Chemical Age

incorporating

PETROCHEMICALS and POLYMERS

VOL. 86 No. 2201 16 SEPTEMBER 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 386*)

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BORON PRODUCTS

"Three Elephant" Brand

PYROBOR* (68.5% B_2O_3)	Tech. 99% min $Na_2B_4O_7$
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Also High Purity Oxides and Salts

*Trade Marks of American Potash & Chemical Corporation.

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VOL. 86 No. 2201
SEPTEMBER 16 1961

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IN THIS ISSUE

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

Chemical Age
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PETROCHEMICALS and POLYMERS

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SECRETS

ONE of the fundamental changes that the post-war chemical industry has seen relates to attitudes towards commercial and industrial 'secrets'. There has been no spectacular move away from long-established caution nor is there likely to be any. What has taken place and is continuing to do so is an increasing realisation that companies in the modern chemical industry can no longer work in completely water-tight compartments.

The post-war necessity of building large-scale plants of optimum economic performance has put a premium on reliable market research studies. Before a company can commit itself to expenditure that may amount to many £ millions it must have as accurate an assessment as possible, not only of potential demand, but also of raw material supplies and of existing capacities of other companies in the same field.

Answers to these vital questions can only be found in co-operation with other firms. To get the information it requires the company concerned will have to divulge something of its own plans. With a large number of firms using the same tactics, the amount of confidential information exchanged is very large. This system is essential if miscalculations in planning projects are to be avoided and it is obviously in the interests of the nation, as well as the chemical industry, that these should not occur.

This exchange of information is all to the good for there is little doubt that much of the information regarded as confidential today could be publicised to the benefit of the industry as a whole, without harming the companies concerned. In every chemical plant project there is, of course, always a need at some stage for secrecy, but once plans have been completed and decisions taken, it is generally in the interests of the company to get maximum publicity for its project.

It would certainly be futile to expect to retain secrecy once a contract has been placed. This is not to say that contractors cannot keep confidences; in fact the opposite is the case, contracting companies are only willing to divulge information with the approval of the client. However, once a contract is placed, the contractor must seek tenders on a thousand-and-one different items; under these circumstances it is impossible to maintain a strict security black-out.

The August issue of *L'Officiel des Matières Plastiques*, published in Paris, draws a picture of industrial espionage in the U.S. chemical industry that does not, thankfully, exist in this country and it is difficult to believe that the practices described are widely adopted across the Atlantic.

According to a survey carried out by the *Harvard Business Review*, process espionage activities include: spies dressed as fire inspectors; a helicopter flying over a phthalic anhydride plant; 'pumping' competitors' employees at technical meetings; introducing one's own employees in competitive plants; bribing employees; the use of transistor microphones; 'poaching' of staff, etc.

So far as process secrets are concerned, many British companies today take the enlightened view that it is best to capitalise on know-how by licensing it to other firms. By the time they are using it, the originator has already made improvements and modifications, thus keeping one step ahead. That is one of the benefits of research.

Details of Large-scale Belgian Chemical Merger Released

DETAILS of the merger plan of a number of Belgium's leading chemical firms (see CHEMICAL AGE last week, p. 358) have been released. Société Industrielle de la Cellulose (Sidac) are to take over Union Chimique de Belge and Union des Fabriques Belge de Textile Artificielle (Fabelta) and continue the company's activities under the name of Union Chimique Belge S.A. The interest of the French group Rhône Poulenc in Sidac and Fabelta are to be transferred to the new U.C.B. company. Two Sidac shares will be exchanged for three shares of U.C.B. and eight Sidac shares for one Fabelta share.

Also to be taken over is Société Continental du Pegumoid, some 21 of whose shares will be exchanged for two Sidac shares. The synthetic fibre producers, Fabrique de Soie Artificielle de Fubize, Le Fabrique de Soie Artificielle d'Obourg and Société Générale de la Viscose are also concerned in the fusion plans.

Sidac, U.B.C. and Fabelta have combined assets of some Belgium Fr.2,500 million and a total annual turnover of some Belgium Fr.4,500 million. Total staff is of some 10,000 workers and clerical staff.

I.C.I.'s Increased Argentine Investments are Pinned to Expanding Economy

THE situation in Argentina is ripe for an expanding economy. It has the highest standard of living in Latin America and there are not the extremes of wealth found in other Latin American countries. In the background, too, is the Latin American Common Market, in theory already existing by treaty, which, encouraged by the results in Europe, will one day begin to function in practice.

These are the reasons why I.C.I. in the last three years have spent nearly £13 million in expanding their interests in Argentina, according to an article which appeared in the September issue of the *I.C.I. Magazine*.

I.C.I.'s subsidiary in Argentina, Duperial, was in no position to respond to the challenge without assistance. After careful analyses of markets and conditions the project known as Plan A was finally supported by the main Board in April, 1959. Sanction was given for a new investment of £1.5 million of the total of £2.5 million required for developing a new site to house modern sulphuric acid, carbon disulphide, hydrogen peroxide and phthalic anhydride plants. This was followed by I.C.I.'s decision to support a project to erect on the same site a polythene plant at the cost of £6.3 million and in July 1961 to proceed with a polyester fibre plant there, initially to cost £2.9 million.

The site chosen is well suited as a petrochemical centre, since there is a large refinery near and it is connected by pipeline to the oil and natural gas areas 800 miles to the north west.

I.C.I.'s total investments in Argentina are now of the value of £2.6 million heavy chemicals, £6.3 million polythene and £4 million vat dyestuffs and polyester fibres.

To carry out this investment programme, Duperial require not only financial and technical assistance but also trained staff to build and operate the plants. Many universities in Argentina turn out first-class engineers, chemists and other specialists and it is the company's policy to employ local talent wherever possible. Many more technical men are needed, however, and a programme of training in I.C.I's works in the U.K. has already begun.

Du Pont Reduce Teflon Prices

FOLLOWING recent manufacturing improvements and increased capacity, Du Pont have cut by 4s a lb. the price of their Teflon TFE fluorocarbon resin.

This means that the price of a 10-lb. drum will be reduced from 38s 9d per lb. to 34s 9d per lb. and the price of a 35-lb. drum from 34s 6d per lb. to 30s 6d per lb. The new price will thus be the same as the other Du Pont granular resins. The prices of other TFE resins remain unchanged.

Increasing Demand for Chemical Export Executives

EXPORT sales appointments advertised in the Press by the chemical industries during the period July 1960 to June 1961 showed a two-thirds increase over those advertised in the previous 12 months, a recent survey shows. But while the pharmaceutical industry advertised for more than twice the number of export executives (35 against 15) and so did the rubber industry (8 against 3), the figures for the general chemicals field rose only slightly from 21 in 1959-60 to 24 in 1960-61. Comparative figures for other chemical industry groups are: plastics, 11 against 8; oil and petrochemicals, 3 against 2, bringing the total for the chemical industries to 81 against 39.

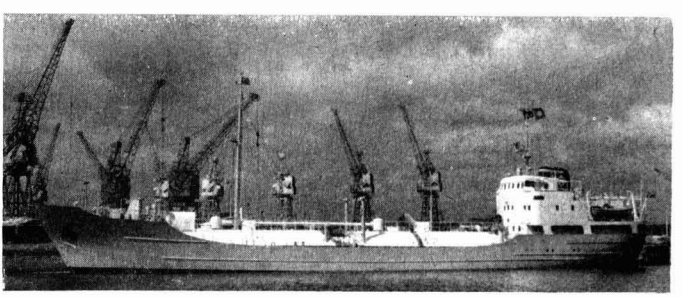
The survey appears in the latest issue of the *MSL Index*—a quarterly report on possible trends in managerial and technical appointments—published by Management Selection Ltd., 17 Stratton Street, London W.1. The report shows a grand total of 471 export executive appointments for all industries in 1960-61 against 230 in 1959-60, and makes it clear that the sudden spurt in demand in the autumn of 1960, revealed in a previous report, was no temporary "flash in the pan".

The report comments on the "somewhat surprising fact" that—when drafting advertisements at any rate—companies tended to place more emphasis on the candidate's knowledge of allied products than on his familiarity with the languages and customs of the people to whom he would be expected to sell his products.

U.K. Exhibits at Zagreb Fair

U.K. products, ranging from agricultural equipment to plastics, are included in a display organised by the Board of Trade at the International Autumn Fair, Zagreb, Yugoslavia.

Latest and Largest Butadiene Tanker



After more than a year's successful experience of transporting butadiene in the special tankers for liquefied petroleum gases owned by A/S Kosangas of Copenhagen, I.C.I. Heavy Organic Chemicals Division is now using the latest and largest vessel of the fleet—the 800-ton 'Lili Tholstrup', photographed at West Hartlepool. A particular point of interest about this vessel is that she is capable of refrigerating her own cargo.

Project News

Danish Ammonia Plant Contract for Power-Gas

● THE **Power-Gas Corporation,** a member of the **Davy-Ashmore** group, has been awarded a contract worth nearly £2 m. for the building of a complete ammonia plant to be erected at Grenaa in Denmark.

This plant forms part of a new fertiliser factory for **Dansk-Norsk Kvaelstoffabrik** of Copenhagen. Power-Gas is responsible for design, procurement, erection and commissioning.

Russia Orders pH Meters from Pye

● FOLLOWING an enquiry received at the British Trade Fair in Moscow this year, an order for industrial pH measuring, recording and controlling instruments worth £150,000 has been received by **W. G. Pye and Co. Ltd.** from the official U.S.S.R. buying agency Mashpriborntorg.

Water Treatment Plant for Esso

● CONTRACT for a water treatment plant has been awarded to **Head Wrightson Processes Ltd.,** a subsidiary of Head Wrightson and Co. Ltd., by **Esso Petroleum Ltd.** Worth £150,000, the plant is for Esso's Fawley refinery.

The plant is the first stage of the boiler feed water facilities and will initially handle 1 million gall. a day, although mains and services will be sized to handle the final flow of 4 million gall. The water is treated by a slip stream process involving hydrogen ion starvation unit with degasser and a basic exchange unit to give a reduction in alkalinity and softening.

I.C.I. Award Contract for Workshop and Depot

● A £60,000 CONTRACT has been awarded to **T.C. Construction Co.,** a member of the Tarmac Group, for the design and construction of a west area workshop and depot for Imperial Chemical Industries at Billingham. Work starts soon and should be completed in about nine months.

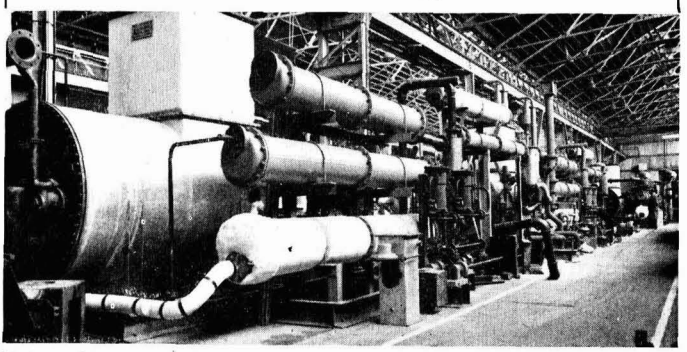
Soviet Materials Handling Contract for Simon

● A CONTRACT, worth £1.8 million, has been awarded to **Simon Handling Engineers,** Cheadle Heath, Stockport, by **Techmashimport,** the Russian trading organisation, for equipment for a new tyre factory to be built at Voljsk near Stalingrad.

The contract is to supply the complete machinery and equipment for handling, storing and the automatic weighing of the basic raw material for tyre making.

The contract took nine months of negotiation and was signed in Moscow by Mr. J. V. Goddard, assistant managing director of Simon Handling Engineers.

Assembly of Hydrogen Plants



Hydrogen/nitrogen plants in course of assembly in the Smethwick works of the Incandescent Heat Co. before despatch to overseas customers in the steel and chemical industries. The company's Gas Atmospheres Division is one of the world's largest manufacturers of packaged nitrogen, hydrogen, carbon dioxide and other gas producing plants. Orders on hand include plant to be installed in Belgium, France, Austria, Poland, Russia, Portugal, Tanganyika, South Africa, India, Brazil and Australia

With contracts already received from Techmashimport for existing tyre factories, this puts the Stockport company's total orders received during 1961 for this type of work for the Soviet Union beyond £2 m.

New Fat-splitting Plant for Price's

● CAPACITY of **Price's (Bromborough) Ltd.,** at New Ferry, Birkenhead, is to be extended by the construction of a fat-splitting plant.

Harbour Dredging for BP's N. Ireland Refinery Project

● DREDGING work is beginning in Belfast Lough for **BP's** new Northern Ireland refinery to be constructed at Sydenham on the eastern shore of the Lough. This is being done to deepen the harbour approaches so that crude oil can be brought to the refinery in modern tankers. It is anticipated that these dredging operations will be completed by the end of 1961 and construction of the refinery will then begin. Its initial capacity will be 1 million tons/year of crude oil.

Whiffen's £300,000 Loughborough Scheme Makes Progress

● AS part of the £300,000 Willows Site development scheme of **Whiffen and Sons Ltd.,** Loughborough, a member of the Fisons Group, work is in progress on reconstruction of general plant and on buildings for the manufacture of a wider range of dye-line chemicals. Planning is at an advanced stage and work is expected to begin shortly on plants for the manufacture of cyanuric acid and trichlorisocyanuric acid.

The scheme has already seen the completion of new office block and re-arrangement of the packaging and despatch department. Construction of a maintenance engineering and welfare block which also forms part of this scheme is now nearing completion. Accommodation is provided for engineering staff, drawing offices, workshops for joiners, electricians and other technicians, and a welfare section. The building was designed by the engineering section of Fisons Ltd. who, in addition, are responsible for all services. Building contractors are *William Moss and Sons* Ltd., Loughborough and London.

S.A.I. to Open New Fertiliser Depot

● APPROVAL was granted at Ayr Dean of Guild Court last week for a new bagged material store for **Scottish Agricultural Industries Ltd.** at Esplanade Road, Newton, Ayr, at a cost of £25,000. This development continues the programme of expansion in the fertiliser industry in Scotland and the location of strategic depots at various points adjacent to the main agricultural areas for improved distribution.

Improved Plant for Abril Waxes

● FOLLOWING the recent acquisition of new premises at the Bridgend (Glam.) Industrial Estate, **Abril Industrial Waxes Ltd.** have taken the opportunity of installing improved plant for the production of their range of synthetic waxes.

The main reaction vessels are of stainless steel, designed and fabricated by **Stainless Steel Plant Ltd.,** Cleveleys, Lancs, and the installation was carried out by members of Abril's staff. In the belief that the smaller firm can benefit from the use of the most modern methods of automatic control, the company has been careful to apply these methods whenever possible. One such feature is the employment of 'Bikini' electronic temperature indicators, supplied by Fielden Electronics Ltd.,

(Continued on page 400)

DISTILLATES

I HAVE just seen a preview copy of 'Common Chemical Market', a new directory, published by Foster D. Snell, consulting chemists, of New York. This is a first-class production and in addition to giving background information on chemical production in the countries of the Common Market and the European Free Trade Association, it includes lists of chemical producers in each country, together with address and telephone number, although I notice that the list includes such firms as tyre remoulders, plastics fabricators, ink makers and engineers.

This publication, priced at £7, will be available in this country in October, from B.A.S. Overseas Publications Ltd., 50a Sheen Lane, London S.W.14.

Later in the year, the CHEMICAL AGE DIRECTORY AND WHO'S WHO, 1962 will be published and will contain several new features. Firstly there will be a list of independent consultants—chemists and chemical engineers; this will contain a subject index for easy reference. The 'Who Owns Whom' feature, introduced in the 1961 edition, will include a numbered index, so that the parentage of any company can be checked at a glance. In addition to several hundred new Who's Who entries, the plant section of the Buyer's Guide will be published in three sections for the first time —Chemicals, Chemical Plant and Laboratory Equipment.

THE stage was all set for Distillers' impressive civil defence demonstration at Epsom last week (see page 404) and on the word "go" there were loud bangings, shouts and screams from sundry 'casualties', and squads of rescue workers trotted into action among the collection of ruined buildings. At the same moment, there was a loud rushing noise and the earth trembled, and spectators thought for one wild moment that Distillers were really laying things on in a big way by getting a squadron of bombers to fly low overhead.

Reassurance came, however, as a passenger train rumbled past and it was realised that the site was right alongside the main railway line. What the train passengers thought when they looked out and saw clouds of smoke, realistic 'casualties' staggering about amid the piles of rubble and firefighters and stretcher parties going into action I have no means of telling, but at least nobody pulled the communication cord.

I was interested to learn from a Home Office spokesman that, out of a possible 13,000 industrial firms and organisations who are in a position to make contributions to industrial civil defence, only 4,000 are making a really worthwhile effort. It is comforting to know that some of our larger chemical companies are among those who, at their own expense, have prepared themselves for what we all hope will never come.

IT doesn't look as though oil spillage on the sea will have much chance to pollute the beaches in future. Apart from the chemical methods of dispersing oil patches that were in the news last year (see my comments of 6 August, 1960), a method of trapping oil patches on the sea using a flexible plastics 'boom' is now being introduced here by Helly J. Hansen A/S of Moss, Norway. When an oil spillage occurs, the boom is launched so that it surrounds the oil, preventing its escape and allowing it to be dispersed by standard methods.

The boom is basically a series of linked units each consisting of a 20 cm. dia. inflatable p.v.c. hose, closed at both ends. Each unit is 25 m. long and is encased in a protective outer skin of p.v.c. coated fabric. When inflated, the series of double tubes rides on the sea surface and, to ensure that oil does not escape under the boom, a 40 cm. deep skirt, also of p.v.c. coated fabric, hangs beneath the hose. The p.v.c. used for the hose, outer skin and skirt is manufactured by British Geon Ltd., of the Distillers Plastics Group. The material is resistant to both oil and salt water and has also been specially compounded to retain flexibility at low temperatures so that the boom can be used successfully in Arctic conditions.

INDUSTRIAL spies disguised as fire inspectors and helicopters flying over phthalic anhydride plants—these are among methods of industrial espionage which a Harvard Business Review survey would have us believe are current in the U.S.

'Pumping' competitors' employees at technical meetings is, of course, fair game, but I have my doubts about the use of transistor microphones planted at some strategic spot in the works. The latest gimmick—and still in the experimental stage—is a microphone which allows the eavesdropper to overhear a conversation in an office on the other side of the street, even with windows closed. Definitely not cricket.

According to *L'Officiel des Matieres Plastiques*, the French journal, one U.S. chemical company admitted that it could easily have taken advantage of another highly unethical method of process spying. Under this technique, official counter-espionage agencies would be told that an engineer in a competitive plant was a security suspect and that his correspondence should be inspected. It appears simple then to gain access to correspondence on the pretext of giving an opinion on the crimes it concealed and—of course—to purloin any ideas it might contain.

EVERYONE is complaining these days about contamination of something or another by some wicked chemical or another. All such complaints fade into the commonplace when confronted with a demand now issued by the consumers' organisations in Federal Germany. "Don't," they urge, "put laughing gas in the whipped cream".

This complaint is not, as it might seem, the result of a manufacturer more evil than the rest having put surgical spirits in the condensed milk; apparently laughing gas in whipped cream is the order of the day in West Germany. The consumers' bodies dislike its use because apart from the desire not to confuse the cake-shop with the dentist's it makes the quantity of cream present seem greater than it really is.

On those wonderful German menus with all chemicals used appearing in an index at the foot of the page we may now expect "Fine Dairy Cream (with laughing gas)".

FROM the point of view of the chemical industry in general, lactic acid and the lactates have tended until recently to have a large number of small applications, chosen in the light of the importance of specific qualities, such as non-toxicity, involatility, buffering and so forth. The spectacular rise in popularity of the calcium stearyl polylactates as flour conditioners, of lactyl glyceryl palmitate as an emulsifier in bread, ice cream and flour confectionery and the incorporation of lactic acid into all types of polycondensate are rapidly changing this picture and are beginning to make heavy demands on the production of lactic acid.

Such is the scope of application of these three compounds that when Bowmans Chemicals Ltd.—who are probably the largest makers of lactic acid in the world—came to compile the mailing list for a new magazine they have introduced, it was estimated that copies could be sent to at least 37,000 separate companies throughout the range of British industry, without the slightest danger of stepping outside the field of interest.

The first issue of the new magazine, called *Aim*, lies before me. It is attractively presented, contains some interesting articles on the use of sodium lactate as a humectant in cosmetic formulations, on the applications of lactic acid and its derivatives in a wide range of industries, and on other subjects.

Alembic

FRENCH PETROCHEMICAL OUTPUT SHOULD TOP 1,000,000 TONNES THIS YEAR

Natural Gas-based Chemicals Swell Total

EARLIER this year, M. Jean-Marcel Jeannery, French Minister of Industry, opened a series of chemical plants 10 miles from Pau in S.W. France which will use natural gas from Lacq. The capital of £22 million expended demonstrates the importance with which France regards the development of her petrochemical industry. The production of chemicals from natural gas contributes to plastics in the form of ethylene, acetylene, methanol, formaldehyde, urea, etc. Hitherto p.v.c. has been produced entirely from calcium carbide acetylene, but the Lacq acetylene will give 20,000 to 25,000 tonnes of p.v.c. a year.

In the Berre area near Marseilles, the lower Seine, and lower Loire the petroleum industry in association with chemical companies is developing important chemical plants. Olefins, di-olefins, benzenes, xylenes, cumene, etc., are produced as a basis for petrochemistry. France is producing nearly 150,000 tonnes a year of ethylene of which more than 80% comes from petroleum. About 60,000 tonnes will be used for polythene and 10,000 tonnes for styrene production.

Higher up the Atlantic Coast at Donges, Antar have been producing aromatics derived from their refinery. They are now going into production with Standard Oil (California) and Prozil to establish a *p*-xylene plant. The German subsidiary of Dow Chemicals together with Péchiney have set up the polystyrene firm of Plastichimie.

The recent growth of the French petrochemical industry has been dynamic. At the end of 1958 it had invested something like N.Fr.410 million (£30 million) and by the end of this year the figure should be nearly three times as high. Basically this achievement has been possible on account of the well-directed development of the French oil industry and to the discovery of sizeable oil and natural gas fields both in France and overseas. Recent figures for crude oil and fuel oil are given in the table below.

There are quite a number of processing facilities in France for catalytic cracking, catalytic reforming and steam-cracking. The output of the respective units is given in 1,000 barrels per day in the second table.

There are at present in France only two steam-cracking units, which are specifically intended for the production of a very wide range of basic hydrocarbon raw materials, and permit the extraction of di-olefins such as butadiene, isoprene and cyclopentadiene together with appreciable quantities of aromatic hydrcoarbons.

Considering the potentials of the French oil industry and of the petroleum processing machinery, the essential requirements for the development of the French petrochemical industry are met. U.S. investments in petrochemical plant over the past few years illustrate that France has been exploiting these potentials to the full; until 1955, the figure was $47.2 million, from 1956 to 1958, $37.07 million, and from 1958 to 1961, an estimated $140 million.

Total U.S. investments by the end of the year are thus expected to reach about $225 million.

Increased investments over the past year have resulted in increased output, and the expansion in production capacity for both basic raw material hydrocarbons and direct derivatives of olefins, di-olefins and aromatic hydrocarbons can be illustrated in tabular form. Figures are given in 1,000 tonnes a year:

	Capacity 1960	Capacity 1962*
	'000 *Tonnes*	
Olefins inc. ethylene, propylene, n-butene, isobutylene, di-isobutylene, heptane, tripropylene, tetrapropylene, C_6—C_{10} and C_{11}—C_{14} cuts	298	386
Derivatives of olefins including ethylene oxide, isopropyl oxide, acetone (ex-cumene) the oxo alcohols, Epikote resins, chlorinated solvents, low and high pressure polythene ...	212	307
Totals	510	693
Di-olefins	12	56.5
Direct derivatives of di-olefins including tetrahydrophthalimide..	21.2	81.2
Totals	33.2	137.7
Aromatic hydrocarbons	43	107.5
Direct derivatives of aromatic hydrocarbons including phenol (ex-cumene) and of terephthalic acid... ...	63	71
Totals	106	178.5

* Estimated

The overall production figure for 1960 therefore totals 449,200 tonnes and the estimated figure for 1962 is 1,009,200 tonnes. The increased production capacity over the two year period is thus 550,000 tonnes.

These figures give full evidence of the very substantial growth of the French petrochemical industry during the past year, and of the developments in the industry that may be expected during this year. The increasing importance to the French economy of oil and natural gas cannot be underestimated.

FRENCH CRUDE OIL AND FUEL OIL STATISTICS

	1959	1960	1961*
		'000 *Tonnes*	
Crude Oil			
Produced	3,140	9,465	14,918
Imported	24,309	25,853	29,223
Refined	25,638	26,913	30,590
Fuel Oil			
Produced	12,336	13,056	16,383
Imported	495	723	871
Exported	2,022	1,973	2,597

* Estimated.

OUTPUT OF CRACKING AND REFORMING UNITS

Company	Catalytic cracking	Catalytic reforming	Steam cracking
C.F.R.	20	20	—
Esso Standard SAF	20	17.8	5.3
Shell	20	12	—
Mobil Oil Francaise	10	9.8	—
Antar	10	10	—
Caltex	4.6	—	—
Soc. Française des Petroles	—	15	—
Naphtachimie	—	—	3

New Worming Drug for Cattle

I.C.I. have developed a drug, Mintic, which enables farmers to treat sheep and cattle for the whole range of intestinal round worms themselves. The basic chemical is methyridine, the same compound that is the basis of Promintic introduced by I.C.I. Pharmaceutical Division in February of this year. Its most important feature is that it attacks worms at all stages of the life cycle. The new drug is administered orally (Promintic is given by injection and requires the services of a member of the veterinary profession).

Elemental Fluorine May Give 40% Performance Increase in Space Age Application

ONLY two decades of development have brought fluorine from a laboratory curiosity to the position where it can now be ranked as a 'heavy chemical'. Before the second world war only a few laboratories had prepared elemental fluorine in very small quantities. During the war, there was a relatively small-scale industrial production in Germany for the manufacture of chlorine trifluoride for military purposes, but it was not until fluorine was required to meet the needs of the atomic bomb programme that the element was produced on a large-scale. The U.S. production of hydrofluoric acid is now approximately 150,000 tons a year and current consumption of chlorofluoro hydrocarbons is estimated at approximately 125,000 tons annually.

Fluorine is now used in many fields: in chlorofluoro hydrocarbons as aerosol propellants and as working media for refrigerators and air-conditioners; high performance fluorocarbon plastics; novel compounds for the preparation of nuclear fuel, for insulating transformers and possibly other important applications in the electric power field; in medicines; and as a rocket fuel oxidiser with the greatest specific impulse now obtainable in a chemical propellant.

It is in this last application that the hopes for fluorine's future in the space age is based. It is predicted that 40% performance increase may be realised by replacing present-day operational propellants with high-energy combinations. The high density of elemental fluorine allows for a greater power pack and a smaller storage space, permitting greatly reduced weight of the empty space vehicle.

Another development of fluorine which may be of considerable interest in the future is in the use of uranium hexafluoride in the separation of uranium—235 from uranium—238 by gaseous diffusion. The existence of breeder reactors which generate more power than they use, only recently a workable proposition, may mean that it will be possible to convert U-238 and thorium from low grade ores into fissionable fuel. In this connection the recent development of Allied Chemical's improved process for preparing uranium hexafluoride for gaseous diffusion may be significant. This process is now in operation in Allied's Illinois plant.

One important potential application of fluorine is in the production of high-boiling fluorocarbons for use as safe working media for power plant boilers.

A gaseous fluorocarbon, perfluoropropane (C_3F_8), is currently under investigation as an insulating gas for transformers. Other fluorocarbons, liquid at room temperature, are being tested in another design for insulating transformers; and ingenious modification of the standard refrigeration cycle would utilise fluorocarbons as both cooling and insulating agents. Fluorocarbons may extend the fields of application for gaseous dielectrics. For example, they make it possible to reduce the size and weight of power and distribution transformers and simplify their installation in large buildings.

An example of the quantities in which fluorine chemicals are currently being used is given by Allied Chemical's, Illinois plant, believed to be the largest privately owned fluorine plant in the free world. Some 1,000 tons of fluorine are produced a year at the adjacent uranium hexafluoride plant which produces 6,000 tons of atomic feed material yearly for the Atomic Energy Commission. Additional fluorine is produced and shipped in liquid form by special tank trucks. As much as 5,000 lb. of fluorine can be shipped on a single truck.

The supply of basic raw materials for fluorine, fluorspar and sulphuric acid, is ample. A requirement of 100 tons of fluorine per day for two years would deplete only about 1% of the workable fluorspar reserves in the North American continent.

Project News

(*Continued from p. 397*)

Wythenshawe, Manchester. These instruments, mounted in centrally placed panels, indicate accurately the temperatures in reaction units which in some cases are 120 ft. away from the panels.

For many years, Abril Industrial Waxes have served an increasing number of wax-using industries at home and abroad, and with the improved manufacturing facilities now available they look forward to providing prompt and efficient attention to customers' needs.

Precipitator Contracts From Iron and Steel Works

● Two further electro-precipitation plants for the iron and steel industry have recently been ordered from **Simon-Carves-Lodge Cottrell** at an approximate cost of £350,000. The first is for dealing with fume from two 360,-ton open hearth furnaces at the South works of the South Durham Steel and Iron Co. Ltd., with a total gas volume of about 100,000 c.f.m. at 300°C. The high-efficiency precipitators will clean the gases to 0.04 grain N.c.f. The second order is for five electro-precipitators to remove dust from the discharge end of a sinter strand being installed by Head Wrightson Iron and Steel Works Engineering Ltd., at Appleby Frodingham's Scunthorpe works. The guaranteed efficiency is 99.3% and the total gas volume will be about 335,000 c.f.m. at 212°F.

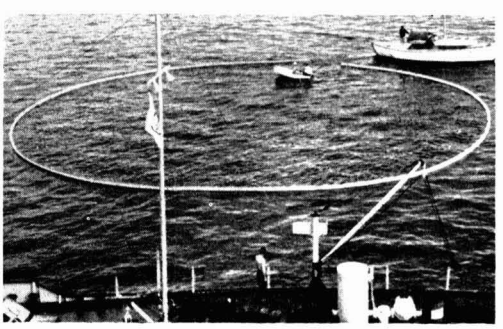
Simon-Carves' precipitator interests were merged with those of Lodge-Cottrell Ltd., Birmingham, nearly a year ago.

New Building for Antioxidant Product

● A NEW, single-storey building of some 7,000 sq. ft. floor area is under construction by **William Pearson Ltd.**, Clough Road, Hull, for the refining of one of their antioxidants, butylated hydroxy toluene (BHT). The development is one of separation and streamlining, rather than installation of additional or replacement facilities; the refining plant will comprise existing units moved from their present site and relocated in the new building.

As a result, Pearson's expect better service in the supply of food grade and technical grade BHT crystal; BHT powder; and BHT aqueous suspension. Work up to ground level is now complete and the plant should be in operation by the end of the year.

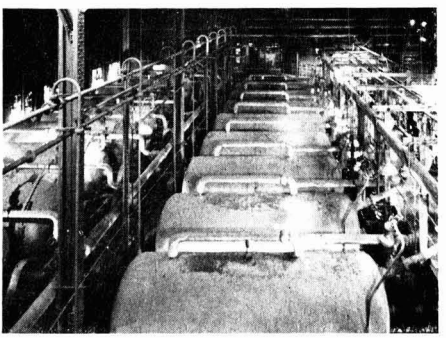
Plastics Boom Beats Oil Pollution



A plastics boom is used to trap oil spilt on the sea (see 'Distillates', p. 398)

Aluminium Industry Meets the Challenge

Double-headed Attempt to Cut Production Costs



General view of the autoclaves or kiers in which the bauxite is digested at the Newport alumina works of the British Aluminium Co. Ltd.

ALTHOUGH aluminium is one of the most abundantly occurring metals in nature, it is only during the last 100 years that it has been used in the form of the metal. Applications of aluminium are increasing daily due to the rapid advance in materials technology, but the method of producing the metal is, to all intents and purposes, the same as that used when aluminium was first manufactured commercially.

In the traditional method aluminium is extracted from bauxite in a three-phase process—the extraction and preparation of the ore; the production of alumina, in most cases by the Bayer method of digesting the bauxite with caustic soda under pressure to form sodium aluminate and hence alumina by calcination; and, finally, the electrolytic production of aluminium metal from a solution of the alumina in molten cryolite using carbon electrodes.

Until a short time ago, only bauxite, with a metal content of 30 to 75%, was suitable for development on a commercial scale, and France is the only country with substantial quantities of bauxite deposits. An important factor, therefore, in the cost of bauxite is transport. As the production of 1 kg. of metal requires 7 kg. of bauxite and only 2.5 kg. of aluminium oxide, the tendency is to locate the ore treatment plants in vicinity of the reserves, and the electrolytic units in areas where cheap electric power is available.

Another economically significant factor in the production of aluminium by the traditional method is the source of cryolite. The function of cryolite is to lower the melting point of the alumina during electrolysis. The only naturally occurring deposits of the ore is in Greenland, but it is possible to obtain a synthetic form of cryolite. The synthetic material has a higher melting point which increases the costs of the electrolytic stage, but this disadvantage is offset to some extent by the greater degree of purity.

Rapid advance in technology has increased the possibility of interchanging materials. If aluminium is to keep pace with the new materials now making their appearance, more economic methods of production will have to be developed. The aluminium industry has not been slow to see this.

Attempts to cut the cost of the aluminium process have been concentrated in two directions—to eliminate the alumina stage from the traditional process, or to break completely from the established process and find a way of commercially exploiting the large quantities of aluminium which occurs in materials other than bauxite, particularly clays.

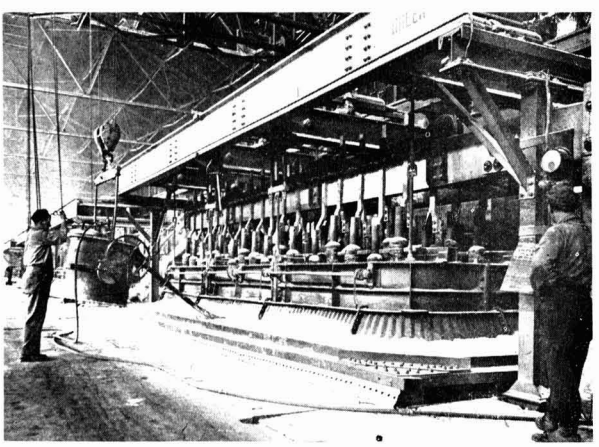
Notable among the attempts to eliminate the alumina stage is the process developed by Aluminium Ltd. of Canada. It is based on the reduction of bauxite in an electric furnace and a subsequent reaction with the subhalide. It would appear to require the same amount of energy as electrolysis, but the elimination of the alumina phase naturally makes it possible to effect substantial economies in investment and consequently to cut down the cost to a considerable extent, if Aluminium's claims are substantiated. A pilot plant of 6,000-8,000 ton capacity has been built based on the process.

In France, a new method has been developed by Péchiney, which, although it does not eliminate the alumina stage, does enable appreciable saving to be made on investment. The process consists of a series of carbothermal reductions during which corrundum is produced in the electric furnace, followed by the reduction of the aluminium oxide by the addition of carbon and the separation of the aluminium from the carbide. Péchiney have built a pilot plant based on the process with an annual capacity of 4,000 to 5,000 tons.

An electrothermal process is also reported to have been developed in the U.S.S.R. which, it is claimed, decreases the cost by 15 to 20% compared with the electrolytic process.

A new process has been patented by the Strategic Material Co. of New York which uses the aluminium-bearing shales discarded from coalmines. It consists of first calcining the clay and then treating it with concentrated sulphuric acid to convert the aluminium oxide into aluminium sulphate. The ferrous oxide is eliminated and the pure aluminium sulphate is calcined to return it to the oxide which is then ready for electrolysis. An interesting aspect of this process is that the waste products can be used for building materials. The North American Coal Corp. are to build a plant based on this process. The new installation will have a capacity of 40,000 tonnes of aluminium sulphate. The mining deposits of Powhatan (Ohio) have been chosen for the site of the new plant. These deposits furnish 6,500 tonnes of coal a day, the residues from which could yield 50,000 tonnes of aluminium a year.

Olin Mathieson Chemical Corp., who produce aluminium through a partly-owned subsidiary Ormet, have revealed recently that they are a long way towards developing a process for the manufacture of aluminium based on common clays. Their interest also sprang from the aluminium-bearing shales of coalmines. Existing methods of producing aluminium from shales normally involve



Tapping metal by suction from a 100,000 amp. furnace at the Lochaber reduction plant of British Aluminium Co.

working with small crystals (0.01 in. and less) which are difficult and costly to separate from solution. The Olin Mathieson process, on the other hand, is said to yield coarse, sand-like particles ($^1/_8$ to $^1/_{16}$ in.) which are simple and inexpensive to separate. The company already has several patents on the crystallisation method used and has others pending.

The Olin Mathieson process also involves the leaching of the clay with sulphuric acid and the separation of the aluminium sulphate produced, but a special Olin technique is used in producing sufficiently pure crystals of such a size that they can be readily separated by filtration. The final stage is to find a satisfactory thermal method of decomposing the aluminium sulphate to alumina and the removal of the sulphur trioxide liberated. Several decomposition methods have been tried in the laboratories and it is now planned to try them out on a pilot plant scale.

U.S. Reaction

Reaction from the industry in the U.S. to this process has been scarcely noticeable. There are two basic reasons. Not only has research on clays as practical sources of alumina been conducted for some years—in the last 25 years the U.S. Government and industry have spent more than $25 million in trying to solve the problem—but also such work has not been altogether unsuccessful before now. In fact, Anaconda (another of the lesser U.S. aluminium companies) has had a clay-alumina process in the pilot-plant stage for the last three years.

About all it has said so far, however, is that as a production method it has proved highly satisfactory: on the all-important cost question it has merely indicated that alumina produced from clays by the Anaconda process is comparable in price with the delivered price of the alumina bought by the company from outside sources, where it is obtained from bauxite.

It is the cost problem which is the real fundamental issue. The U.S. aluminium industry is going through a difficult phase at the moment in common with many sectors of the economy and faced with constantly falling sales, despite intense price competition, due to continuing high fabricators' stocks primary producers are becoming increasingly cost-conscious.

Olin Mathieson's process, it has been estimated, would probably give alumina at a cost of some $50-$55 per ton against the present basic price of about $65 for hydrated alumina, which approximates to the metallurgical grade used in virgin aluminium plants. Actual alumina costs vary from plant to plant depending on the accessibility for raw material shipments, the quality of the bauxite used and other factors, but most aluminium producers seem to feel that to be really worthwhile new processes like Anaconda's and Olin Mathieson's would have to result in substantially lower costs. If not they would not justify the initial capital investment.

Another point in favour of the Olin Mathieson process is that whereas most bauxitic ores now used have 45% or more alumina content it will work, it is believed, with material with as little as 20% alumina content.

Until more is known of the Aluminium Ltd. and Péchiney's projects, however, interest in the clay-alumina processes developed so far is likely to remain largely academic.

Whatever the method used for the production of aluminium, the principal 'raw material' is still power, the cost of which is often several times that of the ore. In France, the cost of aluminium is estimated at 28% power and fuel.

Through progress in technology, however, consumption of energy per ton of metal produced has been steadily reduced, and consequently the relative importance of this item in the cost is tending to diminish. The utilisation of energy sources other than hydro-electric power, therefore, would now seem to have become an economic proposition.

In this connection, special importance may be attached to the establishment by the two leading French producers—Ugine and Péchiney—of two plants, at Lannemezan and Noguères respectively, which employ the power derived from the methane deposits at nearby Lacq. Although this form of energy costs more than hydroelectric power, the enterprises concerned take the view that this handicap will be able to be outweighed by economies—especially in manpower—and rationalisation.

In the U.S. also, the recently constructed plants seem to be holding their own with their competitors in spite of not using hydroelectric sources. Cases in point are the units in Texas and Louisiana (natural gas and lignite) and Ohio (coal), whose disadvantage resulting from the higher price of energy is offset in some measure by their being nearer to consumers of aluminium products. Moreover, they are favoured by the fact that their supplies do not depend on the caprices of nature.

In view of the present tendencies towards rationalisation, however, it may well be that other industrialised countries lacking hydroelectric power but possessing worthwhile sources of energy (lignite, methane and coal) will contemplate the creation of an aluminium industry.

The trend of technological progress is towards economisation in energy and raw materials, and it is the tendency for the industrialised countries to make themselves less and less dependent on deposits of raw materials. Their chances of success in this respect are increasing, and the case of aluminium affords a typical example. Also, the price of aluminium is becoming increasingly competitive in relation to those of other non-ferrous metals and steel, and this is traceable to some extent to the advance of substitutes, especially plastics.

Attractive New Discounts Offered to Pyrethrum Users

ATTRACTIVE discounts on prices of pyrethrum extracts have been announced in London by the Pyrethrum Board of Kenya. A "label discount" amounting to 5s 6d/lb of Extract 25% is available to insecticide manufacturers including pyrethrum as an activator in formulations based on synthetic residual toxicants.

The "symbol discount", which amounts to 9s/lb of Extract 25% is available to manufacturers whose formulations contain only pyrethrum and which are of sufficiently high quality to conform with minimum standards laid down by the Pyrethrum Board and where the manufacturer includes in his label the new symbol for African Pyrethrum. About £60,000 will be spent this year advertising the symbol to the public.

Full details of the discount scheme may be obtained on application from Biddle, Sawyer and Co. Ltd., London, the Board's sole distributors in the U.K.

Enlarged view of the Pyrethrum Board's quality symbol. Reproduction on packages must be not less than 2 cm. deep

Tough Plastics Take Extra Factory Space

EXTRA production space has been acquired by Tough Plastics Ltd. and a new factory at Culcheth, near Risley, Lancs., with some two acres of land for further extensions, is already in limited production. The company states that "sustained increased demand" for Tufplas fabrications has made it necessary to take the extra production space, giving a usable floor area seven times greater than that now in use at the company's Weybridge factory.

Tough Plastics, who include chemical plant fabrications in their production range, state that the greatly increased space will enable them to continue their training programme to provide the largest skilled force of fabricators in the U.K., and will enable their delivery times to be reduced from the present average 12 weeks to a projected maximum of six weeks for any contract of any size.

N.E.L. RESEARCH RANGES FROM HEAT TRANSFER PROBLEMS TO SYNTHESIS OF DIAMONDS

CHEMICAL industry applications are envisaged for apparatus that has been developed at the National Engineering Laboratory, East Kilbride, Glasgow, for measuring heat transfer coefficients in packed beds. One important application is the regenerative type of heat exchanger in which two streams of fluid temperatures flow alternately through a bed of solids. There are other applications, particularly in chemical industry operations in which heat is transferred between a moving fluid and a matrix.

The direct measurement of heat transfer coefficients would be difficult as it would involve estimating the amount of heat transferred within the matrix, and the temperatures of the solid surface and of the fluid at positions throughout the matrix would have to be measured. In the N.E.L. apparatus the inlet temperature of air passing through the matrix is varied sinusoidally so that heat is transferred alternately to and from the matrix; the variations of air temperature at inlet to and outlet from the matrix are recorded. There is a mathematical relation between the amplitudes of the inlet and outlet temperatures from which the heat-transfer coefficient can be determined.

The apparatus is now working satisfactorily and has been used to measure heat-transfer coefficients for beds of steel spheres so that results could be compared with those obtained elsewhere by various techniques. The results obtained with the new apparatus show that it will provide a convenient means of measuring the heat-transfer coefficients of industrial materials.

This development is described in the Laboratory's 1960 annual report (published for the D.S.I.R. by H.M.S.O., price 5s) which also notes that the Laboratory is now in a position to undertake research, development and test work for industry on problems of heat transfer and the performance of heat exchangers. Research in progress in this field covers the design and performance of heat exchangers of various types, heat transfer problems in general and the relevant physical properties of fluids commonly used in heat exchangers. The laboratory for heat transfer investigations is provided with large supplies of electricity and cooling water, and steam at various pressures and temperatures including superheat.

Attention has been given to the problem of applying very high pressures to materials to force their crystal lattices into new arrangements, yielding new materials (e.g. synthetic diamond from graphite) and to the difficulty of producing the required pressure. Apparatus has now been built at the Laboratory for the production of novel materials by a combination of high pressure (up to 100,000 atm.) and high temperature (up to 3,000°C). It uses the tetrahedron principle, devised in the U.S., in which four tapered anvils, ending in flat triangular faces, each exert a force on one facet of a pyrophyllite tetrahedron. As the anvils are forced together pressure is generated in the tetrahedron and its edges are squeezed out to form a gasket between the anvils. The prophyllite (a hydrous aluminium silicate) transmits the pressure hydrostatically to a tubular specimen container located between the midpoints of two opposite edges of the tetrahedron. The specimen is heated by passing a large electric current through this tube.

In the N.E.I. apparatus an American modification to the original equipment is used in which an external force is applied to only one of the anvils, using a conventional 500-ton hydraulic press. The lower ends of the other three anvils bear on the inside surface of a tapered steel ring, thus creating the necessary thrust through reactions from the ring.

Pressures up to 90,000 atm. have been generated and polymorphic transitions of bismuth at 25,000 atm. and thallium at 40,000 atm. have been demonstrated by measuring the abrupt change of electrical resistance associated with these transitions. The production of high temperatures is also of great importance since its combination with high pressure provides a far more powerful tool for the manipulation of lattice structure than is afforded by either variable separately. Various types of heater assembly are being investigated; so far temperatures of 2,000°C have been generated at pressures up to 60,000 atm.

The field for ultra-high-pressure research is very wide, and with the staff available the present effort is being confined to a study of hard compounds such as diamond. An investigation of the graphite-to-diamond transition is being undertaken to gain experience in this field and to prove the apparatus, and is to be followed by studies of the nickel-carbon system at high pressures.

British Standards

New Specifications for Rubber Tests, pH Scale, Compressed Air Fittings

BECAUSE methods of sampling and testing synthetic rubber latices do not, in all cases, agree with methods used to examine natural rubber latices, the British Standards Institution has issued B.S. 3397 (price 4s) which deals with synthetic rubber. At the present moment the standard covers only methods of sampling and determining total solids, coagulum, pH and surface tension. However, work is continuing in the preparation of other standard methods, and these will be issued as addenda to the present document as and when they become available.

Also newly issued is part A21 of B.S. 903 (price 3s) which describes two new methods of test for the determination of rubber-to-metal bond strength. The first method covers rubber which is assembled to two metal plates, and the other deals with rubber assembled to one metal plate. The publication also gives details of the test piece, apparatus, preparation of test piece, procedure, and method of operating.

pH Scale. B.S. 1647, the British Standard Specification for pH scale, was first published in 1950. The plan adopted is to define the difference in pH of two solutions in terms of a specified electrometric measurement and to complete the definition by assigning a value of pH at each temperature to one chosen solution, termed the primary standard. The primary standard specified is a 0.05 molar solution of potassium hydrogen phthalate.

The original specification has now been revised. No basic change has been made to the standard but its usefulness has been increased by extending the range of temperature covered. Originally 0-60°C, this range is now 0-95°C. Corresponding extensions have been made to the relevant tables in the appendices.

As in the previous edition, recommendations for the use and calibration of the glass electrode are included, together with information on the pH values of aqueous solution suitable for this purpose. It has not been found possible to make more than one addition to the list of these solutions, the pH values of which must be known reliably to an accuracy of 0.005, and the desirability of further additions is emphasised in the text. Price 4s 6d.

Enlarged B.S. to Cover Safety Valves and Gauges. The use of compressed air in industry grows each year as more and more applications are found for it. To help this growth, the British Standards Institution have revised and enlarged B.S. 1123, giving the specification for safety valves, gauges and other safety fittings for air receivers and compressed air installations. Price 4s.

Copies of these standards are available, at the prices shown, from the British Standards Institution, Sales Branch, 2 Park Street, London W.1. For non-subscribers postage is extra.

D.C.L. CIVIL DEFENCE TEAMS SHOW THEIR PACES IN REALISTIC DISPLAY

CIVIL defence teams from factories of the Distillers Group all over the country took part in an impressive two-hours' demonstration staged at the War Office Training Ground, Epsom, last week. Here a group of ruined buildings represented an area that had been affected by a nuclear explosion, the area including a section of a Distillers chemical factory. Well trained teams of rescue workers rescued extremely realistic 'casualties' from the debris and from the tops of damaged buildings, while fire-fighters dealt with outbreaks of various kinds, all operations being carefully planned and controlled from a central emergency post.

The display was watched by Mr. David Renton, Minister of State, Home Office, and other Government, local government and public services officials, and by Sir William Garrett, M.B.E., chairman of the Association of British Chemical Manufacturers, and many other distinguished personalities from the chemical industry.

At the conclusion of the display, Sir Graham Hayman, chairman of the Distillers Co., recalled that the company's civil defence units had been enrolled as soon as the Industrial Civil Defence Service was formed in 1953, and said the company now had some 900 volunteers trained or in training at various establishments in England, Scotland and Wales. These were in addition to the Group's fire-fighting, first aid and general welfare services.

During the Civil Defence demonstration, a 'casualty' trapped in the debris is given expert attention by a D.C.L. rescue leader

Mr. David Renton congratulated the company on the way it had responded to the Government's invitation to employers to train industrial civil defence units, and on the high standard of training that had been achieved.

Swedish Executive Says U.K. Exporters Adopt 'Take-it-or-leave-it' Attitude

FAILINGS of U.K. exporting companies were commented upon by Mr. Arne Lundberg, president of the British-Swedish Chamber of Commerce and director of AB Pharmacia of Uppsala, Sweden, when he addressed an export trade meeting in Edinburgh on Monday. Mr. Lundberg accused British companies of a 'take-it-or-leave-it" attitude towards customers and said that a particular failing was an ability to meet special requests of customers.

He said that if a Swedish buyer of machinery wanted an amendment made to the design the German supplier would send somebody to discuss it on the spot and do everything possible to satisfy the customer's requirements in the shortest possible time. Service of this kind was not usually forthcoming from British companies, he said, and the attitude appeared to be that the equipment was good enough for the purpose and that amendments were not necessary.

Mr. Lundberg also complained that, too often, Swedish customers had to write to the U.K. to obtain price quotations; few British companies tried to find out if their prices were right. In addition, he said, British salesmanship could be more aggressive.

BTR Industries Form German Subsidiary

ANTICIPATING Britain's entry into the Common Market, BTR Industries Ltd., London, have formed a wholly owned subsidiary in Cologne—BTR Industries GmbH—which will ensure quick deliveries and 'on the spot' service for customers in Germany. This new company will, at the outset, manufacture Hi-Flex hydraulic hose assemblies to meet British, American, German and French standards and sizes. The market will include primarily earthmoving, agricultural, mining, and hydraulic machinery manufacturers, together with the iron and steel industry.

Dunlop Develop New Ebonite Tank Lining

A NEW high-temperature rubber tank lining with a greater impact resistance and flexibility than any other true ebonite now being produced by the company, has been developed by Dunlop Ltd. Known as Duraline, the lining is particularly suitable for vessels used for the transportation of liquids or those subject to vibration and shock. It has been used in environments up to 105°C continuously for considerable periods without deterioration.

Unlike standard ebonites, the new lining does not harden in use, but rather softens slightly, resisting any tendency to become fragile with age. It does, however, have a lower yield temperature than conventional ebonites and must be treated with greater care on flanges of vessels or pipes where bolting up operations are to take place.

Enquiries should be addressed to Chemical Plant Linings Group, General Rubber Goods Division, Dunlop Rubber Co. Ltd., Cambridge Street, Manchester.

World Synthetic Fibres and Plastics Estimates

A spokesman of the German chemical concern Farbwerke Hoechst AG has stated in Frankfurt that over the current year some 800,000 tonnes of synthetic fibres would be produced in the world as a whole. This compares with a 1960 total of some 700,000 tonnes. Currently some 56% of world production was taken up by polyamides, 18% by acryl fibres and 16% by polyesters. Japan, West Germany and Italy at present have the greatest expansion rate in this field.

Similar estimates issued at the same time by Badische Anilin- und Soda-Fabrik AG put world capacity of high-pressure polythene at 1.8 million tonnes by 1965 and that of low-pressure polythene at some 540,000 tonnes by the same year. Within the present Common Market bloc, high-pressure polythene capacity will rise from about 150,000 tonnes last year to approximately 400,000 by 1965.

Will of Lord McGowan

Lord McGowan, K.B.E., D.C.L., LL.D., who started as a 5s a week office boy and became head of Imperial Chemical Industries, Ltd., and who died on 13 July, aged 87 years, left £120,744 net (duty paid £62,075). Among the bequests is one of £500 to Mr. Stanley P. Chambers, the present chairman of I.C.I. and £1,000 each "for loyal and devoted service to me as secretaries over a long period of years" to Miss W. M. Springfield and Miss J. M. Walker.

Probate has been granted to Philip H. Byam-Cook, solicitor, and Stanley P. Chambers, company director.

Mr. Henry Murray, B.Sc., A.R.C.S.I., F.R.I.C., Enfield, Middlesex, late manager of the chemicals, dyestuffs and intermediates department of Joseph Weil and Son Ltd., who died on 15 February last, left £7,022 12s 2d, £6,012 10s 7d net (duty paid £181).

Universities will Use £3½ m. Computer

AN Atlas electronic digital computer has been ordered for the National Institute for Research in Nuclear Science. The computer, together with the necessary buildings will cost about £3½ million. It will be installed at the Institute's Rutherford High Energy Laboratory, Harwell, for common use by the universities, the U.K. Atomic Energy Authority, Government Departments and the N.I.R.N.S. itself. It should be ready for use early in 1964.

The Atlas computer, made by Ferranti, has been developed in co-operation with scientists at the University of Manchester, where the prototype is now being assembled. The U.K.A.E.A. and certain universities have substantial requirements for time on such a machine, but the Atlas can cope with so much work that it was decided to provide one machine for common use in the first instance, and the Institute were invited to manage it.

The A.E.A. have been intimately concerned with the development of the project now entrusted to the Institute, and will continue to be closely associated with it. They are also handling the contract negotiations for the Institute. At Harwell the biggest demands on Atlas are likely to be made by the Culham Laboratory team and by the solid state physicists.

I.C.I. at Copenhagen Plastics Exhibition

THREE of the Divisions of I.C.I.—Dyestuffs, Plastics and General Chemicals—are exhibiting at the International Plastics Exhibition to be held in Copenhagen from 22 September to 1 October 1961.

Dyestuffs Division is showing Polymon colours for the mass colouring of polythene, polystyrene, cellulose acetate and other plastics, Vynamon pigments for p.v.c. and other vinyl resins, and Hexaplas polymeric plasticisers used with vinyl chloride polymers and copolymers and with rubbers of the butadiene-acrylonitrile and neoprene types.

Plastics Division is featuring a comprehensive range of their products including Perspex, Darvic rigid p.v.c. sheet, Fluon, Melinex polyester film and the Butakon range of butadiene copolymers.

General Chemicals Division is showing the Cereclor range of chlorinated paraffinic hydrocarbons, materials which are used to reduce the consumption of plasticiser and polymer in compounding p.v.c.

Montecatini Annual Report

In the summary of the annual report of Montecatini, Milan, which appeared in CHEMICAL AGE, 2 September, p. 328, the figure for Italian sulphur production in 1960 should have read 80,000 tonnes, not 30,000. In the table of Montecatini chemical output in 1960, the second column of figures relates to outputs for 1960. In the same article, the figure for the increased capacity of formaldehyde plant should have been shown as 200,000 tonnes.

New Amorphous Polypropylene May Have Uses in Adhesives

A NEW kind of polypropylene—amorphous polypropylene of low molecular weight—is being sampled by Eastman Chemical Products Inc. The product is sticky, stretchable and easily melts. It is compatable with a number of other resins and with most waxes and is soluble in most aliphatic and aromatic solvents.

The new product is currently available in two grades—a tacky elastomer and the other in a physical form similar to a moderately heavy grease.

Preliminary investigations have shown the materials to have promise in hot-melt adhesive blends for laminating and sealing, and in caulking and potting compounds. Their usual physical properties and wide compatibility have also produced some novel blends with a number of waxes and other resins. In many application so far, the elastomeric type has imparted flexibility to olefin waxes and resins.

Seven-pound samples of both grades are available upon request to Eastman Chemical Products Inc., subsidiary of Eastman Kodak Co., Chemicals Division, Kingport, Tennessee.

Austrian 1960 Chemical Production Reaches 16% Over 1959 Figures

FOLLOWING details of 1960 results of the Austrian chemical industry given in CHEMICAL AGE of 1 July 1961, it is now stated that actual output of organic and inorganic chemicals over the year amounted to 496,000 tonnes, that of synthetic fertilisers 943,000 tonnes, that of rayon 53,000 tonnes and that of plastics and plastics goods 51,000 tonnes; that of paints and varnishes reached 46,000 tonnes over the year.

Chemical imports rose from 4,200 million Schilling in 1959 to 5,400 million Schilling last year, thus reaching 9.8% of total Austrian imports. Direct chemical industry exports from Austria went up from 2,100 million Schilling to 2,600 million Schilling over the same period, chemical products thus taking up 6.6% of total 1960 Austrian exports.

Main suppliers are Federal Germany, Switzerland and the U.S., main customers Federal Germany, the U.S. and Communist China.

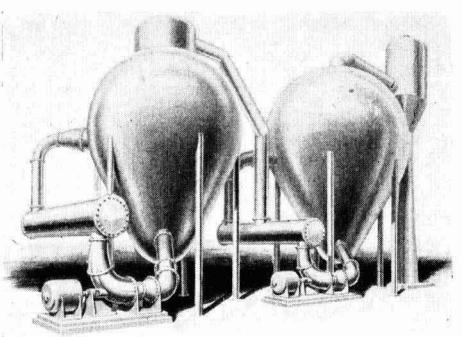
By the end of last year the Austrian chemical industry consisted of 798 firms operating 1,098 plants and the plastics-processing industry 500 plants with some 50,000 employees.

Figures issued by the Government after the announcement of the above facts show that over the first four months of the current year the Austrian chemical industry produced some 6.9% more than over the corresponding period of 1960. However, the rate of increase last year over 1959 had been as much as 16%.

Chemicals and Equipment for Oil Refineries

ORDERS for bulk chemicals, catalysts, barytes, etc., placed in the U.K. by oil companies during the second quarter of 1961 reached a value of £5,817,530 as compared with £6,130,299 for the same period of 1960. Other comparative figures are: specialised equipment for oil refineries, etc. (not including pumps and valves), £2,309,469 (£1,867,572); tubulars, pipe fittings and valves (ferrous and non-ferrous), £2,399,498 (£2,773,763); pumps (excluding slush, oilwell and kerbside), £470,033 (£550,780). These figures are given in a statement issued by the Council of British Manufacturers of Petroleum Equipment, which shows that the total value of orders for materials and equipment during the period was £25,140,695 (£29,608,104).

Conispherical Crystallising Units



Unusual shape of these crystallising units, developed by Chicago Bridge and Iron and Co., U.S., is said to result in a number of advantages, including greater control of the process and minimum build-up of salts in the vapour section. The units were described in C.A., 6 May, p. 736

PEOPLE in the news

● **Mr. A. I. Johnstone** of the engineering design department at I.C.I. Billingham Division will be transferred to Severnside Works as resident engineer for Billingham projects on 1 October. He will be succeeded as civil engineer in charge of products projects at Billingham by **Dr. R. Humphreys.**

● Four technical representatives of Quickfit and Quartz Ltd., of Stone, Staffs., scientific glassware manufacturers, will tour Holland and Scandinavia during the autumn. **Mr. R. M. Mackenzie** will spend a month in Denmark. **Mr. N. G. Wright** is visiting Het Instrument exhibition at Utrecht, Holland (4-11 October) and will then undertake a tour of Holland lasting two weeks. **Mr. M. Morgan** will be in Sweden from 13 September until the end of October. **Mr. K. Bradley** will tour Norway throughout October.

● **Mr. D. Parry Davies,** who has been appointed a director of Mond Nickel (Retirement System) Trustees Ltd., is succeeded as comptroller of the International Nickel Co. (Mond) Ltd. and Henry Wiggin and Co. by **Mr. L. C. H. Voss. Mr. C. W. R. Edwards** has been appointed secretary of Inco (Mond) and Henry Wiggin in succession to **Mr. E. Vaughan,** who remains a director of both companies.

● **Mr. Otto Secher,** vice-chairman of Marchon Products, has been appointed chairman of Marchon Italiana S.t.A., the Marchon-owned subsidiary now in production in Castiglione della Stiviere (Mantava).

● **Mr. Charles B. de Than** has been appointed European commercial representative for M. & T. Chemicals AG, it is announced by **Mr. C. H. Carpenter,** vice-president and general manager of the International Division of the parent company, Metal and Thermit Corporation, as whose administrative assistant Mr. de Than previously served. Mr. de Than, who will be headquartered in Zug, Switzerland, will be responsible for contacts with European companies under

C. B. de Than

licence to produce M. & T. inorganic and organometallic chemicals, organic coatings and electroplating chemicals. M. & T. licensees include M. L. Alkan Ltd. (U.K.), Albright and Wilson Ltd. (U.K.), Waldberg S.A. (France), Rhône-Poulenc S.A. (France), Erich Kiesow GmbH (Germany), and Th. Goldschmidt AG (Germany). He will also handle direct European sales of M. & T. products produced in the U.S. which include, in addition to the preceding, minerals and welding electrodes. Before joining M. & T. earlier this year, Mr. de Than was appointed as European regional manager of FMC International, a division of Food Machinery and Chemical Corporation. He previously worked on development of new plastics for E. I. Du Pont de Nemours and Co.

● Newly appointed to the boards of Fisons Ltd. subsidiary companies are: **Mr. G. V. K. Burton,** as chairman of Fisons Overseas Ltd.; **Mr. A. Gillies,** as a managing director of Fisons Fertilizers Ltd., as well as acting-chairman; **Mr. H. G. Rope,** a vice-chairman of Fisons Fertilizers; **Dr. E. Parry-Jones,** chairman of Fisons Pest Control Ltd., and **Mr. A. Robinson,** as deputy chairman of that company.

● Roger Williams Technical and Economic Services Inc., chemical market research specialists, announce that **Mr. Gordon D. Allen** has been named manager of their London office, which is at Mellin House, Hallam Street, London W.1.

● **Mr. E. K. G. James** has been appointed to succeed **Mr. E. E. Haddon** as director of chemical defence research and development in the War Office.

● **Mr. Vincent N. Hurd** has been appointed manager of the newly formed petrochemicals department of Gulf Eastern Co. in London.

● **Mr. P. W. Howard,** deputy chairman and former managing director of BTR Industries Ltd. has retired. Following a period as sales manager of Pyrene Co. Ltd. and, later, of Pirelli Co. Ltd., he joined British Tyre and Rubber Co. Ltd. (then British Goodrich Rubber Co. Ltd.) as general sales manager in 1926, becoming a director in 1949. He was appointed managing director in 1951 and held that office until 1959, having become deputy chairman shortly after the company changed its name to BTR Industries Ltd. in 1957.

● **Mr. William D. Morrison** has joined Hooker Chemical Corporation, U.S., as general manager of the company's newly-formed International Division, responsible to **Mr. F. Leonard Bryant,** president. This fifth corporate division is located at company headquarters, 666 Fifth Avenue, New York. Mr. Morrison has been in the chemical industry since 1948. For the past five years he was associated with FMC Corporation as manager of the Central Development Department, general manager of International Chemical Operations of FMC International, and vice-president and director of FMC International Ltd. Previously he was assistant manager of the Commercial Chemical Development Department of Celanese Corporation of America.

● **Mr. Godfrey S. How** is resigning from Imperial Chemical Industries to take up an appointment as managing director of Smith Brothers and Co. (Oil Distillers) on 2 October in place of **Mr. C. B. Wingfield,** who retired recently.

● **Lieutenant-Colonel P. F. Benton Jones** has been appointed chairman of the Council of the British Coke Research Association following the resignation of **Sir Frederick Scopes** from the office. Lieutenant-Colonel Benton Jones is a managing director of United Steel Cos. New vice-chairman of the Council is **Mr. A. H. A. Wynn,** the scientific member of the National Coal Board.

● **Mr. A. H. Milne** has been appointed manager of the general diagnostic department of William R. Warner and Co. Ltd., Eastleigh, Hants. **Mr. R. H. R. Wilkins** has been appointed to the new post of training officer and will be concerned with the organisation of training programmes for new representatives. **Mr. D. M. Walker** has been appointed manager of the merchandising sales department.

● **Mr. J. D. Eccles** has been appointed director and general manager of Head Wrightson Stockton Ltd. **Mr. A. J. Long** has joined the Head Wrightson Export Co. as general manager.

● **Mr. John Dee Shapland** has been appointed managing director of Foamite Ltd., fire protection engineers, of Victoria Road, Feltham, Middx. After joining the company as chemical engineer, he was appointed to the board as technical director and later assumed the position of assistant managing director.

● **Mr. J. Connolly** has been appointed a director of Polymer Corp. of Canada.

● **Mr. A. R. Milne** has been appointed a managing director of I.C.I. Fibres Division jointly with **Mr. E. B. Abbot** and **Dr. F. J. Siddle.** For health reasons, Dr. Siddle will retire from the Division board at the end of this year. **Mr. C. N. Harries** has been appointed a commercial director (Overseas) and **Mr. D. N. Marvin** has been appointed commercial director (home).

● **Mr. E. W. L. Williams,** soap making manager, Lever Brothers Ltd., Port Sunlight, for the past two years, has been appointed general production manager of Mac Fisheries Ltd., Bracknell, Berks. Before joining Lever Brothers, he was for seven years engaged on soap and chemicals development projects with Joseph Crosfield and Sons Ltd., Warrington.

Overseas News

DU PONT AND PHILLIPS REACH AGREEMENT OVER POLYTHENE PATENT

A SETTLEMENT of litigation has been agreed between Du Pont and Phillips Petroleum over a composition of matter patent on high density polythene. Both firms have declined to comment upon the nature of the agreement beyond saying that it involves an exchange of patent rights. Du Pont will withdraw the suit they filed against Phillips in 1958.

The Du Pont patent involved in the suit is the composition of matter patent issued in 1957 covering high density polythene "no matter how it is manufactured." The patent defines linear polythene in terms of chemical structure and several typical physical properties. Phillips doubted whether the patent covered their polythene because it was based on a high pressure process. When Du Pont tried to negotiate licensing arrangements with Phillips, the company maintained that the Du Pont patent was invalid and therefore was not infringed.

The three licensees of the Phillips high density polythene process will not be affected by the new agreement. They are Celanese who have a 50 million lb.-capacity plant at Pasadena, Tex., W. R. Grace with a 50 million-lb. plant at Baton Rouge, La., and Union Carbide Plastics who operate a 25 million-lb. facility at Seadrift, Tex. Phillips themselves have a 100 million-lb.-a-year plant at Pasadena.

Synthetic Rubber Plant for Brazil Planned

The Government of the Brazilian State of Pernambuco has asked the National Development Bank to grant credit of 1,500 million cruzeiros and take over a guarantee for a further $U.S.13 million to enable the building of a synthetic rubber plant 19 miles from Recife. It is planned to use the Firestone process and the plant would be built by the Lummus Co. The operating company would have a capital of 1,500 million cruzeiros, to be raised by a compulsory income tax levy against which shares will later be issued. The Government would allow tax-free operation of the plant, capacity of which is not as yet known.

Petrochemical Complex for Austria ?

The Austrian company Donau Chemie AG, of Vienna, which at the end of this year is to open a new sulphuric acid plant at Moosbierbaum in Austria, is reported to be interested in outside co-operation in the building up of a large-scale petrochemical complex. The Austrian company itself has a capital of only 80 million Schilling (rather over £1 million) and has not the necessary funds to finance the building of such a plant itself. The acid plant, constructed by Oronzio de Nora and based on the Monsanto process, is near the Niogas natural gas pipeline, and this could possibly feature in any future petrochemical plant there, though the operating company can at present barely meet current demand for its gas.

More Soda Produced in Poland

Over the first half of the current year Poland produced 92,400 tonnes of 96% caustic soda and 263,700 tonnes of 98% calcined soda. These figures were respectively 9.6% and 2.1% higher than the totals for the corresponding period of last year (83,500 tonnes to 261,400 tonnes).

Imperial Oil Develop Cold-water Detergent for S. American Market

Imperial Oil Ltd. of Canada have developed a detergent alkylate which will produce suds in cold water. The product was developed in the course of a long-term research programme and is aimed at the South American market where there is a lack of hot water.

Imperial Oil have already sold their product to detergent manufacturers in Colombia, Venezuela and Brazil. The Canadian Department of Trade and Commerce estimate that detergent alkylate now ranks third in Canadian exports to South America.

The detergent alkylate is shipped in bulk to South America in special chemical tankers.

Rheinische Olefin Raise Ethylene, Polythene Capacities

Rheinische Olefinwerke GmbH, Wesseling, West Germany, have now increased their ethylene capacity to 150,000 tonnes a year and that of polythene to 130,000 tonnes. This represents over the past five years a rise in production of 1,500% for the former and of over 2,000% for the latter product.

Now one of the world's leading polyolefin producers, the company is owned 50% by Badische Anilin- und Soda-Fabrik AG, Ludwigshafen-on-Rhine, and 50% by Deutsche Shell AG, Hamburg.

Increased U.S. Chemical Investments Abroad

The Office of Business Economics, a branch of the U.S. Department of Commerce, has announced from Washington that current estimates put the amount of money to be spent this year in direct investments by the U.S. in non-U.S. chemical plant and equipment at $288 million. This compares with a figure of only $237 million for last year.

Investments expected for 1962 are as high as $301 million. In the petroleum industry such investments, which reached $1,467 million last year, are to stand at some $1,776 million for the current year and $1,794 million for next year. Respective figures for the rubber products industry are of $68 million for 1960, $71 million for 1961 and $74 million for 1962.

U.S.-Dutch DMT Production for Holland

A chemical plant to be built at Delfzijl, Holland, by NV Petrochemie A.K.U.-Amoco—a company formed by Amoco Chemical Corporation, U.S., and Algemene Kunstzijde Unie NV, Arnhem, Holland—is scheduled to start production in 1963. The plant will produce dimethylterephthalate (DMT) by the Amoco process, using *p*-xylene as base material.

It was intimated in CHEMICAL AGE, 22 July, p. 133, that A.K.U.-Amoco would establish a terephthalic acid plant, the acid to be used as a raw material for A.K.U.'s production of Terlenka polyester fibre.

Du Pont Methanol Plant in Ohio

Ohio Fuel Gas Co. will supply natural gas for the production of 30 million gall./year of methanol by E. I. du Pont de Nemours at a new plant that is due to be completed by early 1963 at Huron, Ohio.

Chemical Industry in Austria

Statisites available for January to April 1961 show that the output of some chemicals and allied products in Austria has risen considerably.

	Jan./Apl. 1960 Tonnes	*Jan./Apl. 1961 Tonnes*	*Increase %*
Synthetic resins .	16,000	21,000	31.3
Rubber and asbestos goods . . .	15,000	17,000	13.3
Paints and allied goods	13,700	16,000	16.8

Output of fertilisers remained at the same level as before, while production of soap and detergents decreased by 5% (from 20,000 to 19,000 tonnes).

Hungarian Pharmaceutical Plant for Ghana

One million ampoules and 1,000 million tablets are now given as the annual capacity of a pharmaceutical plant to be delivered by Hungary to Ghana. The unit will be erected at Tema, near Accra, and produce latest Hungarian-developed pharmaceuticals, using Hungarian equipment and experts. Delivery will be by the Complex trading company of Budapest.

Unique Citric Acid Plant in South Africa

A new factory for the manufacture of citric acid from sugar cane molasses, claimed to be first of its kind in the world, is to be erected on the Natal coast of South Africa at a cost of £550,000. More than 60% of the required equipment will be manufactured

in South Africa. Production at the rate of 2,400 tons a year is expected to begin towards the end of next year.

The factory will be capable of meeting South Africa's total requirement of citric acid, which are at present being imported, and a further 900 tons will be exported annually. The annual saving of foreign exchange is estimated at some £390,000.

Polyacrylamide Gets F.D.A. Approval for Food Packs

Polyacrylamide has been cleared by the U.S. Food and Drug Administration as being safe for use within tolerance limits as a component in the production of paper and paper-board for food packaging under the provisions of the U.S. food additives law.

Use of this chemical is approved provided it contains less than 0.1% residual monomer and the amount added does not exceed the amount needed to accomplish the intended technical effect. Polyacrylamide should be used before the sheet-forming operation as a flocculant or filter-retention aid in the manufacture of wrapping paper or paper-board.

Increase in Dutch Chemical Trade

Figures recently issued from The Hague by the Dutch Ministry for Economic Affairs show that over the first half of the current year some 10% more chemical products were exported by Holland than in the second half of 1960. Exports for this period had been higher by 2% than those for the previous six-month period. Over the first 1961 half-year imports of chemical products into Holland rose by 4%.

Cyanamid of Canada to Make Broad Spectrum Antibiotics

Cyanamid of Canada Ltd. are to expand their facilities to include the complete production of broad spectrum antibiotics. The new unit will be sited at Niagara Falls, Ontario, next to the company's existing Welland plant. The expansion programme will raise Cyanamid's antibiotics manufacturing investment in Canada to $11½ million. The expansion, which is scheduled to begin production in August 1952, will mark the completion of a project started in 1958.

Synthetic Fibre Consumption Up in Australia

Synthetic fibres gained over wool during 1960 in Australia. Consumption of wool was 2% higher, but synthetics were up by 23%. The Bureau of Agricultural Economics at Canberra expects the production of synthetic fibres to expand rapidly in the next few years.

Argentine Concessions for Chemical Producers

President Frondizi of Argentina has signed a decree granting special concessions to foster the development of Patagonia. Argentine firms that establish or extend factories in the following industries may obtain the concessions provided in the decree: chemicals and petrochemicals, aluminium and metallurgy in general, provided that the raw materials of the region, or raw materials not produced in other parts of Argentina, are used.

Firms coming within these categories may obtain total or partial exemption for up to 10 years from Customs duties, exchange surcharges, income tax, capital gains tax, inheritance tax and stamp tax. Priority in the supply of natural gas will be given to qualified firms.

Melbourne Plant for Cyanamid-Australia

Cyanamid-Australia have taken an option on an area of 105 acres for a new factory at Laverton, near Melbourne. The Australian subsidiary of American Cyanamid will spend several £ millions on the plant, the first section of which will be manufacturing pharmaceuticals before the end of this year. Further activities will be undertaken when the market for the company's products has been surveyed.

Cyanamid-Australia also have a plant in Sydney.

Chemical Industry in N. Vietnam

Over last year, it is announced from the Communist authorities of North Vietnam, the country's chemical production stood at an index level of as much as 616.6, taking 1957 as 100.

Natural Gas for German Chemical Company

Erdgas - Verkaufs - Gesellschaft mbH, of Münster, West Germany, the common marketing body of the Federal German natural gas industry, has signed a contract with the Liebenau, West Germany, chemical concern GmbH zur Vertwertung chemischer Erzeugnisse. Under this contract delivery of natural gas to the latter company is to start at an annual rate of at least 3 million cu. m. by the end of this year. A 4-in. pipeline will carry the gas from the Voigtei gas fields of the Mobil Oil-Gewerkschaft Elwerath consortium to the Liebenau plant.

Ohio Site for New Du Pont Methanol Plant

E.I. Du Pont de Nemours, U.S., will start next month on the erection of a methanol plant of some 30 million gall./year capacity at Huron, Ohio. Feedstock will be piped from the Ohio Fuel Gas Co. To cost several million dollars, the plant will be complete in early 1963.

Chemical Plant Factory for India

The Struthers Wells Corporation, U.S., through their subsidiary company Struthers Wells International Corporation, have signed an agreement with the Mapara Engineering Co. Ltd., of Bombay, India, for the construction of a factory for the manufacture of chemical industry and mineral oil equipment. The American company, which foresees investment of $4 million in the project, has lodged a request for permission to undertake the scheme with the Indian Government.

Italian Chemical Equipment for U.S.S.R.

An Italian trade delegation headed by the president of the Snia Viscosa concern is reported to have held negotiations in Moscow with regard to possible delivery of Italian plant and equipment for the production of synthetic products. A credit sum of $U.S.75 million is stated to have been offered by the Italians.

European Office for I.S.R.P.

The Institute of Synthetic Rubber Producers, of New York, has established a European branch office at 32 rue Joseph II, Brussels 4, Belgium.

New Japanese Polystyrene Firm to Tie Up with Cosden

TWO Japanese chemical firms, Toyo Koatsu and Miike Gosei, are planning the formation of a new company, to be owned on an equal basis, for the production of polystyrene. The two companies have been negotiating with Cosden Petroleum Corp. of the U.S. for a technical licence. Application for permission has recently been submitted to the Japanese Foreign Investment Council.

The contract with Cosden involves the payment of the total value of an annual output of 9,000 tonnes of polystyrene and a royalty of Yen 500,000 (£500). Additional royalty will be paid in one of two ways: an amount calculated on the basis of $50 per tonne per year for production exceeding the royalty solvency (12,000 tonnes annually); or an amount calculated in the basis of 0.5% per lb. The period of contract is 15 years.

Annual output planned by the new company is 3,000 tonnes of crystal styrene polymer, 4,800 tonnes of styrene rubber, graft copolymer, 1,200 tonnes of polyblended impact and 2,400 tonnes of acrylonitrile styrene copolymer. The acrylonitrile styrene copolymer will be produced by a Toyo Koatsu process. Styrene monomer will be supplied by a company, to be known as Muroran Seitetsu Chemical, created by Toyo Koatsu for the purpose.

Construction of the new factory will begin in October of this year, and is scheduled to take a year to complete. It is expected to be in full production by 1964. The capital required for the new project is Yen 1,652 million (£1.7 million), of which Yen 1,231 million is for plant, Yen 180 million technical fee and Yen 240 million for auxiliary equipment.

Bookshelf

Well-presented Material of Rapidly Developing Field

THE CHEMICAL AND BIOLOGICAL ACTION OF RADIATIONS, Vol. V. Edited by *M. Haïssinsky*. Academic Press, London, 1961. Pp. xi + 278. 63s.

This particular volume contains four contributions, the first of which is by A. O. Allen on the mechanisms and kinetics of water radiolysis by gamma rays and electrons. The second is a set of chapters by J. Pucheault (in French) on the action of alpha and other heavy particles on water and aqueous redox salt systems. Both phyical aspects and mechanisms are fully discussed.

Diffusion kinetics in radiation chemistry, which is the title of A. Kuppermann's contribution, is a masterly account of the application of reaction-rate and diffusion laws to the H and OH radicals through which radiations effect chemical reactions in aqueous media. Progress has been made possible by using computers to solve the associated complex sets of equations. The final contributors are D. P. Stevenson and D. O. Schlisser who deal with those aspects of mass spectrometry which are relevant to radiation chemistry; the topics include ionisation cross-sections, appearance potentials and ion-molecule reactions.

Since this is a subject in a stage of rapid development and has such wide possible applications, well-presented material of this type is a good investment for all chemistry libraries as well as for active participants in this field.

Organic Microanalysis

QUANTITATIVE ORGANIC MICROANALYSIS (SECOND EDITION). By *Al Steyermark*. Academic Press, London, 1961. Pp. xvii + 665. 118s.

The second edition of this book benefits from the author's extensive practical experience as director of a large industrial microchemical laboratory and as chairman of three major committees concerned with the standardisation of microchemical apparatus and methods. It includes the latest recommendations of these groups as well as many advances in technique. All the methods included have been carefully assessed for their reliability.

The chapters are presented in the same order in which the techniques involved should preferably be taught to those aiming to become competent microanalysts. Nine are devoted to the microdetermination of the elements and six to the microdetermination of functional groups. Two chapters cover the microdetermination of molecular weights and the common physical constants and a further two deal with the construction, mounting, maintenance and use of microbalances. Throughout the book full constructional details and specifications of all the apparatus described are given together with useful suggestions as to commercial sources of supply.

The extensive bibliography at the end of each chapter includes most of the relevant papers up to 1959, and many in 1960. A valuable feature for reference purpose is a table preceding each bibliography in which the publications are conveniently classified according to their content.

This volume will serve as a valuable reference work for practising microanalysts as well as for research chemists who wish to adapt micro techniques to the solution of new problems. The amount of specialised details which it features precludes its general use as a handbook for advanced University practical classes.

Radical Polymerisation

RADICAL POLYMERISATION. By *J. C. Bevington*. Academic Press, London, 1961. Pp. viii + 188. 40s.

The heroic period of investigation of free radical polymerisation lasted approximately from 1940 to 1955. Chemists then established the main features of the systems; and developed methods by which their kinetics could be quantitatively investigated. Emphasis was generally placed on the process in rather the same way as occurred in the study of other radical systems. In recent years academic interest in radical polymerisation has declined and research has largely served to fill in the gaps and tidy up the field. Bevington's book should therefore be looked to as a systematic account of the field, written at a favourable time, rather than an introduction to exciting new developments. Many problems, of course, remain incompletely solved but it seems that new techniques will have to be brought to bear before the picture can be considerably altered. Better means of separating and characterising polymers might provide the key for, as Bevington points out, the molecules are permanent records of chain reactions.

This is the first book devoted entirely to polymerisations that classifies the material according to the types of elementary reaction involved. This in itself is an important landmark in the development of the subject. The following topics are discussed in chapters of roughly equal length: Production of radicals, Initiation of polymerisation, Growth reactions, Transfer reactions, Interaction of literature is fully covered up to the radicals, Retardation and inhibition. The early months of 1960 but it is noticeable that the best information on many topics, such as transfer reactions, comes from work that is 10 years old.

The material is well-arranged and clearly discussed so that the book could be read with profit by an honours student. He would have been better served if rather more space had been given to a comparison of other radical systems, though this would have made the book a less attractive length. Those who already work in the field should be glad to spend a couple of evenings reading this book.

Boron

ORGANIC CHEMISTRY OF BORON. By *W. Gerrard*. Academic Press, 1961. Pp. x + 308. 55s.

Interest in the organic chemistry of boron is now so great that any moderately priced review of the field is certain of a warm welcome. Such an assembly of information can save workers much time and effort. The author has taken considerable trouble to list references to such matters as the physical properties of the compounds. Unfortunately he has spoiled his work by adopting a most unsuitable method of giving references. Joint publications are always referred to by the name of the first author; thus Schlesinger *et al*, (1953) could refer to any one of the 10 important papers published by them in that year. It is not fair to the reader to leave him to guess which.

The book has a number of other curious features. A 20-page appendix is devoted to a list of papers, with titles, about the use of tetraphenyl boron derivatives in analysis. At times the author's own interests are over-emphasised. This results in more than twice as many references to his work as to that of H. C. Brown. It also leads to a strange chapter in which boron is hardly mentioned. The author is clearly an enthusiast with an individual viewpoint.

Chloride Determination

DETERMINATION OF CHLORIDES. By *T. A. Strivens*. Pye, Cambridge, 1961. Pp. 55. 10s 6d.

In the first of a series of handbooks on electroanalytical methods, the major methods of chloride determination are surveyed. 'Classical' methods are outlined, preceding detailed accounts of potentiometric, conductimetric and amperometric procedures and a guide for deciding which methods are the most suitable in terms of accuracy and chloride concentration. The remaining pages describe suitable modifications when interfering ions are present, reviews of particular applications as in blood and urine analysis, organic compounds and water, a bibliography of about 180 references, and some useful appendices.

Since the majority of analytical chemists are concerned with estimating trace quantities, small volumes such as this which collect together a large body of practical information can always be recommended.

TRADE NOTES

Cut in Glycerine Prices

From 11 September, Glycerine Ltd., 8 Tudor Street, London E.C.4, have cut home trade prices of refined glycerine by £20/ton. A new home trade price list is available from the company.

Nylon for Engineering

A new type of nylon for engineering applications, designated Polypenco MC, is described in a news letter (No. 4) issued by Polypenco Ltd., 68-70 Tewin Road, Welwyn Garden City, Herts. Dimensions are given for standard shapes now available—plate, discs, tube and rod; physical properties are tabulated and engineering applications suggested.

Polyethylene Glycols

A new technical brochure evaluating seven types of polyethylene glycol has been made available by Allied Chemical International.

The brochure outlines specific applications in cosmetics, pharmaceuticals, soaps, detergents, rubber, textiles, plastics and agriculture among other industries. In addition, specifications, shipping and handling information are given.

Copies may be obtained from: Product News Section, Allied Chemical International, 40 Rector Street, New York 6, New York.

Aerosol Stencil Ink

Particularly suitable for stencilling both porous and non-porous surfaces such as boxes, crates, metal drums, etc., is a range of stencil inks produced by J. and H. Rosenheim and Co. Ltd., Craigton Industrial Estate, Glasgow, S.W.2. Supplied in aerosol dispensers, the range is known as Spray. The colours available are black, blue, green, white, red orange, yellow and aluminium. They are waterproof and non-flaking.

Automatic Control Service

Automatic Control Engineering Ltd. have opened a new Northern area design office at 15 Bloom Street, Manchester 1 (tel.: Central 1462/3) to meet the increase in demand for automation system design service. The new premises have three times the floor space of their previous offices in the area.

T.W.W. Stock List

First issue of a new stock list, which will be produced at regular intervals, has been published by the industrial plant department of Thos. W. Ward Ltd., Albion Works, Sheffield. It is a 16-page booklet, fully illustrated, listing current holdings of boilers, tanks, pipes and tubes, air receivers, valves, scaffolding, ladders, etc., and it also gives details of the department's activities in specialised fabrication.

Strip-chart Recorders

Further production increases have enabled George Kent Ltd., Luton, to cut prices and speed deliveries of their Mark 3 electronic strip-chart recorder. Price of the 16-point model is now reduced from £437 to £355. Delivery of Mark 3 instruments within a wider range of standard specifications can now be made in eight weeks.

Gas Sampling and Analysis

Specification sheet No. SS016 from George Kent Ltd., Luton, Beds., describes an oxygen analysis system with which is associated gas sampling equipment, gas analyser, measuring instruments and ancillaries.

Tube-in-Strip

A novel component for heat exchangers is the Impalco Tube-in-Strip, this being a single piece of aluminium providing a combination of parallel tubes and strip material. It lends itself to heat transfer applications between fluids of different heat transfer characteristics, or, by inserting heating elements in the tubular passages, radiant heating panels may be simply constructed. An illustrated leaflet is available from Imperial Aluminium Co. Ltd., P.O. Box 216, Witton, Birmingham 6.

New Ermeto Depot

To provide an improved delivery service, British Ermeto Corporation Ltd., and their associates, Simplifix Couplings Ltd., both members of the Alenco Group, are to open a depot on 2 October, in Blackett Street, Manchester.

Welded Tubes

Published by Rollo-Hardy and Co. Ltd., Paddockhall Road, Haywards Heath, Sussex, a member of the Compoflex Group of companies, is an illustrated booklet with the title 'A guide to welded tube economy.' The booklet describes the manufacture and types of Permbrite welded stainless tubes which are claimed to be at least as strong as solid drawn tubes and are cheaper and more readily available.

Corrosion Engineering

A folder with the above title has been produced by Corrosion Technical Services Ltd., Sunlays Island, Great West Road, Brentford, Middlesex. It describes the company's services to the chemical, steel, engineering and allied industries, which cover corrosion-resistant linings, flooring materials, pickling tanks, design and erection of effluent treatment plants, protection of structural steel, and other services.

Vitreous Enamelling

The vitreous enamelling service provided by Metal Porcelains Ltd., Cornwall Road, Smethwick 40, Staffs., is described in an illustrated folder, V6B. As well as manufacturing all types of frits, the company act as consultants to the industry, recommending and, if required, supplying a wide range of vitreous enamelling plant and equipment manufactured by other member companies of the Incandescent Group.

Change of Address

Singlehurst Engineering Ltd., specialists in industrial hose and high pressure flexible pipes and fittings, have moved to larger premises with greater facilities at 72-76 Clun Street (off Carlisle Street), Sheffield 4 (Sheffield 29919).

Market Reports

TRADING CONDITIONS REMAIN STEADY

LONDON A continuation of steady trading conditions has been reported from most sections of the industrial chemicals market, with the routine soda products and potash chemicals in regular call. In other directions there has been a quietly steady demand for hydrogen peroxide, borax and boric acid on home and export account, while the movement against contracts, in the aggregate, has covered good volumes.

Prices are fairly steady and the supply position generally is easy. Copper sulphate has risen slightly to £79/ton less 2% f.o.b. Liverpool, while zinc oxide has been reduced by 50s/ton, present prices being White Seal £95, Green Seal £93 and Red Seal £90/ton for 1 ton lots.

Most of the coal tar products are in steady request and the general position is unchanged.

MANCHESTER The approaching end of the holiday season has been reflected in slightly more active conditions. Fewer instances of delivery suspensions against contracts have been evident and there has been an improving tendency in the weight of new business. The latter has been mainly concerned with spot and near delivery parcels, although there have been some forward bookings extending over the last quarter of the year.

Prices generally continue on a steady to firm basis. In the markets for fertilisers additional buying has been reported in basic slag and the compounds.

SCOTLAND The slight improvement in general business earlier this month has been maintained and, if anything, has increased somewhat during the past week, although some sections of the trade are relatively quiet. Apart from a slight increase in some of the metal derivatives, prices on the whole have been steady and with quite a healthy volume of business placed for forward delivery, on the home market prospects are looking very much brighter. The agricultural trade is more or less following a pattern; weather conditions have dictated a slower demand for some chemicals, especially for burning down potato haulms, but no doubt this leeway will be made up before the season is over.

Commercial News

- A.P.V. Resume Interim with 3¾%
- Thomas Hedley's Record Profits, Exports
- Big Capital Increase for Chemalloy
- German Cellulose Project for N. America?

A.P.V.

Improved profits and turnover for the first half of this year as compared with the first half of the previous year are noted by the directors of the A.P.V. Co. Ltd., the engineers and contractors of Crawley, Sussex. An interim dividend of 3¾% is declared in respect of the current year to 31 December, this being the first interim payment in five years. A single dividend of 11¼% was paid in the previous year.

The chairman of the company, Mr. W. E. Jenkins, draws attention to the Chancellor's request concerning restriction of dividends, and says that the interim should not be taken as an indication of an increase in the total dividend for the year.

Thomas Hedley

Thomas Hedley and Co., the detergent manufacturers who form part of the U.S. Procter and Gamble Group, increased their profits by nearly £1 million to £5.4 million in the year ended 30 June. Exports reached a record level of over £3.5 million—24% more than the previous year.

After U.K. tax, the net profit, at £2,708,000, was £482,000 higher than in the previous year. A total of £2,452,000 was remitted in dividends to the U.S. parent, leaving £256,000 retained in the British business, compared with £689,000 the year before. During the year profits of the Procter and Gamble group rose by £9,561,000 to £79,055,211.

American Enka

American Enka Corporation are to resume dividend payments in view of the improved business during the first eight months of 1961. A quarterly payment of 20 cents, payable on 30 September, will be the first dividend since September 1960.

Allied Colloid

Allied Colloid, distributors of dyestuffs, auxiliary chemicals and specialised chemical products for Badische Anilin- und Soda-Fabrik, have announced the signing of an agreement with B.A.S.F. whereby if they wish to dispose of any shares they undertake to offer them for purchase in the first place to the West German firm.

Allied Group net profits for the year ended 31 March 1961 was £71,000 and the dividend paid was 17½% as forecast. Sales since 31 March have continued on the same level as sales during the corresponding months of the previous year.

Chemische Fabrik Billwarder

Chemische Fabrik Billwärder AG, Hamburg, have announced an unchanged dividend of 8% on their DM1.5 million capital for 1960. The firm, whose sales comprise some 20% of exports, recorded a 7% increase in turnover over the period. Turnover development has been negative over the first few months of 1961, though a current improvement gives reason to expect a satisfactory result for 1961.

Chemalloy Minerals

Chemalloy Minerals, Ltd. are to increase their authorised capital from $3 million to $5 million by the creation of an additional 2 million shares of par value of $1 each. The company as holders of 52% of issued shares of New Surpass Petrochemicals Ltd. has received an offer from a chemical concern to purchase all of the issued shares of New Surpass and to acquire a debt of approximately $169,000 owed by New Surpass to Chemalloy, for a price of $380,000. Chemalloy have offered to purchase all of the New Surpass shares not already owned by the company at 46 cents per share for purpose of delivery under the offer.

Chemische Fabrik Weyl

Chemische Fabrik Weyl AG, Frankfurt, have altered the company's aims to "production, processing and sale of coal-tar products and the production of all kinds of chemicals as well as the trading therein." Weyl are a fully-owned subsidiary of Rütgerswerke AG, also of Frankfurt.

Diamond Alkali

Diamond Alkali's bid for Bessemer Limestone and Cement Co. has been approved by shareholders of both companies and became effective on 1 September. The cement plant and limestone quarries of Bessemer in Ohio will be operated by Diamond's Cement-Coke Division.

Impag

The Swiss chemical trading concern Chemie-Import AG Schweizerischer Industrieller 'Impag', Zurich, announce for the 1960 financial year an unchanged dividend of 5% on S.F.1 million capital.

N.W. Nitro-Chemicals

Northwest Nitro-Chemicals Ltd. report net income of $1,721,032 ($594,803) for the year ended 30 June 1961.

Waldhof-Aschaffenburg

Waldhof-Aschaffenburg Cellulose Development Corporation is the name of a study company set up in New York by the two Federal German cellulose producers Zellstoffabrik Waldhof and Aschaffenburger Zellstoffwerke. The joint subsidiary is to consider the erection of a sulphate cellulose factory in North America. Both companies have a growing demand for this material in unbleached form which cannot be covered by West German supply.

Minerals and Chemicals

Net profit of Minerals and Chemicals Phillips Corporation, U.S., record for the first half of the current year is equivalent to 86 cents/share. Corresponding figure for the first 1960 half-year was 82 cents.

INCREASES OF CAPITAL

RODOL LTD., chemists, etc., 138 Richmond Row, Liverpool 3. Increased by £20,000, beyond the registered capital of £30,000.

WINTHROP GROUP LTD. (formerly Bayer Products), manufacturers of and dealers in chemicals, etc., 12 Whitehall, S.W.1. Increased by £500,000, beyond the registered capital of £1,050,000.

SICHEL-WERKE AG, Hanover, West Germany, chemical producers, have raised their capital from DM1.2 million to DM2.1 million. Permission has been given by the shareholders to raise the capital further by up to DM600,000 by 30 June 1966.

HANSEATISCHE ACETYLEN-GASINDUSTRIE GMBH, of Hamburg, West Germany, acetylene gas producers owned 96% by Svenska A/B Gasaccumulator, of Lidingö, Sweden, have raised their capital from DM6 million to DM8 million.

PROGIL S.A., Paris, are increasing their capital from 40 million to 60 million francs by the issue of new shares at a rate of 1:2 and at 240% nominal value.

DECREASE OF CAPITAL

INTERNATIONALE GESELLSCHAFT DER STICKSTOFF-INDUSTRIE AG, the nitrogen industry concern of Basle, Switzerland, have reduced their capital from S.F.1.2 million to S.F.60,000 by annulling 11,400 shares against repayment.

NEW COMPANIES

CEE BEE CHEMICAL CO. LTD. Cap. £3,000. Manufacturers of and dealers in goods and products used for cleaning, preserving, protecting and treating all types of buildings, etc. Directors: K. B. Smith, A. H. Blair. Reg. office: 46 Parliament Street, Westminster, London S.W.1.

BEEDEX OILS AND CHEMICALS LTD. Cap. £1,000. Directors: P. Bromhead, A. Denison. Reg. office: Remo House, 310/2 Regent Street, London W.1.

NEW PATENTS

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

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

ACCEPTANCES

Open to public inspection 11 October

Choleretic, noncholagogic agents containing alpha-hydroxy-phenylcyclohexyl butyric acids. Maggioni & C. S.p.A. **879 425**

Photopolymerisation of vinyl monomers with metal oxides as catalysts. General Aniline & Film Corp. **879 892**

Trisazo dyestuff. Farbenfarbriken Bayer AG. **879 635**

Method of making polyurethane prepolymers and polyurethane thread produced by said method. United States Rubber Co. **879 638**

Method of producing containers of synthetic plastics material. American Can Co. **879 752**

Azo dystuffs of the pyrazolone series. Farbenfabriken Bayer AG. **879 641**

Method of manufacturing alkyl iodides. General Aniline & Film Corp. **879 350**

Process for dyeing nitrogenous fibres. Ciba Ltd. **879 642**

Process for the production of cyclohexanone from cyclohexylamine. Zimmer, H. J. **879 564**

Polymerisation of vinyl and related monomers with organometallic catalysts and organic co-catalysts. National Lead Co. **879 565**

Process for obtaining substantially straight-chained saturated hydrocarbons. Farbenfabriken Bayer AG. **879 706**

Copper-containing azo dyestuffs. Farbenfabriken Bayer AG. **879 235**

Production of acrylic acid esters and catalysts therefor. Union Carbide Corp. **879 346**

Production of acrylic acid esters and catalysts therefor. Union Carbide Corp. **879 305**

Production of acrylic acid esters. Union Carbide Corp. **879 306, 879 307 879 308**

Diluent and monomer recovery and purification process. Phillips Petroleum Co. **879 848**

Pigments for ceramics and enamels. Rhone-Poulenc. **879 962**

Chromous chloride catalyst and the polymerisation of ethylene therewith. Grace & Co. **879 309**

Process for the manufacturing of polymono-olefins. Asahi Kasei Kogko Kabushiki Kaisha. **879 899**

Process for the purification of olefins. Shell Research Ltd. **879 506**

Preparation of alkane sulphonyl chlorides. Continental Oil Co. **879 900**

Process for the manufacture of spirocyclic polyketones. Hoffmann-La Roche & Co. AG, F. **879 789**

Preparation of solid olefin polymers. Standard Oil Co. **879 283**

Water-insoluble salts of basic anti-histaminics. Boehringer & Soehne GmbH, C. F. **879 901**

Polymerisation process for polyolefins. National Distillers & Chemical Corp. **879 284**

Process for the preparation of 1-cyclohexyl-1-propanol carbamate. Compagnie Francaise des Matieres Colorantes. **879 236**

Treatment of olefin polymers; and the resulting polymers and articles manufactured therefrom. Shell Internationale Research Maatschappij N.V. **879 304**

Transparent polymeric styrene compositions. Montecatini. **879 806**

Acrylonitrile polymer spinning compositions. Du Pont de Nemours & Co., E. I. **879 810**

Cyclopentanophenanthrene derivatives and process for the manufacture thereof. Syntex S.A. [Divided out of 876 986.] **879 237**

Open to public inspection 18 October

Processes for producing organo-polysiloxane protective finishes. Bradford Dyers' Association Ltd. [Cognate application 8330, March 13, 1957.] **883 315**

Production of aqueous aluminium chlorhydrate gels. Albright & Wilson (Mfg.) Ltd. **880 261**

Dehydration. Scott & Son (London) Ltd., George & Glaser, W. **880 183**

Production of condensation products of alcohols. British Hydrocarbon Chemicals Ltd. **880 406**

Adhesive compositions. Bemmels, C. W., and Gagliardi, D. D. **880 284**

Drying compositions. Unilever Ltd. **880 354**

Polystyrenes. Montecatini. **880 099**

Reforming of gaseous hydrocarbons and liquid hydrocarbons of low boiling point. Kellogg Co., M. W. **880 108**

Tetrahydro-dioxopyridazines and process for their manufacture. Ciba Ltd. **880 015**

Dioxo hydropyridazines and process for their manufacture. Ciba Ltd. **880 016**

Process for the catalytic treatment of hydrocarbons. Otto & Company GmbH., C. **883 355**

Use of alkalated styrenes in copolymer based enamels. Canadian Industries Ltd. **880 356**

Process for recovering sulphuric acid from waste acid liquors. National Lead Co. **880 359**

Biocidal compositions. Progil. **880 411**

Steroid compounds. Laboratories Francais de Chimiotherapie **880 362**

Organo-silicone block copolymers. Union Carbide Corporation. [Addition to 802 688.] **880 022**

Polyolefins. Phillips Petroleum Co. **880 025**

Aralkyl-piperidines. Ciba Ltd. **880 067**

Production of esters of bis-(carboxymethylthio)-methane. Uclaf. **880 421**

Coating compositions. Imperial Chemical Industries Ltd. **880 068**

Process for preparing glycidyl polyethers of polyhydric phenols. Bataafse Petroleum Maatschappij N.V. **880 423**

$\Delta^{1,4}$-pregnadienes and method for their preparation. American Cyanamid Co. **880 071**

N : N^{I} : N^{II}-trisubstituted hydroxyaspartamides. Pfizer & Co. Inc., Chas. Nov. **880 071**

Acylated α : α-dioxy-diamino-anthraquinones, and their manufacture and use. Ciba Ltd. [Additionto 865 809.] **880 426**

Production of trans-1,4-dichlorobutene-2. Du Pont De Nemours & Co., E. I. **880 029**

Thiocarbamates. Monsanto Canada Ltd. **880 030**

Phosphoric and thionophosphoric acid ester amides and diamides. Farbenfabriken Bayer A.G. **880 297**

Polyhydrous resins. Ateliers de Constructions Electriques de Charleroi. **880 384**

Process for the splitting of bis-(hydroxyphenyl)-alkanes or -cycloalkanes by hydrogenation. Farbenfabriken Bayer A.G. **880 300**

Antibiotic. Soc. Farmaceutici Italia. **880 035**

Curing of ethoxyline resins. Devoe & Raynolds Co. Inc. **880 302**

Substituted piperidines and preparation thereof. Sterling Drug Co. **880 139**

Stabilised pesticidal composition. Diamond Alkali Co. **880 389**

Fungicidal compositions. Imperial Chemical Industries Ltd. **880 270**

Bactericidal and fungicidal compositions containing xylene derivatives. Diamond Alkali Co. **880 272**

Penicillins. Beecham Research Laboratories Ltd. [Addition to 870 395.] **880 642**

Plastic containing composition and the process of making same. Blake, C. L. **880 198**

Polypeptides. Ciba Ltd. **880 245**

16α,17α-substituted pregnatrienes and derivatives thereof. American Cyanamid Co. **880 201**

Resins. Union Carbide Corporation. **880 202**

3,3-disubstituted-2,4-azetidinediones. Lepetit S.p.A. **880 332**

Method of stabilising dihalogen-triazine dyestuffs Ciba Ltd. **880 393**

Process for preparation of alpha tocophenol. Collett-Week Corporation. **880 399**

Penicillins. Beecham Research Laboratories Ltd. [Addition to 870 395.] **880 400**

Vinyl resin compositions. Okonite Co. **880 364**

Linear polyurethane-semicarbazide. Chemstrand Corporation. **880 401**

Aminotriazine compounds, their production and use. Ciba Ltd. **880 403**

Substituted acrylamide colour couplers. Du Pont de Nemours & Co., E. I. **880 206**

Production of 2,3-dichlorobutadiene-1,3. Du Pont de Nemours & Co., E. I. **880 077**

Epoxycycloaliphatic trioxane derivatives and their preparation. Ciba Ltd. **880 255**

Process for producing L-aspartic acid. Tanabe Seiyaku Co. Ltd. **880 234**

Pyrazoles and a process for their manufacture. Ciba Ltd. **880 256**

Ferrous chelates of amino acids. Tanabe Seiyaku Co. Ltd. **880 313**

Process for producing 1,8-dioximino-4,7-methane-3a,4,7,7a-tetrahydroindene. Union Carbide Corporation. **880 373**

Process for the production of water-soluble salts of alpha, beta-ethylenically unsaturated sulphonic acids. Badische Anilin-& Soda-Fabrik A.G. **880 329**

Hydrazinium compounds, their preparation, and pharmaceutical preparations containing them. Grace & Co., W. R. **880 235**

Process for the production of N-amino alkyl hydrazines. Farbenfabriken Bayer A.G. **880 332**

Fabrication of thermoplastic resins. Du Pont de Nemours & Co., E. I. **880 059**

Polymer latex and method for its production. Dow Chemical Co. **880 338**

Process for the removal of hydrogen halide from silicic acid esters. Dynamit Nobel A.G. **880 211**

Preparing hydrocarbon-boron compound. Purdue Research Foundation. [Divided out of 877 936.] **880 212**

Steroid compounds. Laboratories Francais de Chimiotherapie. [Divided out of 880 362.] **880 363**

Hydrazine derivatives and a process for the manufacture thereof. Hoffmann-La Roche & Co., F. **880 278**

Substituted piperidines and the preparation thereof. Sterling Drug Inc. [Divided out of 880 139.] **880 140**

Mercury Process Regulations

The Ministry of Labour has prepared a preliminary draft of the Mercury Processes Special Regulations which are intended to apply to mercury processes or the storage of mercury or mercurial compounds at any place to which the provision of the Factory Acts apply. The draft includes proposals as to personal equipment, control of the work place and medical supervision.

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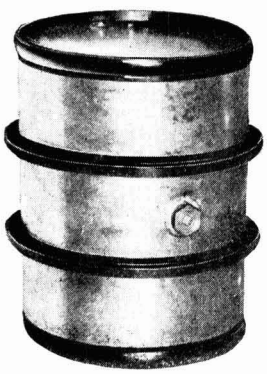

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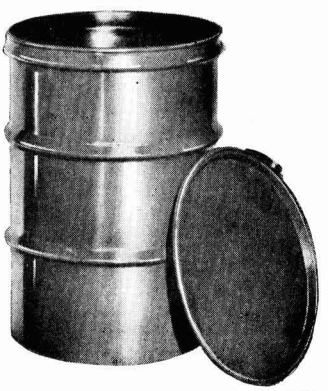

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7 ft. **EDGE RUNNER MILL** by **Clayton Goodfellow,** cast iron tapered pan 9 in. deep at sides, twin tapered rollers average 37 in. dia. fitted scrapers and ploughs, no outlet, pulley drive. Aluminium canopy with side covers. TWO AVAILABLE.

PATENT LIGHTNING CRUSHER, size 1A, with stainless steel liners, hammers, rotor and grids. Feed opening 9 in. × 10½ in. Grid aperature 2 in. × ⅞ in. Pulley drive. THREE AVAILABLE.

VACUUM DRYING PLANT by **Scott,** comprising Horizontal cylindrical agitated drier 23 ft. long × 4 ft. i.d. with top centre feed and bottom centre outlet with handwheel control, jacket and chamber pressures 10 p.s.i. Drive by 10 h.p. 400/3/50 cycles motor through gearbox Steel feed hopper, electric vibration unit, belt and bucket elevator, overhead steel holding bin, etc.

OCTAGONAL DRYING DRUM, approx. 82 in. across flats × 39 in. wide with 39 in. × 23½ in. feed opening secured by 14 swing bolts. Drum of welded mild steel construction, drive by 3 h.p. motor. With Sturtevant No. 1 motorised blower and heating chamber, cyclone, and ancilliary equipment.

VACUUM OVEN by **Francis Shaw,** 6 ft. 3 in. high × 7 ft. 10 in. back to front × 5 ft. 1 in. wide internally, welded platens and heavy swing door each end having four corner wheel operated swing clamps. Usual flanged connections to internal headers with swan neck connections to platens. SEVEN AVAILABLE, three 15 platen cast iron, two 12 platen cast iron, two 12 platen steel.

VERTICAL MILD STEEL WATER JACKETED TURBINE MIXER by **Dobson & Barlow,** Model No. 7, 6 ft. × 5 ft. 3 in. deep on straight bolted on cover, flat bottom 4 ft. dia. impeller in bottom, underdriven through glanded shaft and worm reduction gearbox from 50 h.p. motor. Jacket suitable 40 p.s.i. water pressure, mounted on mild steel legs.

STAINLESS STEEL DOUBLE TROUGH MIXER by **Winkworth,** trough 3 ft. 6 in. × 3 ft. 4 in. × 2 ft. 8 in. deep with 18 in. high aluminium apron extension. Two stainless steel 'Z' glanded agitators driven by 10 h.p. geared motor. Trough fitted chains and counterbalance weights over gantry, tilting be geared motor. Suitable 380/420/3/50 cycles.

HYDRO EXTRACTOR by **Broadbent,** 48 in. dia. solid mild steel basket 18 in. deep, direct drive by 400/3/50 cycles motor with starter. Hand operated skimmer attachment, three point suspension. Hand operated brake. Basket speed 570 r.p.m.

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VERTICAL PRESSURE VESSEL, 888 gallons capacity, 5 ft. 6 in. × 5 ft. 3 in. deep with 9 in. deep dished ends, construction $\frac{5}{16}$ in. plate. Bolted side bottom manway, centre bottom outlet and connections. Suitable 60 p.s.i. w.p. Mounted on skirtband. Internally coated with Detel red paint. EIGHT AVAILABLE.

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