing at Billingham, Heysham and Severnside. Most of these requests have been turned down, says Dr. P. W. Reynolds, who succeeds Mr. P. Mayne as Billingham technical director at the end of November.

Dr. Reynolds described this as "the most modern process in the world for making hydrogen from light distillate oil".

Using the process, the division now had to build the biggest plants with the largest vessels and the smallest number of machines possible so as to cut costs to a minimum. The plant had to be started up with the least possible delay and kept running with the minimum of interruption. Then I.C.I. would squeeze it until they get out of it more output than was at present forecast, added Dr. Reynolds.

Water treatment plant for Yugoslav fibre factory

● CONTRACT, worth £23,000, for the supply of an automatic water demineralisation plant for a new acrylic fibre factory in Yugoslavia has been awarded by Courtaulds Ltd. to **William Boby and Co.** The plant will have a capacity of 7,000 gall./hr.

As reported in CHEMICAL AGE, 18 June 1960, p. 1007, some £2 million worth of plant and machinery for an acrylic fibre factory is being supplied to Yugoslavia under an agreement between Courtaulds and their subsidiary, Luna Ltd., and three Yugoslavian concerns.

Big chemical orders for A.E.I. motors, control equipment

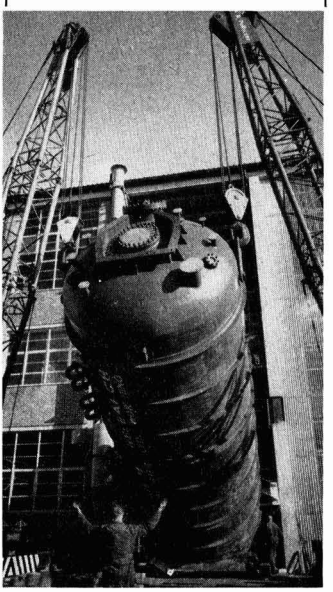
● FURTHER orders totalling £170,000 in value have been placed with the Motor and Control Gear Division of **Associated Electrical Industries Ltd.** One of these, from Foster Wheeler and Co. Ltd., is for 120 electric motors ranging from ¼ h.p. to 4,000 h.p., together with high- and low-tension switchgear. The equipment is for installation at the butyl rubber plant being built at Esso's Fawley refinery.

Another 82 A.E.I. motors have been ordered by Constructors John Brown Ltd. to assist in doubling capacity of I.C.I.'s polypropylene plant at Wilton. Last year A.E.I. supplied the original 150 motors for this installation.

New ketones plant for Howards of Ilford

The new cyclic ketones plant which is now in production at Howards of Ilford Ltd. This is a recent addition to their chemical works at Ilford and was designed and constructed by W. J. Fraser and Co. Ltd., Romford, Essex. Howards supplied the basic design data from their laboratory and pilot plant investigations. This plant prepares ketones by catalytic dehydrogenation of cyclic alcohols. These cyclic ketones are purified by distillation and find wide use in the process industries as powerful organic solvents

Penicillin vessel for Beecham



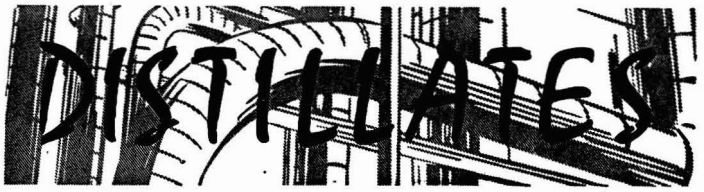
First of a series of large penicillin fermenters to be installed at the Worthing factory of Beecham Research Laboratories Ltd. recently travelled by road from Manchester, where it was manufactured by Autodrome (Engrs.) Ltd. Photo shows the vessel being hoisted into position. It will be used in production of the new Beecham semi-synthetic penicillins

Kite mark for polythene pipe

Manufacturers of polythene pipe (type 425) must apply to the British Standards Institution for a licence to use the Kitemark if they want to label the pipe as conforming to B.S. 1972. This is now a mandatory requirement of the standard, a new edition of which has just been published. The type designation of 425 is an indication of the recommended maximum working stress in the material in pounds per square inch as 20°C when in pipe form. This stress has been used as the basis for calculating the minimum wall thicknesses.

Treatment of industrial and sewage sludges

A symposium on the treatment of industrial and sewage sludges is to be held by the Institute of Sewage Purification at Friends House, Euston Road, London W.C.1, on 20 December 1961. The papers to be read include 'Chemical industry solids disposal problem' by M. E. Chodak (Albright and Wilson (Mfg.) Ltd.) and 'Disposal of solids and the use of sludges for concentration of radioactive wastes' by H. J. Blythe (Atomic Energy Research Establishment).



★ ALTHOUGH details will take some time to finalise, Norsk Hydro, Oslo, are examining the possibility of arranging bulk deliveries of p.v.c. for the U.K. They are planning bulk deliveries in Norway and other Scandinavian countries markets by about the middle of 1962. I gather that a letter will be sent to most U.K. consumers in the next few weeks in the form of a questonnaire asking for suggestions as to the form of bulk delivery best suited for this market.

Norsk Hydro, who have been expanding their sales in the U.K. (as stated in this journal, 1 July, p. 22) have specialised in the easy-processing suspension resins, which have proved popular in the U.K. A considerable proportion of their anticipated expansion programme next year will be made up of these resins and substantial stocks will be held in this country.

In fact, during the last week or so, Norsk Hydro have introduced two new suspension resins to the British market. These are S3-55 for extrusion and injection moulding and S2-65 for dry-blend extrusion of rigid p.v.c. pipes. The company is also planning considerable expansion of its technical service next year and it is expected that more frequent visits will be made to individual customers. In addition it is hoped to issue bulletins giving suggested formulations.

Norsk Hydro are obviously seeking a larger slice of the U.K. p.v.c. market, which our special survey (C.A., 14 October, p. 589) showed is likely to expand considerably in the next few years. It is thought that some 3,000 tons of Norvinyl resins will be imported this year.

★ DAMAGE worth a minimum of DM 2,000 million to DM 3,000 million is done by plant and animal pests to the agricultural industry of Federal Germany each year, while the cost of the necessary pest control media to combat totals only about DM 200 million. This interesting fact was told to the October meeting in Munich of the West German chemical body, Verband der Chemischen Industrie, by Professor Dr. Carl Wurster, chairman of Badische Anilin- und Soda-Fabrik AG and 1962/63 president of the Verband. It was generally believed, said Dr. Wurster, that anything between 10 and 30% of the world's total agricultural production was destroyed by pests.

Other striking examples used by Wurster to show the importance of chemicals in present-day life included the fact that the world nitrogen industry could produce the materials for 50 million tonnes of nitrogenous fertilisers a year; these, used with the appropriate quantities of phosphates and potassium compounds, could result in extra annual production of over 150 million tonnes of cereals or a constant daily ration of bread for one-half of the current world population. Within the next 40 years the world population would have more than doubled.

Dr. Wurster also estimated that the annual saving of wood in the world brought about by chemical protection combined with painting amounted to some 500 million tonnes of building timber and pit props.

★ I HAVE spent some time this week trying to make sense out of three separate newspaper reports. One was headed categorically "Oral contraceptive a failure", another equally categorically "New contraceptive trials' success" and the other non-committally, "Trial of oral contraceptives"—and all summaries of the same *B.M.J.* report on the first stages of large-scale British trials on oral contraceptives.

The tablets undergoing trial are produced by G. D. Searle and Co. and are a mixture of hormones. It appears that in order to avoid unpleasant side effects, norethynodrel must be kept low but must be supplemented by the right amount of oestrogen. In Birmingham, where 14 pregnancies occurred in 48 women, the oestrogen content was too low. Women in London and Slough fared better, where larger concentrations of oestrogen were used.

This report is merely an interim one and trials are continuing. One point still puzzles me. Fertility appears to be a question of geography. One of the reasons put forward for the high incidence of conception in Birmingham is the "quite exceptional fertility" on the part of the Birmingham women. What is a poor girl to do?

★ APART from one or two scientific papers by workers at the various Government-backed research laboratories, most of the information about the industrial applications of silicones in this country has come from the manufacturers' literature. Welcome, therefore, is a little booklet entitled 'Silicones at work' produced by the D.S.I.R. Information Division, which explains, in non-technical language, the main applications of silicones at present.

With separate sections on electrical, engineering, building, glass industry, textile, paint manufacturing, leather trade, food manufacturing and plastics uses, the booklet should prove helpful to the non-technical executive in industry. The modernistic drawings which illustrate the booklet are not its least attractive feature.

Copies of the booklet are available from the D.S.I.R. library at D.S.I.R., State House, High Holborn, London W.C.1.

★ HIGHLIGHT of my visit last week to the Stallingborough plant of Laporte Titanium Ltd. was a first-ever inspection of titanium oxide manufacture. Perhaps the most fascinating aspect of production, which involves all the chemical engineering processes except distillation, is the transformation of black ilmenite into 'shining white' titanium oxide. First production on site started in 1953 with capacity of 16,000 tons/year, which was later boosted to 25,000 tons/year and very recently to 35,000 tons. It is now planned to boost this to 50,000 tons.

Since U.S. consumption is probably over 7 lb./year per head of population, about double the U.K. figure, it is clear that there is room for still further expansion. Laporte whose process differs from others only in the unique continuous sulphation stage, claim to make one of the world's best surface-coated rutiles for the paint industry. I could find little enthusiasm for the non-sulphuric routes to TiO_2, which are based on hydrochloric acid, perhaps because little seems to be known about them.

Laporte's, who claim to be the world's second largest titanium oxide producers, currently produce about 30% of Britain's sulphuric acid with production topping 600 tons/day. Their first 100 tons/day plant, started in 1953, is a pyrites-burning Simon-Carves unit, which was installed at a time of the sulphur shortage. This was followed by a sulphur burning unit with 200 tons/day capacity and earlier this year by a 300 tons/day Simon-Carves unit; this is Britain's largest acid plant. Catalyst used is Monsanto's vanadium pentoxide.

★ FIRST of its kind in Spain is a plant for the production of toluene-based preservatives for the food processing and other industries, which has recently been completed in Barcelona by the Dutch chemical concern, N.V. Chemische Fabriek Naarden. Another Naarden project in Spain is a plant to make benzyl products, now nearing completion in Barcelona. Naarden are also building a laboratory where research for the Spanish food industry will be carried out, and this is due to be opened early in 1962.

Alembic

NEW PLASTICS LABORATORY FOR SHELL CHEMICALS

Aim—full exploitation of new polymers

A NEW plastics laboratory, which will provide technical service and advice to customers in the U.K., has been opened by Shell Chemical Co. at Carrington. Shell's concern is the manufacture of polymers on a large scale, but their technology is bound up with the consumer industries and the role of the laboratory is to see that new plastics are exploited to the full.

There is no sign of demands for various plastics tailing off. In 1959 the turnover from the plastics industry in the U.K. was £150 million; at present it is £200 million, and by 1970 it is estimated that it will be in the region of £600 million. The world consumption of polythene alone is 1 million tons a year and polypropylene is expected also to show the same astonishing growth rate. Polystyrene is following a slower growth rate. World consumption in 1960 was 0.5 million tons but, with the newer developments such as expanded polystyrene which are expected to increase applications in the packaging and automotive industries, it is estimated that the world consumption in 1970 will be 1.25 million tons.

Construction of the new laboratory was started in April 1960 and was completed in August of this year at a cost of £300,000. Equipment installed initially is valued at £100,000.

The technical service which the plastics laboratory will provide for customers supports the commercial activities of the company, and is designed to help customers solve their technical problems. Apart from specific problems, the plastics laboratory can help by providing up-to-date technical information on products and processing equipment. The laboratory has a well equipped machine hall with extruders, injection moulding machines, mills, compression presses and other industrial scale equipment.

Product testing

A considerable amount of the laboratory's activity involves the testing of new and established thermoplastics, both in support of technical service and development work, and as part of the general investigational work and accumulation of information. In addition to standard tests on moulding powder, applicational tests are also carried out on finished articles. Fundamental properties of moulding powders are investigated in order to further the knowledge of basic structure and behaviour of the polymer, and also to simulate in fundamental laboratory tests the processing and performance properties of the materials. An example is the determination of flow properties of thermoplastics at various rates of shear in order to investigate the correlation between these properties and the behaviour of polymers in extruding and moulding operations. The degradation effects of weather conditions are studied in various types of accelerated tests.

Newly formed at Carrington is the Plastics Advisory Service whose function is to encourage the use of plastics in industries which do not already use them to any large extent. The agricultural and building industries are examples of these. Applications in the building industry are developing rather slowly but are expected to be of considerable importance once the prejudice against non-traditional materials is broken down.

The plastics laboratory is sited alongside the company's Carrington research laboratory and consequently maintains close touch with the latest developments in Shell materials and has considerable sources of information.

Research laboratory

Carrington research laboratory is one of a number serving the Shell group's chemical interests throughout the world. The laboratory is particularly concerned with research support for manufacturing and marketing operations undertaken by Shell Chemical Co. or Petrochemicals Ltd. in the U.K.

The majority of the work of the laboratory is concerned with projects in an advanced stage of development and planned for immediate commercial operation. The effort covers all phases of laboratory and pilot plant process work and the investigation of the effect of processing conditions on the performance of products in practical applications. A substantial and increasing effort is devoted to alkylene oxides and their derivatives. At present the laboratory is operating a batch polymerisation unit to collect process development data on propylene oxide condensates. Research in the laboratory has played a large part in establishing the manufacture of a number of polyurethane foam intermediates. At the same time studies of the technology of polyurethane foam have assisted in the development of a flexible foam with improved properties.

A large part of the effort of the laboratory is concentrated on polyolefins produced by the application of Ziegler/Natta catalysts. There is still a great deal of controversy over the mechanism of this catalyst system and Shell are carrying out fundamental research in an effort to improve both the process and the product. The catalyst is relatively inefficient; only 1/100 of the titanium atoms are involved in the polymerisation at any one time. With a particular catalyst the life of a growing chain is of the order of 5 sec.

In parallel with the development of manufacturing processes, product studies include the investigation of the effect of the constitution of the polymer on its physical and mechanical properties.

The improvement of the quality of existing products and the development of more sophisticated modifications is also part of the work of the laboratory. In the field of polystyrene, research is concerned with the development of improved grades. For this purpose, investigations cover new types of copolymers based in Ziegler catalysts.

The exploratory work of the laboratory is aimed at the development of new homopolymers and at the combination of polymers with non-polymeric materials, the scope of which is infinite.

Shell's new plastics laboratory and the research laboratory are situated on the site of the £25 million development currently being carried out (see CHEMICAL AGE, 29 October, 1960, p. 725). Plants are under construction to produce 15,000 tons per year of low density polythene and 15,000 tons a year of high density polythene or polypropylene. A plant producing 18,000 tons a year of polystyrene is in operation. Shell use their own high density polythene and polypropylene process based on Ziegler/Natta licences.

To operate polyolefin plants (other than low density polythene) it is necessary to have Ziegler and Montecatini licences. Montecatini have divided the granting of rights into three fields—plastics, monofilament and elastomers. Shell and I.C.I. are both licensed to produce plastics. Shell, through their acquisition of Petrochemicals, however, have exclusive rights in the U.K. to the use of Ziegler catalysts, for which they have licensed I.C.I. The production of monofilament is licensed exclusively to I.C.I. and the elastomeric field is open.

Shell have announced their intention of producing polydiene rubbers at Carrington, but have not announced details of their plans. The production of polyisoprene will be by a Shell process but polybutadiene involves Ziegler rights. Site preparation was due to start this year with completion scheduled for 1963. (A new Shell process for the production of the monomers was described in CHEMICAL AGE, 26 November, 1960, p. 898.)

European federation for pesticide producers

THE origin and objects of Groupement European des Associations Nationales de Fabricants de Pesticides were described by Mr. D. J. S. Hartt in a talk given in London on 18 October, to members of the Industrial Pest Control Association. Mr. Hartt, I.P.C.A. immediate past-president, and its representative on G.E.F.A.P., described from personal experience how the British and Continental associations have been working together to promote the safe and rational use of pesticides for the public good.

G.E.F.A.P. was formed in 1959 and had as founder-members I.P.A.C. and the A.B.M.A.C.

GAS INDUSTRY'S £18 M. PLAN TO USE SAHARAN METHANE GETS GOVERNMENT BLESSING

DECISION of the Government—announced by the Minister of Power in the House of Commons last week—to approve the Gas Council's £18 million scheme for regular importation of liquid methane from the Sahara led to revelation of the final details of the scheme. At a Press conference, Sir Henry Jones, M.B.E., chairman of the Gas Council, welcomed the decision as a means of eventually lowering the cost of gas and said it was hoped that in about 2½ years' time two specially constructed tankers would begin to operate, conveying up to 354 million therms/year to a terminal at Canvey Island, Essex. These deliveries are expected to provide about one-tenth of total gas supplies. The actual cost of town gas produced from methane will be about 8½d/therm at the gasworks.

The scheme embraces a methane distribution grid extending from the Canvey Island terminus north-westward to a point in the Liverpool-Chester region, with branches to serve various area gas boards en route, including the new Lurgi gas project in the West Midlands. Cost of this system would be some £7½ million, while the Canvey Island facilities would cost £3 million and the reforming plant £7½ million.

Gas should start to flow some time in 1964 and it is expected that the project will reduce the anticipated demand for coal by the gas industry in 1965 by 800,000 tons, the demand for oil for gas making being reduced by 400,000 tons. Present usage of coal by the gas industry is around 22 million tons/year.

Algerian liquefaction plant

The gas will flow through an existing main from Hassi R'Mel to Port Arzew, near Oran, and there it will be liquefied in plant to be installed by Compagnie Algérienne de Méthane Liquide (Camel)—an Algerian company owned 50% by Conch International Methane Ltd.; 26% by S. N. Repal and C.F.P.(A.), the French Government-controlled companies owning and producing the gas; and 24% by other French interests. From Port Arzew, the gas will be transported by the special tankers in similar fashion to the cargoes carried by the *Methane Pioneer*, the converted tanker used in trial runs from the Gulf of Mexico to Canvey.

The liquid methane will be stored in tanks to be built by the North Thames Gas Board near their existing tanks at Canvey which will also be used. It will then be pumped to regasification equipment and after that transmitted through a new steel main laid for the purpose to at least seven of the 12 area gas boards (North Thames, Eastern, South Eastern, Southern, East Midlands, West Midlands and North Western). Other boards may also be supplied. Each board will be responsible for the section of the main to be laid in its own area.

The two tankers which will be required to transport the gas will each have a capacity of about 12,000 tons of liquid methane. These specialised vessels will be built to the design and specifications of Conch International Methane Ltd. (40% Royal Dutch/Shell Group, 40% Continental Oil Co. and 20% Union Stock Yard and Transit Co. of Chicago). Contracts for their construction will be closed shortly with Vickers Ltd. and Harland and Wolff Ltd., the cost of the two vessels being £7 million or more.

British Methane Ltd. (owned 50% by the Gas Council and 50% by Conch International) will be responsible for transportation of the liquid methane to Britain, and will charter the tankers on a long-term basis from two separate ship-owning companies—one a U.K. subsidiary of Conch and the other, Methane Tanker Finance Co. (Houlder Brothers Ltd.). The vessels, which will fly the British flag, will be managed on behalf of British Methane Ltd. by expert British tanker operators.

The overall investment required by Camel for the liquefaction plant and a jetty will be about £14 million while the harbour itself at Arzew is to be developed to make it suitable for large methane tankers.

The huge Hassi R'Mel field in the Sahara from which the methane will be drawn has proven resources sufficient to supply gas on the scale mentioned for very many years. It is claimed to be second only in resources to the Panhandle field in the U.S.

Liverpool Borax switch to fibre drums for packaging of detergent chemicals

FIBRE drums are now being used by the Liverpool Borax Co. Ltd. instead of steel drums to overcome the problem of packaging relatively inexpensive detergent chemicals securely yet economically. Some 7,000 fibre drums have so far been used and the company reports very favourably on their performance. It is calculated that there is an 11% saving in actual packaging costs besides a saving in freight costs.

The drums used are produced by Venesta Plywood Ltd., Vintry House, Queen Street Place, London E.C.4, and measure 14¼ in. in diameter by 27 in. deep, with aluminium foil bonded to the inner walls to provide a complete moisture barrier. To establish the merits of the foil lining, and the overall protection afforded by drums, two types of tests were conducted, as follows:

Drop Tests. Six tests were carried out with drums of sizes 14¼ in. by 17 in., 14¼ in. by 22 in., and 14¼ in. by 27 in., each containing about 1 cwt. of various powdered products of different bulk densities. The lids were sealed with the gummed tape in the normal manner. The drums were pushed off a platform, the height of which varied between 3 ft. and 5 ft., so that they landed horizontally, on end, or at an angle to the concrete floor. At no time did a drum burst or a lid come off.

Immersion test. A filled and sealed fibre drum was put into a metal drum so that the water level came 15 in. below the top of the fibre drum. After 24 hours, opening and emptying of the fibre drum revealed that only a minute trace of water had penetrated the walls of the drum at a spot inside the spiral windings.

Fibre drums being filled at the Liverpool Borax factory

Record sales for liquid herbicide

Sales in 1961 of Weedazol T-L, claimed to be the only approved liquid herbicide for couch control in the U.K., reached a record level, state S.D.C. Pesticides Ltd., a main distributor of the product.

CHEMICALS IN SPAIN

Rapid building of production foreseen for new petrochemical industry

A RECENT survey of the Spanish chemical industry reveals that between the years of 1957 and 1958 the value of the mineral oil refined in Spain increased about 120 times. Although the chemical industry as a whole has shown significant growth, no other single product has achieved such a high increase in production since the war. The growth of the chemical industry since 1954 can be shown in the following table which lists some of the more important sections:

Product	*% Increase on 1954 Production*
Sulphur	30%
Superphosphates	35%
Distilled petroleum	133%
Synthetic rubber	185%
All chemicals	100%
Industry as a whole	50%

Thus the chemical industry has been expanding twice as quickly as industry as a whole. Production of consumer products has also risen steadily, and as shown in the following table, plastics exhibit a significantly higher increase than any other commodity. Figures are given in 1,000 pesetas.

Commodity	*1954*	*1961 (estimated)*
Soap	125,000	205,000
Pharmaceuticals	176,100	375,000
Explosives	82,000	96,000
Lubricating oils	25,000	45,000
Plastics	201,000	600,000
Acids, bases and salts	312,000	370,000

During 1959 the total value of Spanish trade in chemicals was £134 million and imports represented just over one-third of this figure. Changes in import duties have had a stimulating effect on the import of basic raw materials, and producers are now seeking cheaper raw materials through manufacture from petroleum fractions. Spain, however, has so far found no petroleum and few natural gas reserves although currently a search is being made. Petroleum is at present brought from North Africa by tanker.

Some basic raw materials for the chemical industry are at present made locally and include:

	Tonnes/year
Benzene	10,000
Naphthalene	4,000
Phenol, recovered	1,500
Ethanol, via molasses	8.000
Methanol, from blue water gas	9,000
Formaldehyde (40%)	9,000
Acetone	1,300

Spain relies on imported products for isopropanol, of which 750 tonnes were imported in 1960, n-Butanol, dodecyl benzene, and ethylene oxide. The plastics industry, of increasing importance, has up to the present relied on imported raw materials. Total annual output of plastic materials is 14,500 tonnes and plant capacity is 25,000 tonnes. Availability of cheaper, home produced raw materials would help these plants to work to full capacity.

A breakdown of production capacities shows that with four plants p.v.c. total capacity is 15,000 tonnes/year, with production of 8,500 tonnes; two polystyrene plants have capacity for 6,500 tonnes/year and output of 3,500 tonnes; while one polyvinyl acetate plant, with capacity for 4,000 tonnes, actually produces 2,500 tonnes/year.

In view of the vast deposits of natural oil in North Africa and of the recently increased number of Spanish oil tankers, the country is now in need of her own petrochemical industry. Existing refineries can now handle over 7 million tonnes of crude oil per annum.

To aid the expansion of the chemical industry and in particular to provide for the possibility of a petrochemical industry, the Government has made various laws to encourage foreign investment, and allows up to 50% of any firm's capital to be owned by a foreign firm. Import duties have been cut on vital raw materials. As a direct result of this, in 1960, four proposals were put forward for the erection of petrochemical plants. These were Union Quimica in conjunction with Dow Chemical, Compania Española de Petroles in conjunction with Esso, Union Española de Explosivos with Royal Dutch/Shell. A proposal was also put forward by the National Institute of Industry. The latter plan and that submitted by Dow were approved, while the other two were rejected.

At the end of 1960 Union Quimica and Dow established Dow-Unquinesa, and using 50% American capital, this new company will form a petrochemical industry based on a naphtha stream cracking process.

Within two years the firm will be producing high and low pressure polythene, propylene, as well a styrene monomer, a raw material at present imported. The plant which is to be erected near Bilboa, will have the following capacities:

	Tonnes/year
Polythene, high pressure	10,000
Polythene, low pressure	6,000
Propylene	8,000
Styrene monomer	12,000

The State-sponsored National Institute of Industry scheme will comprise both

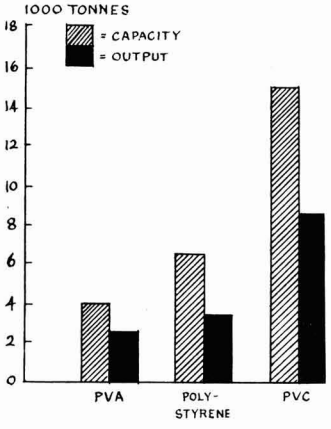
(*Continued on next page*)

Some major Spanish chemical projects

PRODUCER	PRODUCTS	ON STREAM
Abonos Sevilla, S.A. (Union Espanola de Explosivos & Iberica del Nitrogeno)	Ammonia fertilisers at Seville (25,000 t.p.a. of N)	Due for completion in 1963
Amoniaco Espanol S.A.	Ammonia fertiliser plant under consideration for Malaga	For completion in 1963-64
Aragonesa de Industrias Quimica, S.A. C.I.A.	1,500 t.p.a. urea plant, plus p.v.c., at Sabinanigo	In production
Cros, S.A.	13 plants in Spain inc. 475,000 t.p.a. sulphuric acid, 10,000 t.p.a., carbon disulphide and superphosphates	In production
Derco	Ethylene glycols from EO via coke-oven ethylene (450 t.p.a. monoethylene glycol)	In production
Desarrollo Quimica Industrias, S.A. (Du Pont Energia e Industrias Aragonesas S.A.)	Plant at Sabinanigo to make dithiocarbamate fungicides	Due on stream in 1962
Devisa, S.A.	4,000 t.p.a. plant for p.v.a.	In production
Dow Unquinesa (Dow Chemical & Union Quimica del Norte de Espana)	$20 m. complex to produce ethylene, propylene, 10,000 t.p.a. of h.p. polythene, 6,000 t.p.a., to l.p. polythene, 8,000 t.p.a. polypropylene and 12,000 t.p.a. monomer styrene	Due for completion in 1963
Electro-Quimica de Flix S.A. (Hoechst have minority interest)	Acids, alkalis, chlorinated solvents, p.v.a. resins, lauryl alcohol, etc.	In production

oil refinery and petrochemical plants, and is being built by Calvo Sotelo. A pipeline is being laid from the port of Malaga where the oil is unloaded from tankers, to Puertollano, 150 miles away, where the processing plant will be located. This plant is to be larger than that under construction by Dow-Unquinesa, and discussions are reported to be under way with

Spanish capacities for p.v.a., polystrene and p.v.c.



international chemical companies, such as I.C.I., Royal Dutch/Shell, Montecatini and Phillips.

There is a big outlet in Spain for the products of a petrochemical industry, and there is no doubt that the Government will be approving further petrochemical plans in the near future.

Basic chemicals production in Spain

For her basic chemical industry Spain is well-served with most raw materials and produces sufficient quantities for internal needs as shown below:

	Tonnes
Sulphuric acid, 98%	1,100,000
Hydrochloric acid, 30% ...	35,000
Nitric acid, 36° Bé	72,000
Chlorine	18,000
Sodium carbonate	150,000
Sodium hydroxide	140,000
Sulphur, sublimed	26,000
Copper sulphate	14,000
Calcium carbide	75,000

Consumption of fertiliser nitrogen in 1959 totalled 210,000 tonnes which is estimated to rise to 250,000 tonnes by 1961-62 and to exceed 375,000 tonnes by 1970. Some 26% of total nitrogen needs is produced in Spain, although capacity is available for 32%, according to the report on chemicals and fertilisers of the Federation of British Industries mission to Spain earlier this year. (Copies of this report are available from the Association of British Chemical Manufacturers, Cecil Chambers, Strand, London W.C.2.)

Additional nitrogen capacity in Spain is being installed and should by 1962-63 total 193,000 to 199,000 tonnes, probably exceeding 260,000 tonnes by 1966-67.

(*Continued on page 762*)

PRODUCER	PRODUCTS	ON STREAM
Electro Quimica de Hernani	P.v.c. plant at Hernani	In production
Empresa Nacional Calvo Sotelo (managed by I.N.I.)	Plant at Puertollano to produce N fertilisers from shale oil, 250 t.p.a. keryl benzene sulphate	In production
Empresa Nacional Siderurgica (managed by I.N.I.)	Steel plant at Aviles, producing fertilisers	In production
Espanola de Petroleos, S.A., C.I.A. (Cepsa) (with Standard Oil N.J.)	Approval rejected for $10 m. plant in north Spain to produce 24,000 t.p.a. of materials for detergents, plastics, rubber, etc.	—
Etino Quimica, S.A. (Monsanto, Aiscondel & Hidro Nitro Espanola)	Plant at Monzon for polystyrene, p.v.c.	In production
Forêt, S.A. ((Unilever)	Synthetic detergents plant	In production
Hidro Nitro Espanola, S.A.	Calcium carbide plant at Madrid	In production
Hispavic (I.C.I. & Solvay)	Barreda plant for p.v.c.	In production
Iberica del Detergentes (Cros, Flix & Calvo Sotelo)	Synthetic detergents plant	In production
Iberica del Nitrogeno	N Fertiliser plant	In production
Industrias Quimicas de Luchana, S.A.	3,000 t.p.a. phthalic anhydride; fumaric acid; benzoic acid	In production
Industrias Quimicas de Tarragona, S.A.	N fertilisers at Tarragona; 9,000 t.p.a. synthesis ammonia plant	In production Under construction
Insular del Nitrogeno S.A., C.I.A.	33,000 t.p.a. ammonia and 110,000 t.p.a. ammonium sulphate from petroleum feedstock at Las Palmas	In production
Instituto Nacional de Industria (I.N.I.) (State-owned, possibly with I.C.I. Royal Dutch/Shell, Montecatini, Phillips, Hoechst, Union Espanola de Explosivos & Cros)	$70 m. petrochemical plant planned at Puertollano to produce ethylene, propylene, buytlenes, polythene, polypropylene, syn. rubber, etc.	—
Monsanto Iberica S.A. (Monsanto & Aiscondel)	Plant at Monzon for calcium carbide, acetylene & acetylene derivatives	Due in production late-1961
'Naarden' Iberica, S.A. (N.V. Chemische Fabriek 'Naarden.')	Barcelona plants for food preservatives & benzyl products	Nearing completion
Perlofil S.A. (A.K.U. have an interest)	Nylon-6 yarns and fibres at Madrid	Expansion planned
Policloro, S.A.	P.v.c. plant at Hernani	In production
Refineria de Petroleos de Escombreras S.A. (Caltex, I.N.I. & Cepsa)	90,000 t.p.a. fertiliser plant planned for Cartegena making ammonia, ammonium sulphate, sulphuric acid and urea. Cost: $15 m.	Due on stream in 1962
Resinas Poliesteres (Unquinesa, U.E.E., St. Gobain & Repesa)	Plant for 1,500 t.p.a. polyester resins at Miranda de Ebro	Due on stream late 1962
Resinas Sinteticas, S.A. (Reichhold)	Synthetic resin plant at Barcelona	In production
Seda de Barcelona (A.K.U.)	Polyester fibre plant at Barcelona	Due on stream late-1961
Solvay et Cie	Chlor-alkali plant at Torrelavega	In production
Union Espanola de Acid Acetico	Acetic acid plant in Madrid	In production
Union Quimica del Norte de Espana S.A. (Unquinesa)	Plants at Axpe, Baracaldo, Mataporquera produce polystyrene, titanium oxide lithopone, 3,000 t.p.a. phenolic resins, etc.	In production
Union Espanola de Explosivos S.A.	Plants at Guardo, Cardona, Cartegena, Palencia for N,P,K fertilisers, insecticides, sulphuric, nitric, hydrochloric and acetic acids, chlor-alkali, calcium carbide, explosives, acetaldehyde, etc.	In production

How Kellogg International handled a major operation—their move to new H.Q.

Kellogg's drawing office staff find roomier accommodation at the new Kellogg House

MANY problems arose when the Kellogg International Corporation found themselves for the second time within a decade, being pushed into another move to larger premises. Less than ten years ago, 1952, they had moved into sizeable offices in Chandos Street, off Cavendish Square, and only occupied half the space. They soon absorbed this, and by the beginning of this year were obliged to take over other offices outside. At this point the decision was taken to move into completely new premises which could house the whole organisation and make administrative work simpler.

But the problems this decision threw up were much more than those of merely ringing up the removal company and arranging the date. The service to clients had to be continuous. Each department whose success depends on close co-ordination one with the other had to be in a position to operate virtually without interruption. In the event the basic problem was solved by moving the firm with its equipment over two successive weekends, each occasion starting at 4 o'clock on Friday afternoon and finishing by 10 o'clock on the following Monday morning.

New office block

The first task had been to find a suitable building in Central London capable of housing more than 500 people with all their specialist equipment. A newly erected 13-storey office block was found in Chiltern Street, off Baker Street, giving nearly 80,000 square feet of floor space, nearly half as much again as the previous building. Further, now that all departments could once again be housed under one roof the available space could be put to its most efficient use.

Even though the new Kellogg House was a modern building, only completed in 1959, many of the services were ill-suited to the corporation's needs, and some of the amenities were clearly inadequate. In particular the storage space requirement in the basement conflicted at first with the London County Council's stipulation on minimum parking facilities. The whole of the ground floor and basement was replanned by the Corporation's architect in conjunction with the Planning Department of the L.C.C.

The standard of lighting required by K.I.C. was higher than the existing electricity supply and wiring would permit. Thus the corporation's Electrical Division revised the whole of the lighting and power layouts and scrapped the existing system. A new Electricity Board feeder line was introduced and new switchgear installed together with new ducting and wiring throughout the building.

Communications are of prime importance to K.I.C., and the problem of both the period of the move and subsequent arrangements had high priority. The leasing of a Telex channel with the corporation's office in New York had to be co-ordinated with the existing channel and there had to be a tied link between the two London offices for a time. The move also involved a change of telephone exchange which complicated matters still further. New automatic telephone systems were thoroughly investigated, taking into account future S.T.D. facilities, until the arrangements which best suited Kellogg was found. Telephone equipment was in poor supply, and a permanent system could not be established for nine months. As a temporary measure the corporation needed 50 lines and 200 extensions, but only 30 lines and 150 extensions could be provided. Permanent and temporary telephone layouts were planned.

In some ways the most important aspect of the move was the opportunity provided to allocate office space up and down the building in order to increase efficiency. In the same way that K.I.C.'s business is concerned with flows of materials so it is important that work flows efficiently through departments. The corporation's brief to their consultants was to centralise administration and to reduce inter-departmental traffic to a minimum. K.I.C. architects produced complete detailed floor plans for siting offices partitions, power and lighting points and service rooms for local authority approval and specification purposes for tenders.

Kellogg House viewed from the front

Part of the problem of allocating space was the variety of accommodation required—ranging from extensive drawing offices and model room to compact rooms for departmental heads and executives.

To minimise inter-departmental traffic, all service departments are housed on the fifth floor, about half-way up the building and giving ready access to floors above and below.

Kellogg House was the first structure to be affected by new L.C.C. regulations governing internal partitioning in high buildings. These regulations, among other things, decree that all internal wall surfaces and partitions higher than 60 ft. above the ground level must be incombustible. The corporation would have liked to have timber veneered a number of offices, but they were limited to applying this solely to the board room, and even that waiver was only granted on the grounds that the room would not be occupied permanently.

Once all the plans had been agreed with the L.C.C., the St. Marylebone Medical Officer of Health, the Fire Brigade, district surveyors, and so on, the first phase of the operation was completed and the next phase of putting work out to contractors, agreeing prices and times, could proceed.

For the three months up to the time the move was completed in the middle of September there were about 120 men employed continuously at Kellogg House carrying out alterations and preparing against the moving days themselves. The object of all the detailed mechanics of the move was to ensure that the corporation's services to their clients were not interrupted.

The actual operation was planned to

take place over 10 days, one section of the staff being moved over each week-end. Division of staff into two sections helped maintain service. For example certain service departments were moved in two halves over successive weekends so that no other department which had already moved to the new premises or was still at the old building should be impeded through lack of facilities. On successive Fridays work ceased at 4 p.m. and was resumed at 10 a.m. on the following Monday with only the loss of an hour or two of working time. During the weekend all the equipment required for continuous working had been moved by the contractors to Kellogg House so that when the staff arrived on Monday morning all they had to do was to unpack their personnel effects and equipment before starting work.

The change to new premises gave the opportunity for buying new furniture, carpeting, curtaining and other furnishing. And these had to be delivered over weekends as required. To complete this particular operation careful planning was needed because of the limited capacity of the Kellogg House lifts.

An ingenious colour coding and numbering system was employed in expediting the move. When the floor lay-out plans were drawn up each item of furniture was shown on the plans and given a place number. In addition each floor was assigned a distinctive colour. Each item was identified with a label of the colour and number required to see that the removal contractors could place the item exactly as required by the detailed plan. The floor plans were posted on the appropriate landings so that removal workers could by glancing at the colour codes tell at once for which floor any item was destined. This system ensured that both delivery and arrangement of furniture and equipment was completed in a single operation and with maximum efficiency and speed under the guidance of K.I.C. commissionaires.

The internal and external telephone systems were supplemented during the 10 days by a special courier service.

The entire operation from the start of detailed planning to completion of the move on September 18 was but four mouths. The operation was in charge of Mr. Cresswell, deputy manager of K.I.C.'s Design Department. He was assisted by three members of the Kellogg staff on a whole time basis and by 12 others on a part time basis. Kellogg staff put more than 5,000 man hours in planning and supervising the whole operation. Total cost was nearly £100,000.

Firth-Vickers extension will double stainless steel plate output

MORE stainless steel plate and sheet for chemical plant fabrication will be one result of a £4½ million moderisation and reorganisation scheme announced by Firth-Vickers Stainless Steels Ltd., Sheffield. The new scheme will more than double production of stainless steel plate and will make possible the production of longer and wider sheets, which will reduce the amount of welding required and thus result in fabrication economies.

The expansion programme will be carried out in stages, to avoid undue interference with production, and will take three or four years to complete. The first stage is basically the replacement of obsolete mills by a new 80 in. wide hot reversing mill with fully mechanised ancillary equipment for the production of plates of up to 6 ft. finished width and 3/16 to 1 in. thick. The mill will also be capable of rolling sheets up to 6 ft. wide which will subsequently be further reduced in thickness by cold rolling.

Plate production, including the mill, will be carried out in a new plant to be erected at Shepcote Lane, Sheffield. Civil engineering site work has already commenced. Completion of the installation of this plant will be followed by a reorganisation of the facilities for cold rolling and final processing of wide sheets at the company's Staybrite works, extending the handling capacity of the plant from the present 48 in. to 72 in. wide.

This new extension scheme is a continuation of Firth-Vickers' policy of steady development of production for greater efficiency and a stronger position in export markets. It follows a £2 million scheme for stepping up output of stainless steel strip, started two years ago and now nearing completion. Since 1948 the company has spent an average of £1 million a year on increasing production capacity.

Stainless steel plates and wide sheets are used in all types of heavy fabrications, including those for the chemical, oil, fertiliser and atomic energy industries. Firth-Vickers are Europe's largest producers of stainless steel, accounting for 40% of the U.K. output. They claim to be the only company in Europe exclusively devoted to the manufacture of corrosion, heat and creep resisting steels. Firth-Vickers are a subsidiary of the English Steel Corporation (a member of the Vickers Group) and Thomas Firth and John Brown Ltd., each owning 50% of the share capital.

Extensive price cuts by Glaxo

FROM 13 November, Glaxo Laboratories Ltd. are reducing prices of a wide range of pharmaceuticals, antibiotics and corticosteroids. At the same time Glaxo will launch a new steroid for tropical use against inflammatory conditions.

Known as Betnesol, betamethasone phosphate, the steroid is a logical sequence to Betnelan, Glaxo's systemic anti-inflammatory steroid introduced earlier this year.

Weights and Measures Bill may be held over

IT IS unlikely that the controversial Weights and Measures Bill will be presented during the present Parliamentary session. Although Mr. Ian Macleod, Leader of the House, expressed the hope last week that the Bill could still be introduced in due course, he admitted that sufficient time might not be found for it.

As stated in CHEMICAL AGE, 21 October, p. 627, the Association of British Chemical Manufacturers supported the Federation of British Industry in making representations on the Bill, particularly on transactions between manufacturers on an industrial scale in which the public were not involved. It was stated that despite considerable resistance, assurances were given that the difficulties would be re-examined, including certain physical problems connected with bulk deliveries. The Bill was to be redrafted.

I.C.I. wage negotiations still in progress

Negotiations are still in progress over the wage claim of 50,000 labourers employed by Imperial Chemical Industries. I.C.I. have rejected the claim but Union leaders have agreed to adjourn the talks so that they can consider the company's replies and then meet I.C.I. later on. Talks are also continuing on the pay claim by the Amalgamated Engineering Union and the Electrical Trades Union for 12,000 craftsmen.

I.C.I. have stated that their income after tax was only £20 million during the first half of 1961 compared with £27 million during the corresponding period of 1960.

Murphy take on Schering's agricultural sales

As a result of British Schering Ltd.'s closure of their agricultural sales department, the Murphy Chemical Co. Ltd., Wheathampstead, are now handling sales of all the agricultural products previously supplied by British Schering.

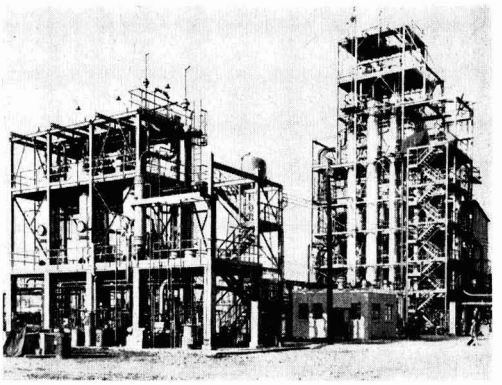
Chemicals in Spain

(Continued from page 760)

Production capacities at the beginning of 1961 include the following:

	Tonnes
Calcium carbide	78,000
Benzene	10,500
Toluene	3,000
Xylenes	800
Naphthalene, crude	4,200
Phenol, synthetic	1,200
Glycerine, crude	3,600
Ethylene oxide, glycols	600
P.V.C.	15,000
Plasticisers	5,000
Polystyrene	6,500
Polyvinyl acetate	2,500
Phenolic resins	3,000
Alkyd resins	800
Dyestuffs	2,500

U.S. VINYL ACETATE CAPACITY TO EXPAND TO MEET DEMAND



Air Reduction Co.'s vinyl acetate plant at Calvert City

THE vinyl acetate picture in the U.S. is a healthy one, as it is in all parts of the world (see also CHEMICAL AGE, 28 October, p. 665). U.S. consumption, 285 million lb. in 1960, is expected to rise to 325 million in 1963 and may reach 425 million lb. in 1965. With the prospect of this rising demand, projects now under construction will raise U.S. capacity from 330 million lb. a year in early 1961 to 450-500 million lb. per year at the beginning of 1963.

Principal end use for vinyl acetate is the production of polyvinyl acetate and its derivative polyvinyl alcohol. According to one recent survey, the following end use distribution is estimated:

	Million lb.	
	1960	**1965**
Polyvinyl acetate . .	155	240
Polyvinyl alcohol . .	50	84
Polyvinyl butyral and formal	37	48
Copolymers	32	41
Miscellaneous and exports	11	12

The major factor behind the increasing demand for polyvinyl acetate is its use in latex coatings, which is expected to rise from 50 million lb. in 1960 to 95 million lb. in 1965. Here it competes above all with styrene-butadiene-based latex paints, sale of which is levelling off, and with another fast-growing group incorporating acrylate resins.

Among the factors responsible for the rapidly growing popularity of polyvinyl acetate paints are ease of application, fast drying, ease of cleaning and freedom from odour. Both homo- and copolymers (with vinyl chloride or ethylene) of vinyl acetate are used in this application today.

In the field of adhesives, polyvinyl acetate consumption has risen from 47 million lb. in 1957 to 59 million lb. in 1961, is expected to reach 75 million lb. by 1965. A strong and flexible bond is obtained in the use of p.v.ac. as adhesive for metal, porcelain, wood, paper, etc. The material is applied in emulsion form, and favoured for its fast curing rate, non-flammability (since no organic solvent is required), low odour, and good shelf life.

A fast-growing market area for polyvinyl acetate is its use as bonding agent for non-woven textiles, and as stiffening agent and other finishing functions in the textile industry.

Second in importance as vinyl acetate consumer is polyvinyl alcohol, which is produced by the hydrolysis of polyvinyl acetate. It takes about two lb. of p.v.ac. to make one lb. of polyvinyl alcohol. The product's end-use pattern (in 1959), exclusive of consumption in polyvinyl butyral, has been estimated as follows:

	Million lb.
Adhesives	11
Textiles	4
Paper	2
Emulsifying and protective colloid	2
Film	2
Other	2

In adhesives application, the alcohol is used both as such and in conjunction with polyvinyl acetate, and serves as remoistenable label adhesive and in laminating applications. In textiles, polyvinyl alcohol is, above all, a finishing agent but interest attaches to the possible market impact of p.v.a.-based synthetic fibres.

Use of polyvinyl alcohol for the production of water-soluble films is currently attracting much interest, especially for the packaging of detergents and dyes in pre-measured amounts.

Reaction of polyvinyl alcohols with aldehydes will yield polyvinyl acetals, third-largest group of vinyl acetate end consumers. By far the most important member of this group is polyvinyl butyral, which serves as interlayer in safety glass.

The outlook for polyvinyl butyral is tied up with new car production and consequently is suffering currently from a downward trend in the amount of glass used per car, and from the widening acceptance of tempered glass.

Various copolymers account for most of the remaining vinyl acetate market. A copolymer with vinyl chloride is used in water-resistant paints. Other copolymers include ethylene-vinyl acetate used as wax additive; vinyl acetate-vinyl chloride in moulded products, notably gramophone records, vinyl acetate-vinylidene cyanide, a developmental synthetic fibre (Darlan).

Vinyl acetate is manufactured by two commercial routes: decomposition of ethylidene diacetate (reportedly used by Celanese Chemical Co.) and the esterification of acetylene with acetic acid.

The latter approach is almost universal today. The reaction is carried out in the vapour phase. The preferred catalyst is zinc acetate impregnated on activated charcoal, with a zinc content ranging from 7-16 parts per 100 parts carrier.

Feed gas should contain acetylene in considerable stoichiometric excess; typical acetic acid; acetylene ratio at the reactor entrance is 15:85. Reactor temperature ranges from 170°C for fresh catalyst to 205°C just before catalyst removal.

The reactor effluent is cooled to 0-10°C. Following phase separation, the gas phase (which is chiefly acetylene, with a maximum of 10% inerts) is recycled to the reaction stage. The condensate leaving the phase separation is taken to a distillation train. In the first column, residual acetylene and acetaldehyde are taken overhead and the acetylene is recycled, following a water wash. The bottoms of the topping column are taken to a fractionator in which vinyl acetate is purified and recovered overhead. The residual product is worked up by distillation for recovery of contained acetic acid.

Vinyl acetate is frequently inhibited against polymerisation in storage. Most commonly employed additives for this purpose are diphenylamine and hydroquinone. However, vinyl acetate may also be shipped uninhibited if care is taken to avoid presence of polymerisation initiators (such as oxygen or peroxides).

The esterification catalyst is readily poisoned by the presence of sulphur or phosphorus. Feed acetylene must therefore be pre-purified, e.g. by treatment with sulphuric acid and sodium bichromate.

The esterification reaction is highly exothermic (470 B.T.U. per lb. vinyl acetate formed). Adequate cooling must therefore be provided in the reactor. Efficacy of heat removal determines the amount of conversion which may be taken per pass. To-day's use of internally cooled reactors permits conversion of 60-70% per pass and should, at least in theory, permit conversion in excess of 90%.

Such isothermal reactors are designed as shell-and-tube units. In Air Reduction Co.'s reactors, for example, the catalyst is mounted inside two-inch-diameter by 11.5-ft. tubes surrounded by liquid heat-exchange medium. Flow of the process phase is downward.

Overall yield depends to some extent on per-pass conversion. In present practice, conversion of acetic acid is about 60-70%. On this basis, vinyl acetate yield (after purification losses) is 97-99% based on acetic acid, 92-95% on acetylene.

Soviet machine used for electroslag welding of vessels in U.K.

A SOVIET welding machine is being used to pioneer the application of electroslag welding to Class 1 pressure vessels in the U.K. by applying this technique to the welding of the longitudinal seams of the heat exchangers for the Dungeness nuclear power station. This has been made possible by co-operation between Head Wrightson Teesdale Ltd. and Head Wrightson's Research and Development Division, which has led to the solution of the technical problems involved.

It is 12 years or more since the electroslag welding process was developed in the U.S.S.R. Despite the many apparent advantages of the process in the welding of thick plate, Western countries have been slow to take it up, and it has only been over the past three years that British fabricators have been showing increasing interest in electroslag welding. Up to the present the only applications of electroslag welding in the U.K. have been in the field of general engineering where the welds have not been subjected to the rigorous inspection requirements appertaining to Class 1 pressure vessels.

The Russian-made welding machine being used for the Dungeness heat exchanger is the only one of its type in the U.K. It was purchased via Esab Ltd., who are also supplying the welding wire and flux being used.

The shell plates of the heat exchangers are between $2^{15}/_{16}$ and $3\frac{1}{8}$ in. thick in steel to B.S. 1501-161, Grade C. Each tier consists of four plates (i.e., there are four electroslag welds per tier), and is furnace normalised after the completion of the electroslag welding. There are six tiers to a heat exchanger and the circumferential welds joining together the electroslag welded tiers will be made by submerged-arc welding. The completed heat exchangers will be 75 ft. long by 23 ft. 6 in. i.d.

The design code is B.S. 1500 and the working pressure 295 lb./sq. in.; the temperature being 420°C at the gas inlet end (shell thickness $3\frac{7}{8}$ in.) falling to 342°C at the gas outlet end (shell thickness $2^{15}/_{16}$ in.).

Summer school in analytical chemistry to be held at Manchester

FIFTH triennial Summer School in Analytical Chemistry, organised by the Royal Institute of Chemistry with the participation of the Society for Analytical Chemistry, will be held in Manchester College of Science and Technology from 9 to 15 September.

The school will consist of four separate, but concurrent, courses:

Physical methods of organic chemistry, course leader, Dr. D. W. Mathieson, reader in pharmaceutical chemistry, London School of Pharmacy.

Recent developments in inorganic analysis, course leader, Mr. W. T. Elwell, chief analyst, I.C.I. Metals Division.

Determination of toxic substances in the air and in effluents, course leader, Mr. H. E. Stagg, chief analyst, I.C.I. Dyestuffs Division.

Newer instrumental techniques, course leader, Dr. V. S. Griffiths, reader in spectroscopy, Battersea College of Technology, London.

Further information can be obtained from: the education officer, R.I.C., 30 Russell Square, London W.C.1.

Valve production continues to rise

IT IS likely that in 1961 the U.K. valve industry will produce a greater value of valves than in any earlier year, surpassing the 1960 figure of £38.2 million, which itself was a record. The value of output was up by more than 10% in the first half year of 1961 compared with the same period last year. This was stated by Mr. F. Burgess, chairman of the British Valve Manufacturers' Association, at the annual meeting held in London recently.

Valve exports were also greater. A recent B.V.M.A. enquiry to members as to economic trends in the valve industry indicated that at October 1961 compared with six months earlier the rate of total new orders was, in general, higher and that the monthly level of output was, in general, higher, but was limited in some cases by a shortage of skilled labour. In a number of instances output had also been affected by a shortage of stainless steel components, such as castings, and bar material.

Decision on methane

(*Continued from page 753*)

Related to this possibility is the eagerness of certain U.S. oil companies to sell low-price LPG and naphtha to the U.K. Their hopes that the U.K. gas industry will come forth as a customer do not seem to be diminished by the Sahara methane decision. Companies that have been named as possible suppliers of LPG include Warren Petroleum—a subsidiary of Gulf Oil—while it is said that Standard Oil of New Jersey could send naphtha from the Caribbean at a cost of less than 5d/therm at U.K. ports, compared with just under 6d/therm for Saharan methane. In these circumstances, and in view of the apprehension in some quarters concerning the possible effects of Algerian political changes on the methane contract, we may yet see the U.S. emerge as a supplier of liquefied gases to this country.

Pesticide residue service set up by F.A.O., W.H.O.

THE setting up of an international regulatory and scientific service to collect and supply members countries with information on all aspects of pesticides used in agriculture and food storage was among the recommendations made at the meeting of a panel of experts held recently in Rome by the Food and Agricultural Organisation and the World Health Organisation. It was stressed that more studies were needed to provide information on residues produced under the wide range of conditions encountered in agriculture and to determine the level of tolerance in various foods.

The eight-member group, made up of four scientists named by F.A.O. and four by W.H.O. also noted in its final report the need for further research into the toxic effects of pesticides on man and useful animals and proposed that scientists should try to develop insecticides toxic to a particular pest but essentially nor-toxic to man, farm animals and plant life.

The expert group included Dr. E. J. Miller (M.A.F.F. Plant Pathology and Laboratory), Dr. H. B. Stoner, also of the U.K.

Lower epoxide prices from Leicester, Lovell

THE price of all liquid and solid Epophen epoxide resins supplied in bulk has been reduced from 1 November by 6d/lb., state the producers Leicester, Lovell and Co. Ltd., associates of the Borden Chemical Co., of North Baddesley, Southampton.

These price cuts, it is stated, follow increased production and economies in manufacture.

Shell Chemical Co. Ltd. have also cut the price of their Epikote liquid resins by 6d/lb. Prices of solid resin are unchanged or reduced by about 1%. Last week, CIBA (A.R.L.) Ltd. reduced the prices of their epoxy resins (C.A., 4 November, p. 732).

Price cuts for U.C.L. glycol ether solvents

GLYCOL ether-solvents made by the Chemicals Division of Union Carbide Ltd., 8 Grafton Street, London W.1. have been reduced in price by £10/ton in accordance with the company's policy of passing all savings in costs on to the consumer.

New spot prices range from £186/ton for 2,500 g. bulk supplies of methyl Cellosolve to £235/ton for 5 g.-lots in drums and from £228/ton for 2,500 g.-lots of Cellosolve acetate to £277/ton for 5 g.-lots in drums.

Gold watches for British Oxygen employees

Some 41 employees of the British Oxygen Co. Ltd., from Glasgow, Aberdeen, Leith, and Belfast, each with 21 years' service were presented with gold watches by Mr. J. S. Hutchison, chairman of the group, at a luncheon in Glasgow last week.

Overseas News

Joint U.S.–Danish venture to acquire propane/butane gas

A NEW joint Danish-U.S. company—Nordisk Gulf-Gas A/S—was formed at a meeting of shareholders held at Esbjerg on 7 November to acquire the propane/butane/liquid petroleum gas business of Nordisk Flaskegas A/S, who now operate in Denmark. Gulf Oil Corporation, through Warren Petroleum International Corporation, a wholly owned subsidiary, hold a substantial interest in the new company. Main source of supply will eventually be the Gulf refinery now under construction at Stigsnaes, Denmark.

Nordisk Flaskegas were formed in 1945 and have expanded rapidly their share of the Danish LPG market. Headquarters are at Esbjerg. Mr. H. V. Nielsen, managing director and chairman of the board, states that present operations are to be extended by the combination of Warren's extensive international experience in all branches of the gas industry and Nordisk Flaskegas' knowledge of the Danish market.

The following have been elected directors: Dir. Holger Gronne, Gross E. Riber Bertelsen and Gross H. A. Wegeberg, representing the Danish stockholders, and Walter James Woodger, Jr., Albert Gregersen and Arve Nilsen, representing Gulf/Warren interests.

Major ammonia expansion for Texas City

Through their subsidiaries, Tuloma Gas Products and American Oil, Standard Oil Co. (Indiana) are planning a substantial expansion of anhydrous ammonia capacity. American Oil are to build a new plant at Texas City on the site of their refinery.

Polythene plant for African Explosives

Africa's first polythene plant is to be built at Sasolburg by African Explosives and Chemical Industries, an I.C.I.-associated company, in co-operation with the State Sasol Corporation. Output will eventually be valued at more than R4 million and with p.v.c., already produced by A. E. and C. I., this will save South Africa an estimated R14 million a year in imports.

Australia to make carbon tetrachloride

Carbon tetrachloride is to be made in an £A1.25 million plant to be built at Botany, New South Wales by Imperial Chemical Industries of Australia and New Zealand. The plant is expected to be in operation towards the end of 1962.

Feedstock will come from a nearby refinery and the plant is scheduled to be on stream towards the end of 1962. Part of the output will be used in the production of fluorocarbons, two plants for which will shortly come on stream. These are for Pacific Chemicals Pty. Ltd. and Australian Fluorine Chemicals Pty. Ltd.

Australian Fluorine's new plant on the Monsanto Chemicals (Australia) site at Rozelle, N.S.W., is due in production by the end of this year. Partners in the new company with Monsanto are Consolidated Zinc Pty. Ltd. The process is that operated by Imperial Smelting Corporation at Avonmouth, where new plant with 3,000 tons/year capacity came on stream earlier this year. Both the new fluorocarbon producers will initially import their raw materials, carbon tetrachloride and anhydrous hydrofluoric acid.

Donau-Chemie to expand

The Landeck, Austria, plant of Donau-Chemie is to spend some Sch.15 million on the building of a plant for the processing of gas produced as a by-product of the works' carbide output. The Landeck works currently produces 30,000 tonnes of carbide annually and hopes to reach full capacity production of 45,000 t.p.a. within the next three years.

First synthetic camphor plant for India

India's first synthetic camphor plant is to be built in Uttar Pradesh State by Camphor and Allied Products Ltd., a newly-formed Indian company. The company will receive technical aid from the E.I. Du Pont de Nemours, and is reported to be negotiating with another U.S. company, Hygrotherm Corporation, New York, with regard to construction. The plant is expected to start production in a year's time with an annual capacity of 900 tonnes; the country's total camphor demand is put at 1,000 t.p.a. Cost of the plant is estimated as 13 million rupees.

Poland plans big petrochemical expansion

By 1970 the Polish petrochemical industry is intended to have an annual production worth of over 20,000 million zloty. The amount of natural gas used for petrochemical operations will be increased to 370 million cu. m./year by 1965 and to 1,600 million cu. m. by 1970. For the development of natural gas and mineral oil based chemical plants at Tarnów, Pulawy, Plock and Blechhammer one quarter of the complete national chemical industry investment—a share equal to 7,900 million zloty—is to be invested in the period up to 1965. The chemical units of the Plock oil refinery are expected to open in the 1966/68 period, the Pulawy plant in 1966/70 and the Blechhammer and Tarnów units in 1964. A petrochemical plant is also to be built on natural gas and mineral oil base at Oswiecim in the 1966/70 period.

Currently Polish petrochemical imports amount to an annual value of some $U.S. 16 million, or 14% of total chemical imports. A balance between imports and exports of petrochemical products is expected by the Polish Government in 1968.

Synthetic fibres plant for Persia ?

A Japanese delegation is reported to have carried out negotiations with the Persian Ministry for Industry and Mines in Teheren and started studies on the possibility of setting up production facilities in Persia for synthetic fibres.

Gas centrifuge development contract placed in U.S.

The U.S. Atomic Energy Commission has selected the Garrett Corporation, AiResearch Manufacturing Division, Los Angeles, California, to conduct a research programme aimed at development of an advanced gas centrifuge for separation of uranium isotopes. A cost-reimbursable contract is expected to be negotiated with the Garrett Corporation. The contract will provide for work estimated at $750,000 during the first year. Under the contract, the company will carry out essentially all of the work in its own facilities.

Currently, the Commission's work in the gas centrifuge programme includes contracts with the University of Virginia for continuing basic research, Yale University for theoretical studies, and Union Carbide Nuclear Company at Oak Ridge, Tennessee, for carrying out centrifuge experimental work.

Chemico ammonia and urea plants for Japan

Synthesis ammonia know-how of Chemical Construction Co. are to be used by Toko Tohoku Hiryo K.K., Japan, to raise synthesis ammonia capacity from natural gas from 138,470 tonnes/year to 267,560 tonnes/year. A Chemico urea plant with 50,350 tonnes/year capacity is also to be built.

New superphospate plant in Turkey

A new factory for the production of superphosphates, with a capacity of 100,000 tons per year, is in course of construction at Yasimoa, near to Izmit. The company concerned is Gübre Fabrikalasi, owned by the Agricultural Bank of Turkey and the Fertiliser Corp. of the U.S.

Turin exhibition of Makrolon polycarbonates

CO-FA, Italian agents for Makrolon polycarbonate produced by Farbenfabriken Bayer, recently held an exhibition of the material in Turin. This material—polycarbonic ester of 4,4' dioxydiphenyl 2,2 propane displays great mechanical

(*Continued on page 768*)

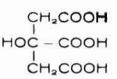

VHEN UP A GUM TREE THINK OF THE VERSATILE PFIZER ORGANIC ACIDS

CITRIC ACID

Non-toxic — excellent sequestrant — one of the most versatile of industrial organic acids — efficient cleaner for ferrous and non-ferrous metals — successfully used in pre- and post-operational power plant cleaning and radio-active decontamination programmes.

Citroflex* esters are gaining a reputation as efficient, non-toxic plasticisers.

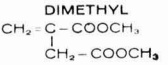
*Trade Mark



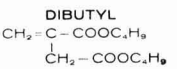
ITACONIC ACID

Low toxicity — reactive monomer — carboxyl groups can add adhesion, stability and solubility to copolymers. Other itaconic monomers (dimethyl and dibutyl) commercially available.

DIMETHYL

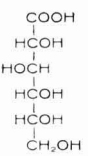


DIBUTYL



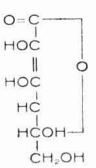
GLUCONIC ACID

Non-toxic — outstanding sequestrant in caustic solutions — low corrosion rate — extremely useful in formulation of metal cleaning compounds for rust removal and paint stripping. Also used in electroplating and other industrial sequestrant applications.



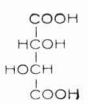
ERYTHORBIC ACID
(FORMERLY ISOASCORBIC ACID)

Non-toxic — effective industrial anti-oxidant — widely used in the brewing industry to protect beer against 'off-taste' and 'haze' caused by oxidation.



TARTARIC ACID

Non-toxic — excellent sequestrant — salts widely used in metal cleaning and plating, textile printing, and blue-printing, plus a host of related industries.



Pfizer CHEMICALS

Pfizer Ltd
Chemical Sales Division
Sandwich
Kent

Sandwich 2371
Advance (London) 1234 } interconnected

CH23/17010b

OVERSEAS NEWS

(*Continued from page 765*)

strength and excellent temperature resistance, from 80°C to 135°C. It also resists most chemicals and with no smell or taste and perfect transparency, has good resistance to water absorption and excellent dielectric properties.

Helium extraction plant for Kansas

Approval of a $15.2 million/year helium-purchase contract, under which more than 1,000 million cu. ft. of the gas will be conserved annually by the U.S. Government, has been announced by the Assistant Secretary of the Interior. Contractors are National Helium Corporation, Liberal, Kans., a subsidiary of the Panhandle Eastern Pipe Line Co., and National Distillers and Chemical Corporation, both of New York City.

National Helium's plant near Liberal will be by far the largest of the three privately constructed helium-conservation plants announced so far under the Department's long-range programme. According to the Bureau of Mines, the National Helium plant will be capable of processing 840 million cu. ft. of natural gas daily containing an average of 0.40 of 1% helium. The Government will purchase this helium from the company at an initial price of $11.78 per 1,000 cu. ft.

Government sale price of helium will be raised from $19 to $35 per 1,000 cu. ft. on 19 November, to pay for the new long-range helium programme.

New Pakistan import duty on sodium dichromate

The Government of Pakistan have decided, after considering the report of the Tariff Commission, that protection should be granted to the indigenous sodium dichromate manufacturing industry for a period of three years, subject to the condition that if prices of soda ash and sulphuric acid which are used in the process of manufacture are revised downward before the expiry of three years, the grant of protection would be reviewed.

The approved measures of protection include imposition of a protective duty of 50% a.v. on imported sodium dichromate. The Government have ordered that the cost structure of both soda ash and sulphuric acid should be examined and measures taken to bring down the cost of their production. The Ministry of Industries will undertake the necessary examination.

Baird to produce thiourea at Peoria plant

Baird Chemical Industries, New York, are to produce thiourea adjacent to their sorbitol operation in Peoria, Illinois. For many years Baird have been a major importer and marketer of thiourea, for which there has been no U.S. producer for several years.

Capacity will be sufficient to supply all U.S. needs. The use of new technology and advanced production techniques will, it is said, assure uniform quality and will stabilise the price at a level designed to encourage new uses.

Japanese acetylene-ethylene plant started up

Acetylene and ethylene, for the first time in Japan, are produced simultaneously in the new plant constructed by Sumitomo Chemical Co. Ltd. in Niihama, Japan, which has now gone into commercial operation. The plant, which produces 25 tonnes/day of acetylene and 50 tonnes/day of ethylene, operates according to the process of Societe Belge de l'Azote et des Produits Chimiques du Marly (S.B.A.) of Liege, Belgium, who granted a licence to Sumitomo. Detailed engineering of the plant was carried out by Sumitomo in co-operation with S.B.A., the equipment being of Japanese fabrication.

The acetylene and ethylene obtained are stated to be of at least 99.9% purity. Ethylene is extracted from residual gas by the Linde process.

Halifax refinery planned by Texaco Canada

A 13,500 bbl./day refinery is planned at Halifax, Nova Scotia, by Texaco Canada Ltd. Cost will be around $14 million and the refinery is expected to be on stream by mid-1963.

U.S. extraction of aluminium sulphate from coal wastes

North American Coal Corporation are constructing a large plant to extract aluminium sulphate from coal wastes as the first step in a project to produce aluminium from domestic ores. The plant now under construction at Wheeling, W. Va., will have an annual capacity of 40,000 tons of aluminium sulphate. It will use a new process developed jointly by North American and Strategic Materials.

Part of the initial production is scheduled for a study of the commercial feasibility of producing aluminium oxide from coal shale wastes and other materials, such as high iron clays and bauxites.

Esso plan refinery for Jamaica

Official approval has now been given for the construction by Esso of a new refinery at Kingston Harbour, Jamaica, to produce 26,000 bbl./day of petroleum products. The refinery will process Venezuelan crude into gasoline, kerosene, aviation fuels and other products and will cost £6 million. Construction is due to start early next year.

Pentachlorophenol plant for Japan

The new company of Santo Chemical, set up jointly by Mitsui Chemical and Tohoku Kyodo Kagaku in Japan, is to start production of 1,000 tonnes/year of pentachlorophenol in April 1962. Mitsui Chemical hold more than 75% of the shares.

French plans to produce furfurol from maize husks

Soc. Financière et Industrielle des Pétroles are to erect at Sorgues, France, plant for the production of furfurol from maize husks. The production unit, which will cost some Fr.6 million, will incorporate hydrolysis, distillation and dehydration processes, the resultant furfurol having a moisture content of no more than 0.1%. Initial output of 3,000 annual tonnes is planned.

Japanese Patent Board asked to rule Montecatini polypropylene invalid

SHIN Nippon Chisso Hiryo Co., against whom Montecatini have filed a patent-infringement suit, have now asked the Japanese Patent Bureau to invalidate Montecatini's original patent for polypropylene. Grounds for this request are that scope of the Italian company's patent has been illegally expanded, that the range listed for organo-metallic catalysts is too wide, that there is no significant process for propylene polymerisation and that the patent has already been issued in Germany.

As stated in 'Distillates' last week, Shin Nippon Chisso are introducing process know-how from AviSun of the U.S. Montecatini are seeking injunctions to restrain both this company and Tokuyama Soda Co., who claim to have developed their own process, from producing polypropylene.

According to *Japan Chemical Week* (2 November), the following Montecatini patents have been established:

Showa - 35 - 10640 'A thermoplastic material', against which Sun Oil have filed a claim.

Showa-34-9892 'Manufacturing method of high polymer with crystalline properties from olefin', against which Furukawa Chemical have filed a claim.

Showa - 35 - 11678 'Manufacturing method of vulcanising elastomer from copolymer and amorphous polymer of alpha-olefin', against which Sun Oil have filed a claim.

Protests against Showa - 35 - 11775 'Method to improve mechanical properties of thermoplastic film' have been filed by Sun Oil, Kawaguchi Rubber, Daido Kasei, Sekisui Chemical, Bando Belt and Shibata Rubber. This patent has been rejected.

Protests have beeen lodged by Sun Oil against Showa-36-4836, 'Manufacturing method of polyolefins with crystalline properties having high affinity to dyestuffs' and Showa-36-4837 'A graft-compounding method of polymerising to the linear high polymer of propylene'.

Shin Nippon Chisso are now seeking invalidity of Montecatini's original patent, Showa-2-10596 'A manufacturing method of linearisation'.

PEOPLE in the news

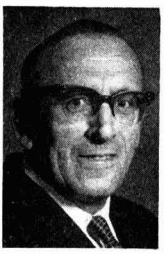
● **Mr. A. Wormald,** a managing director of Fisons Ltd., has been appointed chairman of Benger Laboratories Ltd., and **Mr. P. S. Needham,** managing director of Genatosan Ltd., has become managing director of Benger's. **Dr. R. Powell** has been appointed general manager of Bengers. **Mr. B. D. Thornley** has resigned from the Benger board.

● **Dr. F. W. Stoyle** and **Mr. C. C. Greig** have resigned from the board of A. B. Fleming (Holdings) Ltd.

● **Mr. Cyril Bone** has been appointed a director of Vinyl Products Ltd., Carshalton, Surrey, a subsidiary of Reichhold Chemicals Ltd.

● **Dr. David Jack,** deputy director of research, Smith, Kline and French Laboratories Ltd., has been appointed director of research of Allen and Hanburys Ltd., London E.2, a member of the Glaxo Group.

● **Mr. W. E. H. Rodwell,** manager of horticultural sales, has joined the board of Oxford Horticultural Laboratories Ltd.



J. S. Watkins and Thomas Williams, new president and vice-president of the Fertiliser Maufacturers' Association (see C.A., 28 October, p. 690)

● **Mr. E. Lewis** has joined Plastanol Ltd., Belvedere, Kent, synthetic resin manufacturers, as technical manager. He was previously technical service manager of British Resin Products Ltd., whom he joined from British Paints (Resinous Chemicals Ltd.). Mr. Lewis took up his new appointment on 1 November.

● **Sir William L. Owen,** whose appointment as a full-time member of the U.K. Atomic Energy Authority will expire on 30 June 1962, will continue as a part-time member until 30 June 1964. He will continue as chairman of the boards of management of the Production and Engineering Groups. **Lord Citrine** has been re-appointed a part-time member from 1 January 1962 until 31 December 1962.

● **Mr. A. Robertson** (managing director, Glenfield and Kennedy Ltd.) was elected chairman of the British Valve Manufacturers' Association at the recent annual meeting. **Mr. F. Burgess** (managing director, Whites-Nunan Ltd.) was elected vice-chairman. Other members of the executive committee are: **D. Bailey,** Sir W. H. Bailey and Co.; **B. S. Bass,** Dewrance and Co.; **D. S. Birkett,** Samuel Birkett Ltd.; **W. R. Blakeborough,** J. Blakeborough and Sons; **F. S. Ham,** Ham, Baker and Co.; **H. R. Hammond,** Crane Ltd.; **K. M. Leach,** Audco Ltd.; **N. P. Newman,** Newman, Hender and Co.; **T. B. Pattison,** Alley and MacLellan; **A. L. Trump,** Saunders Valve Co.; **R. F. Walker,** Walker, Crosweller and Co.

● **Mr. F. L. Waring,** managing director of the 'Coalite' Group, has been elected deputy chairman of the group. A past chairman of the Yorkshire Section, Institute of Fuel, and the immediate past president, Association of Tar Distillers, Mr. Waring is also vice-chairman of the Chemical and Allied Industries Joint Industrial Council.

● **Mr. R. E. Ansell** has been appointed sales director and **Mr. C. Bowles** sales manager, responsible to the sales director, announce Henry Wiggin and Co. Ltd.

● **Mr. Charles D. Wenrich,** marketing manager in the New York office of the E.I. Du Pont de Nemours Co. Textile Fibre Division, is to become manager of Du Pont Chemie GmbH, the Düsseldorf, West Germany, subsidiary of Du Pont de Nemours International S.A., of Geneva, whose formation was announced in CHEMICAL AGE for 28 October. Board members will be **Herr Ernst Beck,** of Ernst Beck, Wuppertal; **Mr. Carl. R. Faust,** vice-European director of E.I. Du Pont de Nemours; **Mr. Arthur H. Geil,** managing director of Du Pont de Nemours (Nederland) NV; **Mr. Russell C. Nelson,** vice-managing director of Du Pont de Nemours International S.A., Geneva; and **Mr. William M. McCawley,** textile fibre marketing manager of Du Pont de Nemours International S.A.

Mrs. B. Lamb, chairman of the Polarographic Society, presents Prof. Dr. M. von Stackelberg with the Society's medal for 1961 at a recent meeting in London at which Prof. Stackelberg delivered a paper on 'Some special problems in the polarography of indium and tellurium'.

● **John T. McDonnell** has been appointed to the newly-created position of manager of export sales for Gulf Oil Corp.'s Petrochemicals Department. Mr. McDonnell has been a director of commercial plans in the Petrochemicals Department since 1959.

● The Nobel Prize for chemistry has been awarded to an American, **Professor Melvin Calvin,** University of California, for his work of the chemical process of carbon dioxide assimulation in plants. He used radioactively labelled carbon dioxide to show how plants absorbed carbon dioxide from the air in photosynthesis and what they do with it when it is absorbed.

● **Mr. S. T. Ferris,** general sales manager of Ilford Ltd., has been appointed a director with effect from 26 October, 1961.

● **Mr. Cyril Bone,** who has been the company's accountant since 1943 and its secretary since 1944, has been appointed to the board of Vinyl Products Ltd., a wholly-owned subsidiary of Reichhold Chemicals Ltd. He will continue to act as secretary and accountant.

● **Mr. Robert P. Jemmett** has been appointed acting sales manager of Aeropreen Ltd., High Wycombe polyether foam manufacturers, in succession to **Mr. H. J. Houlgate.** At 31, Mr. Jemmett becomes the youngest of Aeropreen's senior executives.

● **Dr. K. B. Harvey,** a technical officer of I.C.I., has been appointed a visiting scientist to the National Bureau of Standards, U.S. Department of Commerce. As a member of the Physical Properties Section of the Mineral Products Division during his year at N.B.S., he will study methods of visualising dislocations, causes of dislocation decoration, and the interaction of dislocations with other defects in sodium chloride and aluminium oxide single crystals. He is at present on leave of absence from I.C.I.

N.A.B.S. prize draw

By courtesy of the Advertising Association, Mr. Glanvill Benn, this year's president of N.A.B.S. (National Advertising Benevolent Society) is organising a lucky prize draw to be held during the annual dinner-dance at Grosvenor House on 15 November. Half-crown tickets for the draw will be sold during the evening.

The 42 prizes include holiday for two in Newfoundland, return air fare for two to Paris and Le Touquet, the latter with car.

Commercial News

- **Boots maintain interim dividend**
- **Courtaulds sales up, but profits down**
- **S.T.D. report falling off in demand**
- **Canadian petrochemical take-over fails**

Boots Pure Drug

Boots Pure Drug Co. Ltd. have declared an interim dividend of 4% on ordinary capital of £25,600,000 (8% on capital of £12,800,000).

Courtaulds

Group sales of Courtaulds Ltd. to external customers in the half-year ended 30 September totalled £83,451,000 (£79,788,000). Group profit, before tax including investment income, totalled £7,586,000 (£9,569,000) and tax takes £3,155,000 (£4,199,000). £385,000 (£346,000) is allocated to minority interests and £4,066,000 (£5,024,000) to Courtaulds members' interests. Interim dividend of 9d (10d) is declared.

Group sales in the first half-year were nearly 5% up on the same period of 1960-61, but profits contracted mainly due to lower prices and reduced sales in some home market fields as well as to lower prices obtainable overall in export markets, to which there was a substantial rise in sales volume.

Courtaulds say that in to-day's unsettled conditions it is impossible to forecast final results with any confidence, but present indications suggest that profits for the second half of 1961-62 should be of the same order as those for the first half.

A. B. Fleming (Holdings)

Interim dividend of 5% (same) is announced by A.B. Fleming (Holdings) Ltd., producers of oils and colours. Unaudited figures for the six months ending 30 September of group subsidiaries are said to show satisfactory sales and profits.

Scottish Tar

Trading figures of Scottish Tar Distillers Ltd. for the first three months of the current year confirm the general experience of a falling-off in demand, states the chairman. As previously stated dividend is maintained at 7½%. The proposed 1-for-10 scrip issue is being made with the sole purpose of making it possible for trustees to purchase shares. Net profit for the year ended 30 June was £120,159 (£100,391).

Simon Engineering

Simon Engineering Ltd. have declared an interim of 10% on Ordinary for 1961.

New Surpass

The offer by a large unidentified chemical concern to purchase all of the outstanding shares of the Canadian concern New Surpass Petrochemicals Ltd., at 46 cents/share was not successful. The offer was made through Chemalloy Minerals Ltd., who hold 319,000 of the outstanding 614,848 shares of New Surpass. The offer was subject to 100% acceptance.

Close to 80% of the shares were turned in under the offer and it was felt that even with an extension of time it would be impossible to reach the 100% total. Prudential Trust Co. are preparing to return all shares turned in under the offer.

New Surpass will carry on their business in a normal manner and will make every effort to proceed successfully through the "difficult period ahead," said a spokesman.

At the time of the offer, W. H. Irwin, executive vice-president, said that New Surpass had a history of losses since initial operations in 1955, and was recently advised that its major contract was to be terminated. This was what faced the company and directors will make every effort to put some rejuvenation into its affairs, the spokesman said.

Cerebos (Canada)

Cerebos (Canada), subsidiary of Cerebos Ltd., are to acquire compulsorily the balance of shares not already held in Canadian Vinegars Ltd. at $42.50/share. Cerebos (Canada) already hold at least 90% of the shares.

Schering

Schering A.G. propose to increase their Ordinary share capital by an amount up to DM 22 million by the issue of new shares at 150%. These will be offered to Ordinary and Convertible Loan debenture holders.

Scholten Foxhol

W.A. Scholten, Foxhol NV, Netherlands, have announced that profits for the year ended 31 August may be some 15% lower after depreciation than those for 1959/60. Dividend for the year is, however, expected to be maintained at 10%; last year a 10% premium bonus was also paid.

Seichimie

The holding company of the French chemical-metallurgy Péchiney group, Soc. d'Exploitation et d'Interêts Chimiques et Métallurgiques, announces for the financial year ended 30 June a net profit of NF 4,890,000 (NF 3,810,000). It is intended to pay a dividend of 9% (same).

Sogelux

Société de Gestion Luxembourgeoise S.A., the Luxembourg financial consortium, announces the formation of the Sogelux Capital Fund, to invest in shares in Europe, North America and Australia and some 20-25% of whose holdings will be in the chemical industry. Some 60% of the Sogelux holdings will be in European undertakings and the rest in others.

Sterling Drug

Third quarter earnings of Sterling Drug, U.S., were a record 83 cents/share (80 cents). Nine months' earnings, at $2.19 ($2.12), were also a record.

NEW COMPANIES

C.E.A. Laboratories Ltd. Cap. £1,000. To acquire the business of fine chemical manufacturers carried on by C. G. Tilley, A. Westwell and C. Smith at Ashton under Lyne, etc. Directors: C. Smith and K. Lee. Reg. office: 3 Fleet Street, Ashton under Lyne.

Process Plant and Chemicals Ltd. Cap. £1,000. Designers and manufacturers of machinery, plant and equipment for chemical processes, etc. Directors: L. H. Hubbard, J. M. Hart, D. M. Regan. Reg. office: 14 Bath Road, Slough, Bucks.

INCREASES OF CAPITAL

Baxter Laboratories Inc., the U.S. pharmaceutical concern, is to ask its shareholders for permission to raise capital from $2 million to $6 million on 20 November 1961. The capital increase will follow a 2:1 share split-up.

Société Industrielle de la Cellulose (Sidac), the Belgian chemical concern, is to raise its capital from 204 million francs to 1,099 million francs in connection with the merger reported in C.A., 16 September, p.

Dr. A. Wander AG, chemical-pharmaceutical concern of Berne, Switzerland, is to raise its capital from 12.25 million francs to 15 million francs.

High temperature and pressure seal

Pallseal, new stainless steel and Viton A seal for fluid systems operating at between −65°F and +500°F and up to 10,000 p.s.i. is described in literature now available from Pall Corporation, 30 Sea Cliff Avenue, Glen Cove, New York. The Viton A primary stage provides a soft seat for leak-tight sealing. The outer shell of the unit, made of high yield strength Armco 17-4PH stainless steel, maintains the seal under extreme temperatures and pressures, and in addition provides a metal to metal secondary seal, effective if the first seal should fail due to excessive temperatures, or for any other reason. Both parts of the re-usable seal are chemically inert, while the use of Viton A eliminates the need for cure dates, simplifying servicing and stock controls.

They get into everything!

Chemicals, we mean. And, to an ever-increasing extent, BERK Chemicals.* Why Berk? Because Berk offer you the triple advantage of immense technical know-how, long experience (with all the accumulated knowledge and progress that goes with it) plus a personal attention to service which is without equal anywhere. So, if you have a problem . . . *ask Berk.*

***IN INDUSTRY**
more and more people are depending on Berk for . . .

DICALITE high quality filteraids for all liquid filtration. A full range readily available including grades based on diatomaceous earth, perlite and carbon.

ACIDS for all chemical purposes. Available from stock or at short notice.

F. W. BERK & CO. LTD.

BERK HOUSE, 8 BAKER STREET, LONDON, W.1. *Telephone:* HUNter 6688
Manchester Glasgow Belfast Swansea

Bookshelf

Useful material on separation of heavy metals

SEPARATION OF HEAVY METALS. By *A. K. De.* Pergamon Press, London, New York, Paris, 1961. Pp. 308. 60s.

The main aims of the author have been to collect and describe the more important ways of using liquid-liquid extraction and ion-exchange resins to separate the heavy metals of atomic numbers 37(Rb) to 102(No). To do this systematically, the contents are arranged in four parts. Part I is concerned with liquid-liquid extraction; the five chapters are on general aspects of theory and techniques, Groups I and II, III and IV, V and VI including the transuranium elements, and VII and VIII. Part II, on ion-exchange methods, is arranged in a similar fashion. Part III deals with analytical procedures and Part IV with some radiochemical processes. There is also a useful appendix that includes information on the physical constants of suitable organic solvents, chelating agents and ion-exchange resins.

It is stated in the preface that although the amount of information on these two procedures has grown rapidly in the last 10 years, it is still scattered. Although this is not exactly true, one must admit that too few have attempted to write books of the present sort. This author has done his task well for he has collected together an impressive amount of most useful material. The only regret is that the transition metals Sc to Zn have been excluded.

Industrial concerns which produce heavy metals and their compounds, analysis and radiochemists will find this book well worth its value. There is also sufficient detail given for those who teach chemistry at advanced levels to promote a number of instructive exercises.

Colorimetric methods

COLORIMETRIC METHODS OF ANALYSIS, VOLUME IIIA. By *Snell.* D. Van Nostrand Co. Ltd., 1961. Pp. 576. 96s.

The authors claim that this supplementary volume brings the organic photometric methods up to date, that is from August 1953 to early 1960, without repetition of the details in volume III, and it includes thousands of methods with considerable detail. It would be unfair to pick on isolated pieces for criticism and impossible to criticise the whole book in detail. In order to conserve space the instructions given are terse and require intelligent supplementation; "Dilute to 100 ml. with water" may well require an accurate technique for its accomplishment. The text includes methods for the determination of hydrocarbons, alcohols, phenols, quinones, oxides and peroxides, four-, five-, six- and seven-carbon sugars, glucosides, polysaccharides, aldehydes, ketones, aliphatic acids (both substituted and unsubstituted monobasic acids), polybasic aliphatic, cyclic and complex acids, and derivatives of acids such as esters, anhydrides and lactones, as well as two chapters being devoted to compounds containing sulphur and chlorine respectively. There is an excellent subject index, a less obviously useful author index and the text includes footnote references to the original literature.

Purchases by individuals may be rare but this book should be a valuable addition to many departmental or laboratory libraries.

States of matter

STATES OF MATTER. By *E. A. Moelwyn-Hughes.* Oliver and Boyd, Edinburgh, 1961. Pp. vii + 100. 70s.

This book is based on eight lectures describing the principal states of matter in terms of a theory of intermolecular forces. The first chapter discusses the interaction between isolated pairs of atoms or molecules in terms of Mie's equation. Where possible, this equation is extended to describe the interactions between a large number of particles in a particular state, and agreement is observed between the calculated properties and experimentally observed ones. When Mie's equation is not directly applicable to a particular state (e.g. metals or liquids) the general properties of that state are described in terms of the present-day theories.

Second- and third-year students may find this book useful in that it gives an elementary description of the nature of the intermolecular forces in the different states of matter.

Organic mechanism

GUIDEBOOK TO MECHANISM IN ORGANIC CHEMISTRY. By *Peter Sykes.* Longmans, Green and Co. Ltd., London, 1961. Pp. xiii + 247. 21s.

Sir Alexander Todd, in the foreword to this volume, outlines his viewpoint concerning the balance to be struck between the teaching of the theory of organic reaction mechanisms and of factual organic chemistry and emphasises the need for a concerted parallel development of these two aspects of the subject. This book is founded on the author's direct knowledge and teaching experience of this approach in his own university and also profits from his special study of the teaching of mechanistic organic chemistry in U.S. universities.

The first chapter, without devoting excessive space to the details of valence theory, deals briefly but effectively with the basic principles required in the understanding of the different types of bonding and bond fission. Delocalisation in conjugated systems and the kindred topic of aromaticity are discussed with commendable clarity. A concise reference to energy considerations in relation to the transition state is included as well as an appetising introduction to different methods of investigating reaction mechanisms.

The remaining nine chapters are devoted to the application of the basic principles to the task of explaining the variation of reactivity with structure, the existence of three main types of reagent and their behaviour in the four fundamental classes of organic reaction, viz, substitution, addition, elimination and rearrangement. All these classes are very adequately represented and although the examples selected for illustrative purposes are as simple as is consistent with the purpose in view the discussion is not over-simplified. Thus a sound foundation is laid for subsequent more detailed advanced study.

The book achieves the purpose implicit in its title without burdening the reader with too much detail. No references to original literature are included in the text but a select bibliography of 21 books and monographs of a more specialised or advanced nature is given at the end together with some guidance as to the particular merits of some of them.

The author modestly claims that this text is aimed at ". . . the scholarship candidate, the beginning undergraduate and technical college student . . ." but it will undoubtedly be widely used by more advanced grades.

TRADE NOTES

Linseed oil

Argentine linseed oil support price, the basis on which the Government advances 80% on impounded deliveries, has been raised to 19.50 pesos/kg from 16 pesos. Grains shipped between 1 December 1961 and 31 March 1962 will be exempt from the 10% sales tax.

Changes of address

Polypenco Ltd. have recently acquired new office premises at Gate House, Fretherne Road, Welwyn Garden City, Herts, to which all administrative departments of the company will move during November. This will free additional space at both Polypenco's Broadwater Road and Tewin Road factories for production purposes. The telephone number, Welwyn Garden 25581, will remain unchanged.

Bergen Tempered Ltd. who have moved to new premises in Sussex Road, Sheffield 4, make pipe supports for chemical works, power stations and similar installations. Recent orders for Bergen pipe supports have been received from I.C.I., from Foster Wheeler, for Esso's Fawley refinery, and from Chemical Construction, for British Hydrocarbon Chemicals.

New I.C.I. textile dye

Procion Black HN, a new homogeneous reactive dye of the Procion H (or less reactive) series, has been introduced by I.C.I. Dyestuffs Division. Outstanding characteristics are very good fastness to light and washing, very good solubility, good build-up and washing-off properties and generally excellent printing behaviour. It will be of special interest for producing full blacks in textile printing; while the main outlet will be for cellulosic textiles, the new dye is expected to find valuable use also on silk and chlorinated wool. Besides its use for full blacks Procion Black HN is also of interest in pale shades for producing attractive greys. Full technical data and samples from I.C.I. Dyestuffs Division, Hexagon House, Blackley, Manchester 9.

Reinforcing fillers for SBR

A provisional data sheet detailing the uses of Calofort S as a reinforcing filler for SBR rubber has been published by John and E. Sturge Ltd., Wheeleys Road, Birmingham 15. It is claimed that Calofort S, a stearate coated ultra-fine p.c.c., is one of the cheapest reinforcing white fillers available and is particularly useful in SBR compounds where carbon black cannot be used, because of colour considerations, and where all-black loadings tend to yield certain undesirable physical properties.

Change of telephone number

The telephone number of A. J. Askey, European representative of Amoco Chemicals Corporation, has been changed to GROsvenor 8728.

Metals protection

John S. Craig and Co. Ltd., 12-40 Bogmoor Road, Glasgow S.W.1, have published a revised edition of their 'Manual of Marine Paints', an authoritative reference book and practical guide to the protection of metals. When first published in 1959 the manual was designed for the marine field, but its chapters on the problems of meeting corrosion, on the treatment of shot-blasted steel, the protection of aluminium and galvanised iron, and other specialised products have found wide application.

Italian bentonite agency for Chemicals and Feeds

SOLE agency in the U.K. and various other countries for the Italian 7C range of bentonites produced by Ditta Dott. Settimio Cinicola of Milan has been awarded to Chemicals and Feeds Ltd., Adelaide House, King William Street, London E.C.4. These bentonites, which are claimed to be of very high quality, have certain characteristics similar to the Wyoming bentonites, although they are much cheaper in price.

Various grades are produced to suit the special needs of many industries, including animal feeds, ceramics, foundries, soaps, paper, rubber, paints, etc. Technical literature and samples are available.

In addition, Chemicals and Feeds are now also sole U.K. and European agents for ground manganese carbonate (Rhodochrosite ore), from the Taylor-Knapp Co., Montana. Considerable quantities of first-class material are available, ground to convenient mesh size and incorporating a high Mn content with low impurities.

Chemicals and Feeds have been agents for the Taylor-Knapp battery grade manganese dioxide ore for some years and the Rhodochrosite product is a new development from the Montana mines.

N.U.M. to change name

The executive council of the National Union of Manufacturers will recommend to an extraordinary meeting on 15 November that the name should be changed to the National Association of British Manufacturers.

DIARY DATES

MONDAY 13 NOVEMBER

O.C.C.A.—Southampton: Polygon Hotel, 7.30 p.m. 'The testing of ferrous metals for corrosion resistance' by K. A. Chandler.

TUESDAY 14 NOVEMBER

R.I.C.—London: Norwood Technical Col., Knight's Hill, West Norwood, S.E.27. Film show.

WEDNESDAY 15 NOVEMBER

S.A.C.—Edinburgh: R. S. Edinburgh, George St. 7.15 p.m. 'Recent developments in chromatography on cellulose and ion-exchange cellulose' by N. F. Kember.

S.A.C.—Newcastle upon Tyne: Chem. Dept. King's Col. 6.30 p.m. 'Chemical services on British Railways' by G. H. Wyatt.

S.C.I.—Cardiff: University College, Cathays Park, 7 p.m. 'The organisation of research and development' by Dr. F. Roffey.

THURSDAY 16 NOVEMBER

S.C.I.—Belfast 7: The Chemistry Lecture Theatre, Queen's University, Stranmillis Rd., 7.45 p.m. 'Chemistry and the cow' by Prof. J. Houston.

S.C.I.—Birmingham—Visit to H.P. Sauce, Ltd., 2.30 p.m. College of Technology, Gosta Green, 6.30 p.m. "Food technology in Pakistan' by Dr. J. W. Corran.

S.C.I.—Liverpool: Harris Institute, Preston, 7.30 p.m. 'The chemistry of glass and glassmaking' by H. Cole.

S.C.I.—Newcastle upon Tyne: Stephenson Blds., King's College, 6.30 p.m. 'The chemical industry's approach to process and plant design by Prof. J. M. Coulson.

FRIDAY 17 NOVEMBER

INST. PACKAGING.—Bristol: Royal Hotel, College Green, 6.45 p.m. 'The packaging of liquids in treated paper and thin walled plastic packages' by T. M. Gaunt.

Market Reports

STEADY CONDITIONS MAINTAINED

LONDON A continuation of steady conditions has been reported from most sections of the industrial chemicals market, with a moderate volume of new business. However, the movement against contracts is keeping up to schedule. Among the soda products, the hyposulphite, nitrite and chlorate have been in steady request.

Apart from a steady call for basic slag there has been no special feature in the agricultural chemicals market, nor has there been much change in the position of the coal tar products. Pitch is in good request on home and export account.

The price adjustments given in last week's London market report were incorrect. The revised prices should be: White Seal £92 10s, Green Seal £90 10s and Red Seal £87 10s. This also amends the list of British chemical prices which appeared in CHEMICAL AGE last week.

MANCHESTER From the point of view of new business, moderate activity has been reported, but so far as existing commitments there is a fairly steady movement of supplies to industrial consumers in the home section, while shipments to most of the leading overseas outlets are keeping up reasonably well, especially in the plastics field, this also applies to dyes, intermediates and pigments.

The light and heavy coal tar products generally are meeting with a quietly steady demand. Apart from minor changes chemical prices generally have been maintained.

SCOTLAND Demands for the home market were again maintained at a reasonable level, with those from the textile industries featuring well. Although some business was placed against forward requirements, the emphasis was mostly on those demands for prompt and immediate requirements.

Prices generally have remained at recent levels. There has been a reasonable volume of activity in the export market.

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 29 November

Copolymerisation of diolefins and alphaolefins. Chemische Werke Hüls AG. **804 083**

On Sale 6 December

Ortho-substituted phenolic compounds. Ethyl Corporation. **798 438**

Detergent compositions. Hedley & Co. Ltd., T. **808 668**

Plastic composition. General Tire & Rubber Co. **844 240**

Composite metal-polymer compositions. National Lead Co. **859 696**

ACCEPTANCES

Open to public inspection 6 December

Grafted copolymers. Polyplastic. [Divided out of 883 791.] **883 792**

Resinous articles and grafted polymers. Polyplastic. [Divided out of 883 791.] **883 793**

Preparation of substituted di-p-xylylenes. Union Carbide Corporation. [Divided out of 883 939.] **883 940**

Preparation of substituted di-p-xylylenes. Union Carbide Corporation. [Divided out of 883 939.] **883 941**

Open to public inspection 13 December

Decomposition of iron sulphate. British Titan Products Co. Ltd. **884 703**

Polymerisation catalysts and their preparation and use. Montecatini. **884 249**

Process for the preparation of a detergent mixture of the type of the alkyl-aryl-sulphonates and of the secondary alkyl sulphates. Roumania, Ministry for the Petroleum & Chemicals Industry of. **884 656**

Processes for improving polymers. Polyplastic. **884 448**

Filled compositions comprising polymers and processes for their preparation. Polyplastic. **884 449**

Process for separating carbon monoxide and olefins from gaseous mixtures. Farbwerke Hoechst AG. **884 368**

Borated compounds. Standard Oil Co. **884 730**

Process for the production of L(—)-α-aminocaprolactam. Geigy AG, J. R. **884 299**

Grafted copolymer compositions. Ethylene-Plastiques S.A. **884 731, 884 732**

Method of producing water-soluble aluminates from aluminium ore such as bauxite. Montecatini. **884 671**

Polymerisation with organo aluminium compounds. Rohm & Haas Co. **884 706**

Unsaturated aliphatic aminodiols and process for their manufacture. Ciba Ltd. [Addition to 864 261.] **884 461**

Pentaerythritol and polypentaerythritol esters and chlorinated polymers containing them. Rohm & Haas Co. **884 660**

Crystalline acrylic polymers. Rohm & Haas Co. **884 733**

Trifluoromethyl phenothiazines. Olin Mathieson Chemical Corp. **884 760**

Dihydrazide-formaldehyde condensates suitable for treating textiles. Olin Mathieson Chemical Corp. **884 673**

Basically substituted phenthiazine-9-dioxides and process of production thereof. Chemische Fabrik Promonta GmbH. **884 661**

Suphonyl-urethanes and a process for preparing them. Farbwerke Hoechst AG. **884 738**

Pharmaceutical compositions comprising an alkyl-amino substituted barbituric acid and salts thereof. Abbott Laboratories. **884 576**

Methods of preparing sintered berylium oxide products. Commissariat a l'Energie Atomique. [Addition to 833 667.] **884 577**

Epoxy resin adhesives. Imperial Chemical Industries Ltd. **884 578**

Polyepoxide compositions. Imperial Chemical Industries Ltd. **884 579, 884 580**

Production of α,γ-dihydroxy-β,β-dimethylbutyramide. Nopco Chemical Co **884 678**

Preparation of derivatives of pantothenic acid. Nopco Chemical Co. **884 679**

Preparation of diborane. Olin Mathieson Chemical Corp. **884 581**

Polymerisation of formaldehyde. Du Pont de Nemours & Co., E. I. **884 707**

Process of polymerising or copolymerising olefins. Farbwerke Hoechst AG. **884 583**

Polymethacrolein derivatives and their production. Du Pont de Nemours & Co., E. I. **884 478**

Process for the production of chlorinated hydrocarbons. Columbia-Southern Chemical Corp. **884 622**

Reduction of metallic oxides in a shaft furnace. Elektrokemisk A.S. **884 598**

Process for the production of polymeric materials. Balm Paints Proprietary Ltd. **884 746**

Triiodophenyl-propionic acids, and X-ray contract media comprising same. Schering AG. **884 623**

Solid oxidising compositions and solutions containing monoper-sulphate ions. Du Pont de Nemours & Co., E. I. **884 748**

Acylic hydrazinium chlorides and process for preparing same. Grace & Co., W. R. **884 625**

Process for preparing β-(hydroxyalkyl)hydrazinium salts. Grace & Co., W. R. **884 669**

Processes and devices for the manufacture of liquid nitrogen. Philips' Gloeilampenfabrieken N.V. **884 408**

Composite catalysts suitable for use in hydration of olefins to alcohols. Bataafse Petroleum Maatschappij N.V. [Addition to 786 238.] **884 749**

Method of disposing of noxious or obnoxious waste gases. Reutterer Textilwerke AG. **884 627**

Copolymers. Phillips Petroleum Co. **884 490**

Nitric acid production. Roberts, E. S., and Kalous, M. J. **884 217**

Benzothiadiazine compounds. Chinoin Gyogyszer-Es Vegyeszeti Termekek Gyara R.T. **884 628**

Pharmaceutical compositions comprising 5:5-hexamethylenehydantoin. Imperial Chemical Industries Ltd. **884 629**

Production of the antibiotic lagosin. Glaxo Laboratories Ltd. **884 711**

Process for colouring organic fibre-forming masses with water-insoluble organic dyestuffs. Ciba Ltd. **884 630**

Epoxy resin coating solutions. Ciba Ltd. **884 631**

Pharmaceutical and veterinary compositions comprising dithiocarbamoylhydriazine derivatives. Imperial Chemical Industries Ltd. **884 610**

Process for the manufacture of 1,4-dicyanobutenes. Knapsack-Griesheim AG. **884 542**

Alkyl benzene sulphonate detergent compositions. Grange Chemicals Ltd. **884 755**

Water-soluble dyestuffs of the phthalocyanine series. Cassella Farbwerke Mainkur AG. **884 714**

Olefinic halides and a process for their preparation. Rhone-Poulenc. **884 638**

Interpolyesters of bibenzoic acid, a glycol, and an acyclic dicarboxylic acid. American Viscose Corp. **884 680**

6-Methyl-19-nor-steroids and process for the preparation thereof. Organo Laboratories Ltd. **884 412**

Production of polymers. British Petroleum Co. Ltd., Yeo, A. A., and Hambling, J. K. **884 612**

6-Methyl-steroid compounds. British Drug Houses Ltd. **884 544**

Esters of phosphorus acids and insecticidal compositions containing them. Farbenfabriken Bayer AG. **884 613**

Preparation of polyethylene dispersions or powders. Giampietro, F. **884 614**

Thiopivalic acid esters, and process for the preparation thereof. Imperial Chemical Industries Ltd. **884 414**

Method for producing L-pyrrolidonecarboxylic acid and its salts. Kyowo Hakko Kogyo Co. Ltd. **884 415**

Method for producing L-glutamic acid from racemic glutamic acid by use of a micro-organism. Kyowa Hakko Kogyo Co. Ltd. **884 416**

Amines and processes for their manufacture. Ciba Ltd. **884 663**

Quinone derivative. Ciba Ltd. **884 258**

Continuous process for synthesis of aldehydes by the oxo-reaction. Ajinomoto Co. Inc. **884 664**

18,20-Epoxy steroid derivatives. Searle & Co., G. D. **884 571**

Polymerisation catalysts, their production and use. Grace & Co., W. R. **884 545**

Poly-olefin fibres and their preparation. Montecatini. **884 665**

Process for the preparation of uranium tetrafluoride from uranium dioxide. United States Atomic Energy Commission . **884 666**

Process for the manufacture of acrylonitrile. Standard Oil Co. **884 437**

Hydrazinium compounds, their production and pharmaceutical compositions containing them. Grace & Co., W. R. **884 667**

Ethynylboron compounds and method of making same. United States Borax & Chemical Corp. **884 547**

Production of alpha, beta-unsaturated nitriles. Badische Anilin- & Soda-Fabrik AG. **884 548**

Siloxanes. Midland Silicones Ltd. [Addition to 862 576.] **884 687**

Process for the production of esters of thioboric acid and hypothioboric acids. Farbenfabriken Bayer AG. **884 650**

Production of acrylic acid esters and catalysts therefor. Union Carbide Corp. **884 670**

Steroids and the manufacture thereof. Upjohn Co. **884 549**

Process for the suspension polymerisation of vinyl chloride. Dynamit Nobel AG. **884 632**

Preparation of aliphatic acids. Toyo Koatsu Industries Inc. **884 438**

Conversion products of polymethylmethacrylate-containing material. Röhm & Haas GmbH. [Addition to 883 555.] **884 226**

Substituted ureas. Thomae GmbH, Karl. **884 439**

Process for the production of regenerated cellulose fibres with textile properties. Cassella Farbwerke Mainkur AG, and Glanzstoff-Courtaulds GmbH. **884 550**

Method of preparing starch derivatives. Staley Manufacturing Co., A. E. **884 696**

Silica-magnesia catalysts and their use in a process for cracking hydrocarbons. Nalco Chemical Co. **884 633**

Azeotropic compositions and the production thereof. Olin Mathieson Chemical Corp. **884 635**

Preparation of metal sulphates of unsaturated fatty alcohols. Boehme Fettchemie GmbH. **884 618**

Polymerisation of conjugated diolefins and catalyst therefor. Farbenfabriken Bayer AG. **884 699**

Derivatives of the antibiotic lagosin. Glaxo Laboratories Ltd. [Divided out of 884 711.] **884 712**

Antibiotic compositions. Glaxo Laboratories Ltd. [Divided out of 884 711.] **884 713**

Preparation of amino acids. Soc. de Produits Chimiques Industriels, and Guinot, H. M. **884 759**

Synthetic resin coating composition. General Electric Co. **884 619**

Preparation of alkyl aryl hydrocarbons. Continental Oil Co. **884 700**

Production of pentaerythritol dichlorhydrin. Badische Anilin- & Soda-Fabrik AG. **884 441**

Cyclopropane derivatives. Rhone-Poulenc. **884 637**

Synthetic compositions. General Mills Inc. **884 442**

Process for the purification of alpha, beta-unsaturated alphatic aldehydes. Shell Internationale Research Maatschappij N.V. **884 620**

Method for preparing tetrahydroxydiboron. United States Borax & Chemical Corp. **884 621**

18,20-Epoxy steroids. Searle & Co., G. D. [Divided out of 884 176.] **884 572**

Unsaturated tertiary alcohols and a process for their preparation. Soc. des Usine Chimiques Rhone-Poulenc. [Divided out of 884 176.] **884 639**

Polyolefinic alcohols and a process for their preparation. Rhone-Poulenc. [Divided out of 884 638.] **884 640**

2-(4-pyridyl) ethlhydrazine. Norwich Pharmacal Co. [Divided out of 884 605.] **884 606**

CLASSIFIED ADVERTISEMENTS

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

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

EDUCATIONAL

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

FOR SALE

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

PATENTS & TRADE MARKS

KINGS PATENT AGENCY, LTD. (B. T. King, A.I.Mech.E., Patent Agent), 146a Queen Victoria Street, London, E.C.4. City 6161. Booklet on request.

The proprietor of British Patents Nos. 784398 and 802153, entitled "Polyisocyanate alkyd resin compositions" and "Resinous Products", offers same for license or otherwise to ensure practical working in Great Britain. Inquiries to Singer, Stern & Carlberg, 140 South Dearbon Street, Chicago 3, Illinois, U.S.A.

The proprietor of British Patent No. 737822, entitled "Method of separating dispersed matter from fluid masses", offers same for license or otherwise to ensure practical working in Great Britain. Inquiries to Singer, Stern & Carlberg, 140 So. Dearborn Street, Chicago 3, Illinois, U.S.A.

SITUATIONS VACANT

M.Sc., diversified experience in industry, Great Britain and Ireland, seeks technological, commercial or technical post with British firm in Ireland. Box No. 3766.

WORK WANTED & OFFERED

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

OFFICIAL APPOINTMENTS

COVENTRY CORPORATION
Chief Chemist

Within an expanding organisation employing at present over twenty chemical personnel, a vacancy has arisen for a Chief Chemist to be responsible for the team engaged in chemistry of Sewage and Trade Effluents.

Applications are invited from persons of suitable ability and qualifications having the necessary experience of modern sewage purification processes. Encouragement given to the successful applicant to undertake chemical research to assist the engineering personnel in the development of a large modern sewage disposal plant. Modern analytical instrumentation available within combined central laboratory organisation.

Salary offered up to £1,670 per annum. Car allowance and further promotion prospects, depending upon ability to accept responsibility.

Application forms to be returned to the City Analyst, Shortley Road, Coventry, not later than one fortnight after the appearance of this advertisement.

RESEARCH OFFICERS

The FEDERAL GOVERNMENT OF NIGERIA requires Research Officers to carry out laboratory research and development work on Nigerian raw materials.

First or Second Class Honours degree in Chemistry, Biochemistry or Chemical Technology, or equivalent qualification, plus at least 2 years' post-graduate experience.

Emoluments in the range £1,308 to £2,040 p.a., dependent on qualifications and experience.

Further particulars and application forms may be obtained from the Recruitment Attaché, Nigeria High Commission, 9 Northumberland Avenue, London, W.C.2, quoting reference E.14.

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

PLANT AND MACHINERY FOR SALE

Phone 55298 Staines.

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

Send for Lists.

HARRY H. GARDHAM & CO. LTD.,
100 CHURCH STREET, STAINES.

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

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

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

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

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

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

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

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

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

REPRINTS

A few copies of the exclusive CHEMICAL AGE Survey of

NEW CHEMICAL PLANTS IN THE U.K.

are still available

Copies at 3/6 each may be obtained by telephoning Fleet Street 3212 or writing

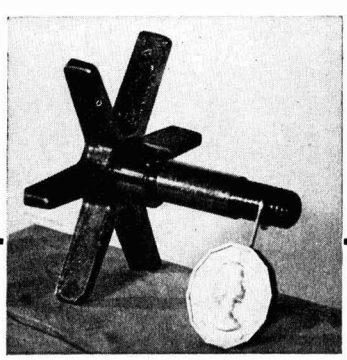
CHEMICAL AGE
154 FLEET STREET, LONDON, EC4

"VULCAN"

CARBOY HAMPERS
SAFETY CRATES
PACKED CARBOYS

HARRIS (LOSTOCK GRALAM) LTD. Lostock Gralam, Northwich, Cheshire

★ ★



Bronze impeller fitted with hard surfaced stainless steel sleeve .5″ dia. × .312″ long life increased to 1500 hours pumping chlorinated hydrocarbon insecticide. We can supply sleeves or spindles for your pumps to give equally improved life.

Full details upon application to

A. S. YOUNG & CO. LTD.

TOWER WORKS, WOODSIDE LANE, LONDON, N.12.
HILLSIDE 6606/7

2nd FOLD

Postage will be paid by the Licensee

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

BUSINESS REPLY FOLDER
Licence No. 2501

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

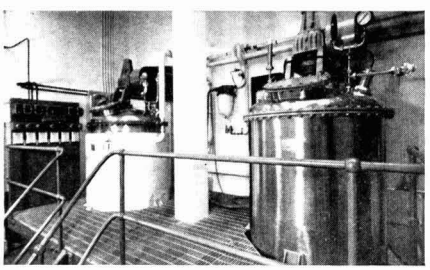
1st FOLD

3rd FOLD

PLEASE CUT ALONG DOTTED LINE

Giusti built better built

A 200 gallon steam-jacketed pan with 4 speed counter-rotating agitator. Photo by kind permission of Helena Rubinstein Limited.



Manufacturing Chemists' Process Plant. Photo by kind permission of John Wyeth & Brother Limited.

Giusti experience in building processing plant and vessels for the Food, Chemical, Pharmaceutical and Dairy Industries goes back more than 40 years. Modern factory extensions and equipment are helping Giusti craftsmen to produce still better plant, yet prices and delivery dates are as keen as ever.

A Giusti technical representative will always discuss your requirements without obligation. Please write or telephone for full details.

T. GIUSTI & SON LIMITED

Belle Isle Works 210-212 York Way Kings Cross London N7
Telephone: NORth 5021-5

GIUSTI

QUALITY PROCESSING PLANT

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