Chemical Age

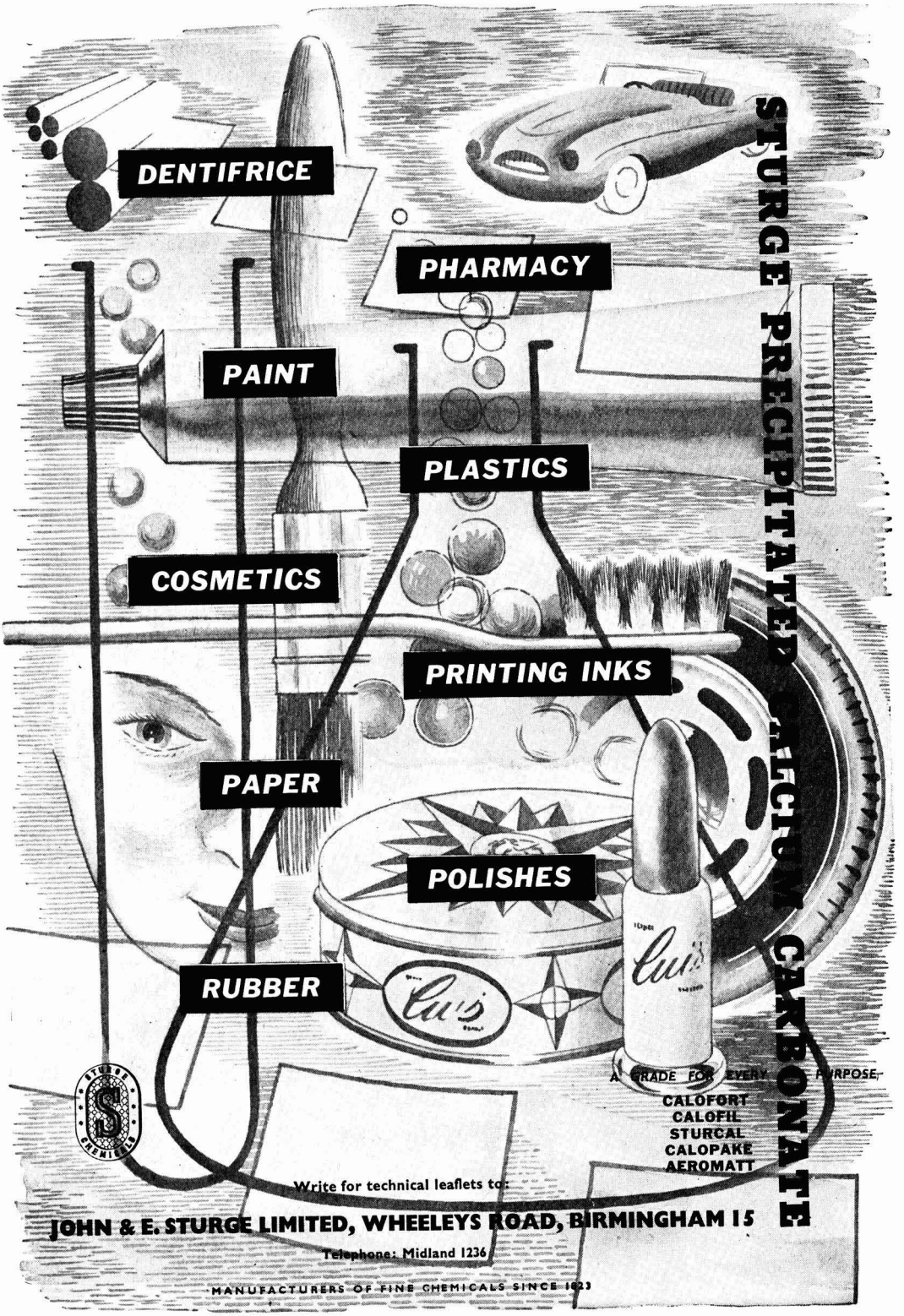
VOL. 84 No. 2152

8 October 1960

THE WEEKLY NEWSPAPER OF THE CHEMICAL INDUSTRY

U.S. MEETING ON CHEMICALS IN EUROPE

(page 577)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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 560)

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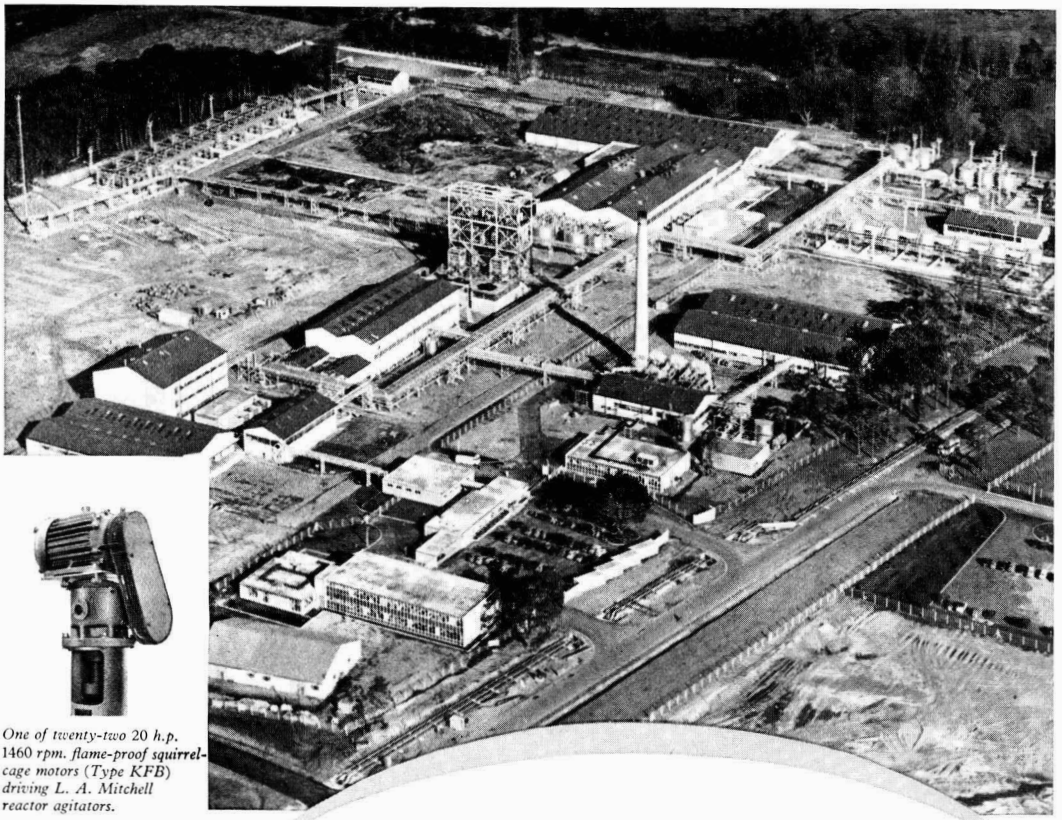
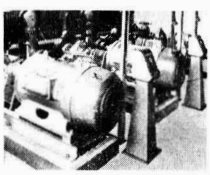
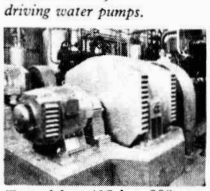


One of twenty-two 20 h.p. 1460 rpm. flame-proof squirrel-cage motors (Type KFB) driving L. A. Mitchell reactor agitators.



Two of four 100 h.p. 2920 r.p.m. squirrel-cage motors (Type HRSP), with pedestal control stations, driving water pumps.



Two of four 425 h.p. 300 rpm. salient pole synchronous motors (Type SM) with overhung exciter driving L. Sterne's refrigeration compressor.

Over 650 Motors

for one of the world's most modern synthetic rubber plants

The new plant of the International Synthetic Rubber Company at Hythe is capable of producing 70,000 tons of synthetic rubber a year using butadiene and styrene as the main raw materials. Three grades of rubber are produced suitable for making motor vehicle tyres, coloured rubber products and general products. The motors ranging from 0.25 to 620 h.p. and used for driving pumps and compressors, were all supplied by AEI. In addition, AEI made and erected the switchgear, transformers and other substation equipment for this plant.

AEI

Associated Electrical Industries Limited

Motor and Control Gear Division

RUGBY & MANCHESTER

COMBINING THE MOTOR AND CONTROL GEAR INTERESTS OF BTH AND M-V

A5580

B

D

Mrs Morgan might be right...

The Glass Container-acceptance Testing Service will find out

The frustrating thing about developing a new pack is that when you have used all the marketing experience, all the know-how, there still remains an element of chance. You never can be sure about a pack until it has been submitted to the criticism of Britain's 37 million packaging experts – the Mrs. Morgans, the consumers. You may have guessed right or wrong. Not far wrong maybe – just wrong enough to make all the difference. The maddening thing is that if you ever do discover what the Mrs. Morgans didn't like, it probably turns out to have been some footling thing that shouldn't logically have made any difference. That's the trick – consumers don't have to be logical – they don't even *have* to be consumers if they don't like your pack.

It is to remove some of this guesswork from pack development, that Britain's Glass Manufacturers have set up the Container-acceptance Testing Service. This provides Packers with facilities to test consumer reaction to new packs *before* they go into mass production. Designs can be tested in any or all of the following four progressive stages.

1 Design Preference Testing. Any new design can be tested on a consumer panel of 400 households. Their preferences will be analysed and presented to the Packer as a report and recommendation.

2 Container in Use Testing. The new container and its product can be tested in actual use in the home. The panel's experience of the new pack will be recorded, analysed and furnished as a report.

3 Shelf Testing. The sales appeal of a new pack can be tested under real store conditions, on the shelves of self-service or other stores. The speed and volume of off-take will be audited and analysed by type of store and locality. The new pack may be tested either alone or against any alternative.

4 Area Test Marketing. It was felt that facilities to convert shelf testing into a test marketing operation would be welcomed by some Packers. To make this possible an expertly staffed marketing service has been established which will plan, organise and, if desired, execute test marketing campaigns in their entirety for Packers launching new glass packed products.

Free Service. Because the glass manufacturers believe that these services should be used as widely as possible, all the facilities under headings 1, 2 and 3 are offered *free* as a service to the packing industry. The only cost to the Packer under these headings will be in the supply of goods, containers and such items as labels and transport. In the case of Area Test Marketing schemes however, a nominal charge will be made for planning the operation.

Security. Where any of these tests are carried out on new products, the whole operation can be executed with absolute security. Packers can have complete anonymity by employing one of the several brand names that have been registered especially for this purpose.

If you would care to have further details of this service, please do not hesitate to ask, irrespective of whether your interest is immediate or not. Your Glass Container Manufacturer will be happy to discuss your problem and to help you in any way. Details of this scheme have been published as a booklet, copies of which are available on request from your Glass Manufacturer or from the Federation.

SEE HOW GOOD THINGS ARE IN GLASS

THIS IS AN ADVERTISEMENT OF THE GLASS MANUFACTURERS' FEDERATION
19 PORTLAND PLACE · LONDON W1
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VOL. 84 No. 2152
OCTOBER 8 1960

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IN THIS ISSUE

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CHEMICAL AGE

BOUVERIE HOUSE · 154 FLEET STREET · LONDON · EC4

NOT SO GOLDEN 60's?

THE rate of increase in Britain's industrial production is slowing down. Official production index for August, adjusted for holidays, is expected to be 121 or 122 (1954 = 100). The index for June was 121, while in August 1959, the index stood at 113. This confirms earlier impressions that the rise in general production had been levelling out. In the first nine months of this year, there was a 9% gain over the corresponding period of 1959, but present evidence indicates that there will be little or no further increase during the rest of this year.

It is obvious that the general trend of economic forces is changing and that expansion is slowing down. U.K. exports are showing certain weaknesses and shipments of chemicals, 10% higher in January-May than a year earlier, were only 6% higher in the period June-August, compared with the same months of 1959. The really disturbing feature is that Britain is losing its share of world trade, while the U.S. is seeing a big expansion in the sterling area (see page 583).

A year ago, the chemical industry was heralding the golden '60s. What does the future look like now? It seems clear that in 1961 manufacturers will be dogged by higher costs (a rise of 5% is estimated), greater domestic and foreign competition and, looming in some fields, a danger of excess capacity. If this picture materialises, then the utilisation of capacity will require skilful marketing efforts.

Excess capacity problems are thought likely to be in ammonia, acrylonitrile, benzene, phenol, phthalic anhydride, maleic anhydride, ethylene glycol and both types of polythene. Confusing the issue is the number of companies who have, either by acquisition or diversification, made sure of their own needs in basic chemicals and intermediates.

Plastics, synthetic fibres and fertilisers have been quoted as indicators in forecasting trends. With new plants due in production in 1961-62, production of plastics will be substantial, but the overall increase will be low compared with that for 1960. In the synthetic fibres field, new plants are scheduled, but construction of many has yet to start. Figures for the first half of 1960 are up on those of 1959, but there is likely to be a noticeable levelling off. Capacity for fertilisers, particularly nitrogenous compounds, is ample and well able to fulfil any increase in demand.

The evidence points to a slowing down in the growth of chemical sales during the last part of 1960 and the greater part of 1961. The coming months, therefore, are likely to see intensified sales campaigns. Costs will be more closely examined, aiming at lower-cost products, produced as a result of a more economic process, a higher-quality or higher-purity product, or better still a new product that gives the edge on competitors.

As previous experience has shown these are the deciding factors if a chemical company is to maintain its progress under more adverse conditions. Few in the industry expected 'boom' conditions to continue and the alternating 'ups' and 'downs' of post-war trade cycles are no longer as upsetting as they were. Although chemical companies are mere onlookers so far as changing economic circumstances are concerned, they can by forward planning to some extent soften the effects when the pendulum swings against them. There seems to be little call for the over-pessimism that pervades some circles; progress will continue to be made, even if on a slower scale.

★ RUMOURS that British Railways are thinking of installing pipelines alongside the railway tracks do not mean that passengers will be pumped to their destinations in fluid suspension; instead, they will continue to be kept in suspense on the station platforms. No, the idea, as explained on page 589, is that the British Transport Commission might go into the business of transporting oil and chemicals to supplement their other freight services.

It all depends, of course, on whether there would be any profit in it, and this again would depend on how the service was operated. It is an arresting thought that, one of these days, some harassed refinery or chemical works manager might hear emanating from a loud-speaker specially installed in his office, some such statement as: "British Railways regret the delay in delivery of Fraction XYZ from the Fawlhaven Refinery, owing to gland trouble".

★ NEWS that Delrin acetal resin is to be finished and coloured in Europe at a new processing plant in Holland, focuses attention on the first plastics material that is really metal-like in that it will do many jobs previously done only by metals. Tough and resilient, much like spring steel, these properties are retained under adverse operating conditions. Although heavy in comparison with most plastics, Delrin is 80% lighter than zinc, 45% lighter than aluminium and more than 20% lighter than magnesium.

At 80 cents/lb. in the U.S., Delrin is not even remotely competitive with zinc (16 cents/lb. or aluminium 25 cents/lb.). But the fact that forming and finishing operations add a cost factor of 100% of raw material cost, compared with a forming-finishing cost factor of 200-400% in the case of zinc—and higher with aluminium—makes Delrin a strong competitor in terms of final product cost.

Behind Delrin are 100 years of world-wide research in the field of formaldehyde chemistry, while in the last 10 years, Du Pont have put in 300 man-years of laboratory research, plus three years of extensive field tests with 350 companies and a financial investment of $50 million.

★ IT is interesting to note the different approaches of designers of large sea water evaporation plants to the problem of overcoming scale formation. In the big new Weir plant at Guernsey, described in p. 576, a chemical is injected for the prevention of scale, but, mistrusting chemical treatments, some designers look for some other way round the problem. Thus, the British-manufactured Aquaflash sea water distillation plant which will be installed in the Cardon refinery of Compania Shell De Venezuela incorporates a number of engineering features designed to minimise scale. These include operation with minimum sea water concentration throughout the plant; a by-pass arrangement in the feed and brine streams around the high temperature end of the plant; and direct injection of the heating steam into the sea water feed, so that there is no heat transfer surface to which scale can adhere. Manufacturers of this plant are Buckley and Tyler Ltd., Oldham, Lancs.

In a new type of sea water evaporator supplied for shipboard use by Werkspoor N.V., Amsterdam, we find yet another approach; that of dislodging scale from tube walls by elastic deformation of the wall. This is done by intermittent chilling and heating of the fouled elements with cold water and steam. In the new design the heating elements are of Monel plate material, which enables a relatively high degree of deformation to be attained.

★ THE role of a conference programme chairman is seldom smooth, but a few weeks before the New Hampshire meeting on the European chemical industry of the U.S. Chemical Market Research Association, Mr. Roger Williams, programme chairman, thought all his speakers were 'in the bag'. But a few weeks before the meeting, the French speaker had to back out and could not name a substitute; then Mr. Sinkel, Chemische Werke Hüls sales director, had a serious illness.

A few trans-Atlantic 'phone calls solved the first problem and Mr. Williams answered the second by persuading the company to finish Sinkel's nearly completed paper, which he then read himself. Since the meeting, Mr. Williams landed in London last week-end and flew to Paris a few days later—Tuesday evening. From Paris, he will travel to Barcelona and Switzerland before returning to the London branch of Roger Williams Technical and Economic Services.

When I saw him at his Grosvenor House suite on Monday, Mr. Williams was most enthusiastic about the meeting. A record attendance for a C.M.R.A.-resort meeting of 475 indicated that U.S. chemical industry interest in Europe is not only continuing, but increasing all the time. A thought that should keep U.K. producers on their toes.

★ WHILE gelatin is ideal for encapsulating a number of products (see p. 580), the conditions of temperature and humidity under which it is used must be rigidly controlled. To keep the air at the right working conditions, Scherer, use three Kathabar lithium chloride air dryers, each with a capacity of 12,500 cu. ft. per minute. These units, together with electrostatic fresh air intake filters and dry pad glass fibre recirculation filters, supply the air for cooling the gelatin on the machine ribbon drums and maintain the necessary room conditions.

However, my colleague returned from the Scherer plant with a more substantial reminder of her visit than an impression of pleasant working conditions. She had been the successful entrant in a competition to guess the number of capsules produced since entering the factory for which the prize was a pint size pewter tankard. Her estimate of 400,000 in about two hours was just over 2,000 short of the actual total. She hastened to assure the managing director, Mr. J. A. Mackenzie, that the prize was in fact "suitable for a young lady".

★ ALL sorts of wrappings and coatings have been tried for the protection and thermal insulation of buried piping, but the most unusual idea I have come across to date is a material called Protexulate, which the makers describe as a "fine mineral powder, prepared by a patented process", and which is simply poured into the trench to cover the pipeline. It is claimed to provide both thermal insulation and protection from corrosion. Protexulate's impermeability to water is attributed to its extreme surface tension, yet it retains its free-flowing condition indefinitely and allows the pipeline to 'breathe'. As far as thermal insulation goes, it seems that the material's thermal conductivity has been established at as low as $k = 0.912$, dependent on the temperature. It is stated that it can be used for conduits with temperatures up to 480°F and that the dielectric constant is 2.7.

Protexulate is now being launched on the market by Croxton and Garry Ltd., of 16-18 High Street, Kingston-on-Thames, Surrey. The company are being secretive about the composition, but it seems to be something pretty chalky.

★ 'HUSH-A-BY tree tops' might be a suitable variation on the old lullaby to introduce along with a new chemical that can put a tree to 'sleep.' The chemical, developed by the United States Rubber Co., is a growth regulant called MH-30, which puts trees into a state of temporary dormancy. In this non-growing state, trees can withstand lower temperatures. Herein lies the usefulness of the new chemical—for instance to citrus growers in areas like Florida, that are annually threatened with frosts.

Alembic

Project News

B.H.C. to Build £10M. Llandarcy Complex—Details Not Revealed

PLANS for a major extension of their manufacturing activities at a new location in South Wales—within a short distance of the B.P. refinery at Llandarcy, near Swansea—have been announced by British Hydrocarbon Chemicals Ltd. No capital authorisations have yet been approved but initial investment may well be about £10 million. No details have been released of the type of plant envisaged, the scale of operations and the nature of the products but "the general pattern of operations can be expected to follow that at Grangemouth".

At Grangemouth, the company have been conducting petrochemical operations for 10 years, feedstocks being drawn from the adjacent refinery of the British Petroleum Co. Ltd. British Hydrocarbon Chemicals are jointly owned by BP and the Distillers Co. Distillers produce plastics at Barry, Glamorgan, through their subsidiary British Geon, and this plant is supplied with raw materials from Grangemouth. It seems natural, therefore, to connect the Barry plant with the new petrochemical project, though B.H.C. make no comment on this particular point.

At Grangemouth, total investment since petrochemical operations began totals over £30 million. Olefin production totals some 130,000 tons/year while extensions which will double butadiene capacity are due for commissioning in 1961. Other current projects at Grangemouth are for methanol and ethylene dichloride. A new plant to produce cumene, phenol and acetone was brought into operation in March this year. For further details of Grangemouth operations see CHEMICAL AGE, 9 July, p. 57, and 24 September, pp. 493-494.

Belvedere Boric Acid Capacity to be Expanded

● BORIC ACID production at the Belvedere works of **Borax Consolidated Ltd.**, the U.K. operating company of Borax (Holdings) Ltd., is to be expanded. Boric acid production at the Couderkerque, near Dunkirk, works of the French subsidiary, Borax Français S.A., is also to be further expanded beyond the expansion plans already announced. Capacity in France will be more than doubled as a result of these projects.

By-products Plants for R.T.B. and United Coke

● SINCE our special chemical plant and project issue of 24 September was published, we have received further news of work in hand by **Simon-Carves Ltd.** In addition to the work referred to in page 502 of that issue, the company has coke-oven and by-products plants in hand for the Spencer Works of Richard Thomas and Baldwins Ltd. and the United Coke and Chemical Co. at Brookhouse.

Four sulphuric acid plants are in hand in the U.K. and 10 overseas. Among the largest is a 200 tons/day plant for Eerste Nederlandsche Cooperatieve Kunsmestfabriek at Vlaardingen, Holland—a repeat order. Simon-Carves have a 22 tons/day SO_2 gas cooling plant approaching completion for the Dutch State Mines. Two fertiliser plants are in hand for W. and H. M. Gould (a) as an extension to their Marina Works, Cork, and (b) also at Dublin.

I.C.I. High-purity Silicon Capacity Reaches 10,000 lb./year

● IN our issue of 24 September, p. 487, the figures given for I.C.I. General Chemical Division's production of high-purity silicon should read in thousands of lb., not thousands of tons as shown. In page 496 of the same issue, total capacity figures of 4,000 lb./year and 8,000 lb./year, achieved by extensions completed end-1959 and 1960, respectively, were given correctly, according to information then available. The latest news that capacity was being increased to 10,000 lb./year reached us in the final stages of going to press. An error in the last-minute transmission of this item led to the appearance of the word "tons" instead of "lb.".

C.A. Survey of Projects Reprinted

The exclusive 'Chemical Age' survey of chemical plant projects planned or building in the U.K., worth a total of nearly £200 million, has been reprinted. Copies of this 8-page feature of our issue of 24 September are now available Price 2s 6d each on application to the Editor at 154 Fleet Street, London, E.C.4.

Exemptions from Import Duty

As a result of a review of temporary exemptions from import duty that expired on 30 September of certain goods falling under Chapters 28, 29, 30, 39, 70, 81, 85 and 90, of the Customs and Excise Tariff, the Import Duties (Temporary Exemptions) (No. 9) Order S.I. 1960-1762 has now been made. First schedule to the Order provides for the exemption from import duty, mostly from 1 October 1960 until 1 October 1961, of certain goods, mainly chemicals.

The second schedule provides for the extension mainly until 1 October 1961, of a large number of temporary exemptions from import duty (mainly of chemicals) which would otherwise have expired on 30 September 1960. Some of the descriptions of goods of which the existing exemptions are renewed by this schedule have been revised. From 1 October 1960 it is the revised description which will determine the scope of the exemptions.

A.B.C.M. Conference Will Discuss "Need for Drastic Revision in Packaging Methods"

VIEW that the increasing range and volume of the chemical industry's products and fiercer competition in export markets demand a drastic revision of packaging design and methods will be the springboard for discussion at the second packaging conference organised by the Association of British Chemical Manufacturers. A sequel to the successful A.B.C.M. packaging convention held at Buxton in 1958, the conference will be held at the Majestic Hotel, Harrogate, from 31 October to 3 November. Mr. G. H. Edwards, chairman of the A.B.C.M. packaging committee will preside.

The point of view that the British chemical industry might be out of date in its approach to packaging will be explored first by *Mr. R. Morris*, technical director of Joseph Crosfield and Sons Ltd. in a paper 'Is the orthodox package obsolescent?' Then *Mr. James Pilditch*, the well-known packaging designer and consultant, will put the case for 'unorthodox packaging' and will be answered by *Mr. E. Richardson*, a member of the A.B.C.M. packaging committee and a seasoned speaker at Institute of Packaging conferences.

All three papers will be delivered at the first all-day session of the conference. On the following day, delegates will split up into discussion groups to thrash out the main points raised by the speakers. Their findings will be summarised on the last day by the group leaders and *Mr. G. H. Edwards*.

One of the conference highlights will be a lecture by a U.S. guest, *Mr. M. Crass* of the Manufacturing Chemists' Association, on the organisation and operation of his association's packaging and transportation activities. *Sir William Garrett*, chairman of the A.B.C.M., will be the principal speaker at the conference dinner on 2 November.

Obituary

Lord Simon of Wythenshawe, president and former chairman of Simon-Carves and Henry Simon (Holdings) has died, in a Manchester nursing home, at the age of 80. Well known as a politician, he was Parliamentary Secretary to the Ministry of Health in 1931. He was knighted in 1932 and raised to the Peerage in 1947.

MULTI-STAGE FLASH EVAPORATOR GIVES GUERNSEY ECONOMIC SEA TO FRESH WATER CONVERSION

A SEA water distillation plant which will use a multi-stage flash evaporation process to produce 500,000 Imp. gall./day of fresh water is to be officially opened at Guernsey, Channel Islands, on 22 October, by Mr. R. A. Butler, British Home Secretary. Total cost of the works, including the necessary sea water intake and pipe lines, is some £257,000, which is estimated to be rather less than one-third of the capital cost of storage. Fresh water obtained from the plant will supplement that obtained from the island's reservoirs and ensure an adequate water supply for Guernsey's £7.5 million tomato and flower growing industry during drought conditions.

Built for the States of Guernsey Water Board by G. and J. Weir Ltd., Glasgow, the plant is believed to be the first of its kind in the temperate zone and in a country with an adequate rainfall. It embodies the new Multiflash process, one of the advantages claimed for which is that it is possible to work to steam economies which were hitherto prohibitively expensive in capital cost. It is stated that performance ratios of 8 and upwards are possible with this system, using less heating surface than was previously required for 6 with submerged tube design.

Low Pressure Drop Feature

A further novel feature is that the total temperature drop is split into a large number of successive drops so that the pressure drop from any one stage to the next is small. This means that there is no necessity, as in other flash processes, to absorb large pressure drops by restrictions such as sprays. Associated technical problems concerned with carry-over and the rate of transfer of brine between stages are overcome by designing the flow passages between stages in such a way that vapour will commence to flash when the brine starts ascending in the duct leading from the base of one flash chamber to the upper region of the next.

The distillation process takes place in an evaporator 69 ft. long, 19 ft. wide and 18 ft. high, which is internally subdivided into a number of flash and preheater chambers. The incoming sea water passes through heat exchangers in the plant's 40 flash chambers, after which it is further heated by exhaust steam from a steam engine.

In the flash chambers the atmospheric pressure is reduced by means of an air ejector and the hot sea water in its passage through the plant flashes off salt-free vapour due to this partial vacuum. The vapour is condensed on the heat exchangers mentioned above as pure distilled water, which is collected and pumped to storage.

De-aeration of the incoming sea water and chemical injection equipment ensure that corrosion and scale formation are kept to a minimum, enabling the plant to be run for long periods.

The main fuel supply for the plant is stored in two tanks, each holding 500 tons, and a 5,000 gallon ready-use fuel tank is provided. There are two Spencer-Bonecourt Steambloc No. 500 packaged boilers, each with a rating of 13,000 lb./hr. at 245 p.s.i.g. These supply steam to a Bellis and Morcom compound steam engine driving an English Electric 550 kW. alternator. Power from this set operates the pumps serving the plant.

The control equipment and switchgear for the whole plant is housed in the control room adjacent to the boiler house. The panel carries all the indicating and recording instruments required, and also an audible and visual alarm to indicate a rise in salinity of the distillate to 100 p.p.m., in which case the distillate is automatically discharged to waste.

Operating cost of the new plant is estimated to be about 7s per 1,000 gall. or £14,000 for an average year's working. Taking this together with capital charges based on a 20-year life for the evaporator plant the total annual expenditure will be £33,000, which is only about one half of the loan charges and running costs of a storage scheme even allowing for a 60-year loan repayment period.

Costs for water catchment and storage are not usually so high as they are in Guernsey. However, Weir claim that they have gradually managed to push distillation costs downward until they are beginning to rival costs of orthodox storage and catchment systems. The company state that they can purify sea water for 6-11s/1,000 gall., but can drop this to 4s if the plant generates electric power along with its distillation unit and charges off part of its cost to the power generated. Recent Water Orders published by local authorities in Britain provide for charging up to 4s/1,000 gallons.

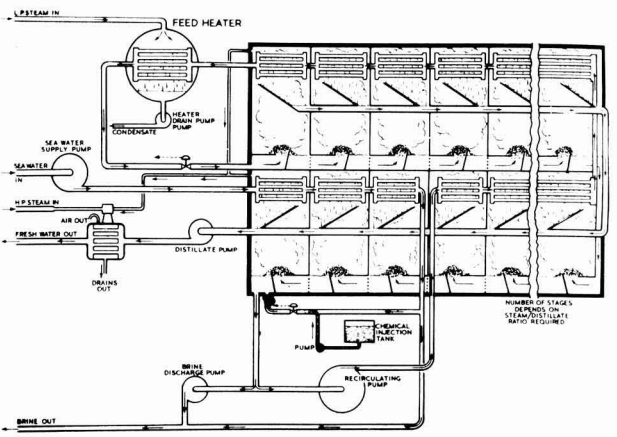


Diagram of a Weir Multiflash sea water distillation plant. The break-off in the multi-stage evaporator is to indicate that the number of stages varies according to the particular requirement

Two New Systems for Spray Cleaning of Vessels, Plant

TWO systems of spray cleaning, both relying on stationary, stainless steel spray heads, have been developed by Diversey (U.K.) Ltd., 42-46 Weymouth Street, London W.1. The equipment can be fixed or portable and can be used for the cleaning of processing vats, evaporators, storage tanks, bulk transport tankers, etc. With this mechanised cleaning system, powerful jets of cleaning fluid are directed to every part of the interior surfaces of the vessel or container to be cleaned. It is claimed that the simplicity of these units virtually eliminates maintenance, since there is nothing that can wear out.

For the cleaning of road and rail tankers it is claimed that one operator, using the Transpray system, can do the work in 10 minutes; manual scrubbing in confined spaces is eliminated and cost is reduced since solutions can be re-used.

Two special cleaning compounds, Bruspra No. 1 and No. 42, have been developed for spray cleaning in the brewery and soft drinks plant. For dairy and ice cream plant, the other system, the Shurspra, is recommended. This is an alkaline, low-foaming product, capable of dealing with milk and fat residues.

U.S. Meeting on Chemicals in Europe

I.C.I. Sales Controller Describes Growth of U.K. Chemical Industry

GREAT interest shown by U.S. firms in the European chemical industry was evidenced by the record attendance at the meeting held by the Chemical Market Research Association at Wentworth-by-the-Sea, New Hampshire, recently. Some 475 delegates registered to hear papers presented by representatives of four leading European companies—I.C.I., Chemische Werke Hüls, Montecatini and Union des Industries Chimiques.

Each of the papers aimed to give basic information on production in the countries concerned, as well as on expansion projects in those countries. Mr. J. H. Townsend, I.C.I. sales controller, in his paper on the U.K. chemical industry said that British chemical production had risen more than twice the rate of industrial production as a whole and I.C.I.'s sales had advanced even more rapidly, the company's progress having been similar to that of the U.S. chemical industry.

Spending on research in 1958 was nearly $100 million, with I.C.I. spending almost twice as much as the rest of the chemical industry combined. In terms of size, only I.C.I. could be compared with the major U.S. companies. I.C.I. group turnover approached that of Union Carbide, was roughly two-thirds that of Du Pont and double that of Allied or Dow.

Inorganic Chemicals. Britain made virtually all the inorganics she required, notable exceptions being potassium chloride and certain electrothermal products, such as silicon carbide and fused alumina. Among key chemicals not previously made on a large scale, carbon black was now produced at the rate of more than 110,000 short tons a year. Titanium dioxide was being produced in similar quantity and calcium carbide production which remained until recently at an annual rate between 110,000 and 170,000 short tons, would be raised to about 400,000 short tons by 1962. Even so, owing to rising demand for acetylene derivatives, some imports would probably be needed even after 1962.

Although U.K. production was much smaller than in the U.S., in terms of output per head, there was less difference:

	Output (million short tons)		Output per head of population (lb)	
	U.S.	U.K.	U.S.	U.K.
H_2SO_4	15.3	2.5	172	97
Alkalis, syn.	8.0	2.0	90	77
Nitrogen, fert. ...	2.4	0.4	27	15

There had been two important changes of pattern in the consumption of inorganic raw materials. Firstly, some 40% of U.K. sulphur needs were now derived from indigenous sources. Secondly, hydrogen for ammonia synthesis was now being made increasingly from oil.

Heavy Organic Chemicals. U.K. production of petrochemicals rose from a carbon content in 1953 of 140,000 short tons to 330,000 short tons in 1958 and an estimated 420,000 short tons last year. In 1954, chemicals from coal derivatives, including carbide acetylene, and by fermentation processes formed about two-thirds by weight of the total organics made. By 1959, the proportion was down to about one-half and was likely to be less than a third by the mid-1960's.

John H. Townend, I.C.I. sales controller

So far as aliphatics were concerned it seemed that the future would see a growing demand for ethylbenzene to make styrene, but that glycol anti-freeze would not attain the importance it occupied in North America.

Of the aromatics, benzene was the most important, production being about 130,000 short tons a year, mainly for dyestuffs and organic intermediates (notably aniline and chlorobenzene), phenol, ethylbenzene and dodecylbenzene. Output of toluene was about 40,000 short tons/year.

Plastics. At the beginning of 1960 capacity for polythene—the largest single plastics material in the U.K.—was approaching 300 million lb./year; additional plant now under construction, with new plant for polypropylene, would raise U.K. polyolefin capacity to nearly 400 million lb./year by the end of 1961. Despite a temporary check through Japanese competition in 1958, vinyl plastics had also made good progress. U.K. output of plastics more than trebled in the 1950's, from 347 million lb. in 1950 to 1,100 million lb. in 1959. Output per head of population was 22 lb. in the U.K. in 1959 (30 lb. in the U.S.).

Dyes and Pharmaceuticals. In dyestuffs, Britain made a comprehensive range, met her own needs and maintained a substantial export business which accounted for about 15% of the world's trade in colouring materials.

Value of the pharmaceutical industry's production was around $450 million; exports rose from about $65 million in 1950 to $112 million in 1959. At present there were 17 U.S.-owned and five Swiss-owned pharmaceutical companies in the U.K., and one of the largest firms, May and Baker, was French-owned. Those companies, it was thought, accounted for about 50-60% of total production.

Synthetic Fibres. U.K. production should continue to rise quickly and might be of the order of 200 million lb. by the mid-1960's. Nylon 66 accounted for about 60% of U.K. synthetics output; spinning capacity of British Nylon Spinners was about 70 million lb./year, but a plant expansion was planned. Both I.C.I. and British Enka, an A.K.U. subsidiary, had announced plans to make nylon 6. I.C.I's investment in Terylene now stood at about $140 million and present capacity was around 50 million lb./year, with further increases, probably on a new site in Ulster, projected.

Prospects. Production as a whole was likely to continue growing at a fairly high rate, with major increases in heavy organics (including petrochemicals), plastics, non-cellulosic man-made fibres and perhaps also in pharmaceuticals.

As far as could be seen, no difficulties would be met in obtaining capital and labour and there were not likely to be shortages in raw materials.

Chemical Trends in France Discussed by Jacques Roché

TURNOVER of French chemical industry in 1959 was of the order of $2,750 million, about one-tenth of chemical sales in the U.S. This was stated by Mr. Jacques Roché, Union des Industries Chimiques, in his paper presented at the C.M.R.A. meeting. Although severely damaged in the war, the chemical industry had made an impressive recovery, from a production index of 100 in 1952 to 305 in June 1960, compared with a French industry figure of 181.

Mr. Roché declared that the 10 leading French firms accounted for 25% of annual turnover, whereas three German firms accounted for 31% of annual turnover and one Italian company for 50%. He referred to a three-pronged approach to rationalisation: amalgamation; formation of subsidiaries with associated firms; and collaboration with suppliers of energy or raw materials, or sometimes consumers. Mr. Roché listed some of the mergers and associations of recent years.

Inorganic Chemicals. 1959 output of sulphuric acid was 1.8 million tonnes, available capacity totalled 2.8 million tonnes; 56% of production was represented by the contact process. Output of ammonia was 660,000 tonnes in 1959, a rise of 32%. Chlorine production totalled 275,000 tonnes in 1959, up 2.6 times over 1952.

Organic Chemicals. Output of methanol in 1959 reached 46,000 tonnes (18,000 tonnes in 1952), while production of formaldehyde in 1959 was 20,200 tonnes (10,000 in 1952).

Output of acetone in 1959 totalled 38,200 tonnes (6,200 in 1952), part being obtained with phenol via cumene oxidation and the remainder from the dehydrogenation of isopropanol. Phthalic anhydride production at 26,000 tonnes in 1959 was more than six times up on the 1952 figure of 4,000 tonnes.

Fertilisers. French production in 1959 was: K_2O, 1,448,900 tonnes (867,300 in 1952); P_2O_5, excluding basic slag, 474,000 tonnes (270,000 in 1952); N, 556,500 tonnes (294,600 in 1952). Production of complex fertilisers in 1959 was 105,000 tonnes of N, while 1959 output of compound fertilisers totalled 3,280,000 tonnes, almost double the 1952 figure.

Plastics. From 35,000 tonnes in 1952. French output rose to 250,000 tonnes in 1959; p.v.c. accounted for one-third of that figure and three new polythene plants were started in the previous 12 months. Polystyrene accounted for 14% of total plastics output.

Production of ethylene began in 1952 and in 1959 amounted to 40,000 tonnes. At Lavera, France had the first European plant to use a workable process of catalytic oxidation of ethylene for the production of ethylene oxide.

Production of Some Chemicals

	1952	1959
	'000 Tonnes	
Inorganic		
Sulphuric acid	1,190	1,827
Ammonia	295	663
Calcium carbide	226	347
Chlorine	106	275
Soda ash	635	775
Caustic soda	400	500
Organic		
Methanol	18.0	46.0
Formaldehyde	10.0	20.2
Phenol	14.4	41.8
Acetone	6.2	38.2
Phthalic anhydride	4.0	26.0

Fine Chemicals. Of pharmaceutical production, which exceeded $400 million, 20% was exported.

Of the world dyestuffs output in 1959 of 375,240 tonnes, France produced 13,083 tonnes, or 3.5% of the total. 1959 output was 5.51% up on the 1958 figure. Exports to some 70 countries totalled 3,602 tonnes, or 27.53% of production. C.F.M.C. (Francolor) represented about 80% of France's dyestuffs production; four other firms shared the remaining 20%.

Miscellaneous. Paints and varnishes production in 1959 was 465,000 tonnes (82,000 tonnes of alkyd materials); turnover in essential oils was $30 million, with exports of $19.5 million; output of material for synthetic detergents was 40,000 tonnes/year; tanning extracts production totalled 22,000 tonnes (mainly chestnut).

Foreign Trade. Exports outside the French Franc zone were $285.6 million in 1959, more than 10% of turnover. The Common Market accounted for 33.1% of exports and the 'outer seven' for 21.7%. France's best customers were West Germany ($39.1 million), the U.S. ($25.6 million), the U.K. ($21.9 million), Italy ($21.7 million), Switzerland ($20.9 million), and Belgium-Luxembourg ($20.7 million).

New Developments. Lacq natural gas reserves approached 300,000 million cu. m., two-thirds of which were recoverable. Lacq sulphur production totalled 425,000 tonnes in 1959 and would reach 1.2 million tonnes in 1961. Lacq plants covered acetaldehyde acetylene, ammonia, methanol, vinyl chloride and heavy water.

Crude oil refined in France increased from 7 million tonnes in 1938 to more than 30 million tonnes in 1958. Capacity for olefin derivatives, 151,000 tonnes in 1958, would rise to 326,000 tonnes in 1962. Output of diolefin derivatives (butyl, nitrile and SB rubbers) and would rise to 80,000 tonnes/year by 1962. Capacity for aromatics should reach 67,000 tonnes in 1962 (36,000 in 1958), meaning more synthetic phenol and terephthalic acid.

Carbon black output at Berre in 1959 totalled 30,000 tonnes and when new plants at Port-Jerôme and Bec d'Ambès were completed, this would rise to 100,000 tonnes. By the end of 1960 capacity for synthesis ammonia should total just under 400,000 tonnes.

1960 Production. Production increases in the first half of 1960, compared with first half 1959, were: sulphuric acid, up 6.7%; ammonia 5.8%; chlorine 15.3%; ethylene 112.1%; methanol 74%; acetone 36.5%; synthetic phenol 21.4%; p.v.c. 48.3%; alkyd paints 14.7%. In addition, production estimates for 1961, established in 1956, had just been altered as follows:

Sulphuric acid, 2.2 million tonnes; hydrochloric acid, 300,000 tonnes; carbon disulphide, 46,310 tonnes; nitrogen, 887,000 tonnes; benzene and allied products, 214,000 tonnes; organic intermediates, 1,194,673 tonnes; acetic and methylic compounds, 453,305 tonnes; plastics, 436,000 tonnes; carbon black, 66,000 tonnes.

Labour Shortage and Lower Investment Growth in West Germany

WHILE world chemical production rose by about 30% from 1955 to 1959, the increase for West Germany was about 46%, equal to an average annual increase of some 11.5%. This was stated in the paper by Mr. H. G. Sinkel, sales director for Chemische Werke Hüls. Mr. Sinkel was unable to attend the C.M.R.A. meeting through ill-health and his paper was read for him by Mr. Roger Williams (Roger Williams Technical and Economic Services) who was programme chairman.

In 1959, the European Economic Community (E.E.C.) increased its production by 36% and increased its share in world production from 15.6% to 16.4% in 1959. West Germany's share in E.E.C. chemical production was 40.7% in 1955 and 43.6% in 1959. Germany would find it difficult to maintain this share, due to large natural gas and crude oil resources in France and Italy.

Employment was a main problem, for with 20.1 million employed, there was an unemployed total of 134,000 to fill 550,000 vacancies. Some sectors were also faced with raw material shortages, partly due to lower coke-oven outputs.

German chemical investments had declined and in 1959 totalled $415 million, 4% up on 1958.

Eight German companies had turnovers exceeding $60 million in 1959. Bayer ($585 million); B.A.S.F. ($540 million); Hoechst ($530 million); Hüls ($146 million); Dynamit-Nobel ($143 million); Degussa ($190 million). Merck AG and Henkel and Cie did not publish sales figures, but these were thought to exceed $60 million.

This spread of sales was a marked contrast with the U.K. and Italy, where I.C.I. and Montecatini, respectively, had a large share of chemical sales.

Plastics and Fibres. Polythene and polypropylene output rose from 6,500 tonnes in 1955 to 60,000 tonnes in 1959 and by 1961-62 polythene capacity was expected to reach 125,000 tonnes.

Production of non-cellulosic synthetic fibres totalled 38,000 tonnes in 1959, when world output was 575,000 tonnes and U.S. production, 290,000 tonnes. Polyamides still held the lead in West Germany, but before long polyacrylonitrile would be a serious competitor. The same was true of polyester fibres, existing facilities being barely able to cope with demand.

Synthetic Rubber. Capacity of Buna-werke Hüls was being raised from an initial 60,000 tonnes/year in 1958 to 120,000 tonnes. The second producer had raised capacity considerably for neoprene and nitrile rubbers. Synthetic rubber accounted for 33.8% of all rubber consumed, probably rising to 40% by end-1960. Plans were in hand to make polybutadiene and polyisoprene rubber (see 'Overseas News', p. 587).

Petrochemicals. West Germany was second to the U.K. with investments increasing from $173 million in 1957 to $263 million in 1958. Production based on crude oil and natural gas was expected to expand. This would not affect chemicals-from-coal production as production of coke, coke-oven gas, benzene and tar depended on steel output and the growth rate in steel was well below that for chemicals.

Petrochemicals accounted for 40% of organics output, compared with 80% in the U.S. Domestic production had not been able to meet demand for toluene and xylene, the gap being filled by imports. Benzene and naphthalene also had to be imported.

ITALY'S FAST EXPANDING CHEMICAL INDUSTRY—BY MONTECATINI SPOKESMAN

GROWTH of Italy's chemical industry from a 1953 production index of 100 to 154 in 1957, 175 in 1958 and 209 in 1959 was the subject of a paper by Dr. G. Ballabio, head of Montecatini's Hydrocarbons and Derivatives Division, at the C.M.R.A. meeting.

Foreign Trade. Italy's chemical imports in 1959 rose by 12.3% to a value of $236 million, compared with the previous year. Exports were up by 25.6% in 1959 to the value of $223 million. Thus Italy's imbalance in chemical trade had been cut from $56 million in 1956 to $13 million in 1959. In relation to Europe, that balance was a little less favourable. Italian exports to the Common Market in 1958 totalling $30.4 million, compared with imports of $87 million.

Production. There was a growing trend towards the production of complex fertilisers and Italian production in 1959 totalled 925,000 tons; demand for superphosphates was declining. Italy was seventh in the list of world nitrogen producers and fourth in Europe, following the U.S., U.S.S.R., West Germany, Japan, U.K. and France. Productive capacity was about 750,000 tons/year of fixed nitrogen; with a home market only half that size, prices had been decreasing until they barely covered production costs.

Chemical Production in Italy

	1958	1959
	'000 Tonnes	
Inorganic		
Sulphuric acid (100%) ...	2,031	2,053
Nitric acid (36° Be)	865	949
Hydrochloric acid *(20-21° Be)	103	117
Ammonia (100%)	609	726
Caustic soda (100%) ...	274	343
Sodium carbonate	415	491
Calcium carbide	320	299
Carbon sulphide	40	46
Organic		
Acetic acid	35	35
Phenol	15	11
Methanol	43	48
Formaldehyde (100%) ...	20	24
Urea	108	119
Plastics	180	253
Other		
Hydrogen peroxide ...	7	7
Tartaric acid	6	8
Trichloroethylene	35	35
Organic colours	11	15

* Excluding hydrochloric acid obtained by chlorination in organic synthesis.

More than 35% of the world's nitrogen capacity was now based on either the Fauser-Montecatini or the Casale Italian processes; the investment was in the range of $1,400 million. The Fauser process was extremely flexible and it was common practice in Italy for 0.85 ton of h.p. steam per ton of ammonia produced to be recovered. Thanks to the technical features of the Italian processes, the current cost of nitrogen in the form of urea (46% N) had been cut to the levels of lower grades of nitrogen compounds, such as ammonium nitrate. Thirty-four plants for producing urea to the Montecatini process had been built; Italian urea production in 1959 was 119,000 tons, a 47% rise on 1958; the 1956 figure was 81,000 tons.

The Campofranco potash plant which started operations early this year was handling 3,000 tonnes/day of ore; a figure that was to be raised to 7,000 tons/day by Montecatini.

Petrochemical. Italy's production of petrochemicals had risen from a 1954 index of 100 to a 1959 index of 1,125. Production in terms of carbon content was: 1954, 16,000 tonnes; 1959, 180,000 tonnes, a 38% rise on the 1958 figure.

Plastics. Production of plastics materials, at 52,000 tonnes in 1953, rose in 1959 to 253,000 tonnes. Italy now had a p.v.c. production of 160,000 tonnes/year. Montecatini's production of thermoplastics would be given further impetus by the new Brindisi plant due on stream by 1962. Capacity of crude oil would be 1.5 million tonnes/year, making the plant the most important in Europe.

Synthetic Fibres. Not including artificial fibres, Italy's production at 4.6 million lb. in 1953 had risen to 50.0 million lb. last year.

Synthetic Rubber. ANIC were producing SBR rubbers at Ravenna with a current capacity of about 80,000 tonnes/year, which might be raised to 90,000 tonnes next year. Montecatini's new elastomer, Dutral (formerly C-23), an ethylene-propylene copolymer, was scheduled to go into large-scale production at Brindisi. Another possibility was polybutadiene, which was preferred in Europe to polyisoprene because of the high cost of the isoprene monomer.

Dyestuffs. Total production in Italy of organic dyestuffs totalled 1,000 tonnes in 1959, 36% up on 1958.

Common Market will Stimulate Imports Says U.S. Government Speaker

BECAUSE the Common Market would speed economic progress in the six countries, it would also stimulate demand for chemicals declared Mr. George H. Becker, Jnr., deputy assistant secretary of commerce for international affairs, U.S. Department of Commerce.

Stabilising effect of the C.M. on the financial status of member states should help them to maintain liberal trade policies with countries outside the area. C.M. currencies were now almost completely convertible and that had sharply cut restrictions on imports from outside sources.

Provided U.S. chemicals were cheaper or better than those available in Europe, then European manufacturers, facing growing internal competition, were likely to buy American if only to be more competitive with rival C.M. firms.

Mr. Becker also saw export opportunities for those chemicals which would be admitted into the C.M. at very low duties; some exports might benefit when duties were cut in France and Italy.

Since the Common Market began in 1958, imports of chemicals from outside the area rose from $456 million in the first nine months of 1958 to $489 million in the same period of 1959; imports from the U.S. benefited from that trend rising from $188 million to $194 million.

The U.S. was not likely to be flooded with chemicals from Europe. Although imports rose from $125 million in 1957 to $176 million in 1959, they were still small compared to the U.S. industry's total chemical sales.

The U.S. Government believed that it must raise exports to all parts of the world rather than to attempt to limit imports. Any such attempt to cut imports by raising tariffs or other restrictions would be self-defeating, inviting retaliation through restrictions on dollar imports. The Government could help expand exports by through tariff negotiations under G.A.T.T. The U.S. would seek meaningful tariff reductions on chemicals,

Progress in Moves to Link C.M. with E.F.T.A.

INVESTMENT by the U.S. in Common Market countries quadrupled during the 1950's and in 1959 more U.S. private capital was poured into the area than in any previous year, stated Mr. Ralph M. Binney, vice-president, International Division, First National Bank of Boston, at the C.M.R.A. meeting. The amount, estimated at $300 million, raised the level of U.S. investments in the C.M. early this year to about $2,000 million. Earnings had been good in nearly all the countries and a large part of the money had been re-invested.

U.S. firms could compete in Europe in many areas, including pharmaceuticals, synthetic fibres, polymers, synthetic rubber, specialty chemicals and even in liquid oxygen, dry ice and other cryogenic gases and liquids.

Mr. Binney felt that in the past few weeks much progress had been made toward a single European trade bloc. Such a merger of the C.M. and European Free Trade Association might take place in the next 12 to 18 months, considering the way that things were now moving. A customs union in both blocs was widely favoured in business circles, appealing to many industrialists in Belgium, Holland, Germany, Sweden, Switzerland and Britain.

Mr. Binney said that a watch would have to be kept on competition from East Germany and the Soviet Union. East Germany was rapidly expanding foreign trade and increasing aid to countries such as India and Pakistan.

AUTOMATION BY SCHERER INCREASES VERSATILITY OF GELATINE CAPSULE PROCESS

Customers of R. P. Scherer Ltd. visit the Slough works on 29 September. L. to r., L. D. Smith, Sangers Ltd., D. Smart, Allen and Hanburys Ltd., and L. O. Smith, Parke Davis Ltd.

IN the last few years the range of products which can be encapsulated in gelatin has grown rapidly; it is now possible to produce capsules of such products as vitamins and bath essences, edible oils and perfumes. The reason for this, say R. P. Scherer Ltd., manufacturers of 90% of the capsules produced in this country, is automation. Scherer have recently installed at their Slough plant new integrated capsulation units, machines which give a greater accuracy of dosage and even greater control of production.

The new machines enable capsulation to be carried out completely automatically to the final drying stage. Each unit comprises a capsulation machine similar in basic principle to the earlier types of rotary die machine but which incorporates a number of refinements making it possible for the machine to run without an operator continually in attendance.

In the present equipment the gelatin and the filling materials for the capsules are supplied to the machines in bulk tanks of approximately 50 gall. capacity and the material is automatically controlled by pneumatic valves to maintain the correct levels in the spreader boxes from which the gelatin ribbons, forming the outside of the capsules, are cast, as well as to maintain the correct level in the small tank feeding and metering pump which injects the fill into the capsule.

Washing and initial drying of the capsules are also handled automatically. They are transferred intermittently by a shaker chute through three solvent washer units and then through two draining stages. Drying is carried out in tumbler baskets by means of heat and infra-red lamps in five stages. Transfer from one stage to another is controlled by electrical timing apparatus and solenoid operated guide vanes. Drying is completed in a drying tunnel by warm air from an infra-red unit.

Scherer present some 72 different products in capsule form but they do not market them themselves. The firm exists to provide the service to other industries, and do in fact supply most firms in the U.K. pharmaceutical industry, and have plans for expansion in the food industry. Scherer prefer to make up the mix for the capsules themselves, since they are best able to judge from their experience which type of mix is suited to their machines. All materials coming into the factory are carefully checked in the laboratory and a trial run carried out on the machine.

The base of the fill consists of a mixture of cooking fat and hydrogenated vegetable oil or sometimes maize oil, the proportion depending on the consistency required. The problem of removing air from the mix is a troublesome one which at present is solved by deaerating by vacuum after mixing is complete. However a change will be made to mixing under vacuum as soon as the machines for the purpose, ordered from Hunts of Dagenham, are complete.

The work of the laboratory is obviously an important part of the Scherer process. It is divided into two main sections, analytical control and product development and research.

New Textile Award for Crease Resistant Process

A new award, the Textile Institute Jubilee Award, is to be presented to scientists and research workers where they have worked as a team in the development of a project which has had a profound and significant effect on the world textile industry. The council has unanimously made the first award to all those members both past and present of the staff of Tootal Broadhurst Lee Co. Ltd., who contributed to the research work which resulted in their crease resist process.

Sodium Sulphite Slurry of 80% Salts Produced at Balfour Research Centre

SUCCESSFUL solution of a number of processing problems submitted by clients is reported from the research and development laboratories of the Balfour Group at Leven, Fife, which were opened at the end of May and were described in CHEMICAL AGE, 28 May, p. 877. The Group reports that the number of visitors to the centre has exceeded all expectations, and that the large technical staff has been fully employed on the specialised services offered by the centre.

One interesting problem concerned the continuous production of sodium sulphite slurry at a very high concentration of salts. This was the responsibility of the Scott Division of the Group, who from their experience, were confident that they could reach the desired target figure of 70%. The client's doubts that this figure could be attained were dispelled by a demonstration which, in fact, reached well over 80%. This resulted in a large order for evaporating plant which will be installed in Western Europe. Further work is now being carried out on the continuous drying of sodium sulphite slurry under very special conditions that require the modification of certain of the existing pilot units and employ particular methods of feeding, blending and operating while allowing vapours to be withdrawn on a selective basis. The process finishes with a drying operation under vacuum.

The Group also reports considerable interest in a number of items of equipment that have been tested or demonstrated at the centre, including a new accelerated film evaporator for heat-sensitive materials, a continuous vacuum band dryer, a rotary jacketed tumbler dryer, as well as spray drying units and pumps for dealing with various kinds of materials.

Loughborough Expansion Prompts Works Move

To meet an increasing turnover, the Loughborough Glass Co. Ltd. have recently moved into a new factory and offices in Loughborough. The new location is close to the original site and their address is not affected by the move. The new buildings include substantially improved research and development laboratories.

The Loughborough Glass Co. produces a range of interchangeable laboratory glassware and also a number of speciality products. A new laboratory equipment catalogue has just been produced.

Courtauld's Moynel Fibre gets Canadian Market Try-out

Moynel cellulose fibre, produced by Courtaulds in the U.K., is being introduced to the Canadian market by the company's subsidiary in Canada. Intention is, subject to Canadian acceptance of the product, to produce the fibre eventually at Cornwall, Ontario.

POWDER HANDLING SYMPOSIUM

411 Delegates Attend Surface Activity Group Meeting

USEFUL contributions to a better understanding of the handling and processing of powders were presented at the first symposium to be organised by the Surface Activity Group of the Society of Chemical Industry, held at The Royal Institution, London, on 29 and 30 September. The symposium was attended by 411 delegates (31 from overseas) drawn from industry, Government departments, universities and research organisations. President of Honour was Sir Alexander Fleck, K.B.E., D.Sc., former chairman of I.C.I., who was attending the first public S.C.I. function since he became president. He was introduced by the chairman of the Surface Activity Group, Sir Eric Rideal, M.B.E.

The symposium banquet took place at the May Fair Hotel, on the evening of 29 September, and was preceded by a cocktail reception organised by Marchon Products Ltd., at which the guests were received by Mr. F. Schon, chairman of the company.

In his opening address at the symposium, Sir Alexander Fleck recalled that, in the first approaches to the understanding of matter, it was customary to classify it as either being solid, liquid or gaseous. As we looked at things with closer examination and with closer approach to practical technology it was seen that matter in powder form was in a solid state which had many properties characteristic of liquids or gases. Normally liquids and gases could be handled much more easily than solids. The skilful use of powders could do a lot to make the handling of solids easier.

Sir Eric Rideal (left) being received by Mr. Frank Schon, chairman, Marchon Products, at the Marchon reception

Part of the scene at the Surface Activity Group's symposium. Mr. F. Riley, hon. recorder, is bottom left

The industrial applications of processes employing powders, which of necessity must always be in presence of gases and liquids, involved problems of physics and physical chemistry many of which are still imperfectly understood. Many old-established manufacturing processes involving powders were largely empirical for this reason. In recent years, however, application of the growing body of knowledge on the surface properties of powders had led to striking improvements in both processes and products and would undoubtedly lead to further developments including the foundation of new industries.

The formation, within the Society of Chemical Industry, of the Surface Activity Group had been instrumental in ensuring necessary exchange of and discussion on advances in specialised study of systems involving small particles. The number of those participating in the Group was, nevertheless, limited. To reach a larger audience it was helpful to hold, from time to time, conferences with a wide appeal to all those concerned with manipulating and using powders. Not least, also, was the advantage of promoting informal discussions between technologists; there was always something to be learnt from somebody else's techniques.

Thirty-one authors contributed to the symposium, which was divided into seven sessions. There were four sections entitled 'Principles of production,' 'Properties of powders,' 'Properties of powders utilised in industrial fields,' 'Principles of application and problems for the future.'

Organisation was by a committee having as chairman, Mr. M. G. Fleming, B.Sc., Ph.D., M.I.M.M., M.A.I.M.H., M.C.I.M.M., and as honorary secretary, Mr. M. K. Schwitzer, M.I.Chem.E. Other members of the committee were Sir Eric Rideal, Dr. H. Heywood, Messrs. R. L. Brown, H. L. Green, G. Nonhebel, and A. T. S. Rudram.

The Surface Activity Group was formed in February 1958, its objects being to advance science and technology in the field of surface chemistry, colloid science and allied scientific disciplines. Further information may be obtained from the hon. secretary, Mr. M. K. Schwitzer, c/o Armour Hess Chemicals Ltd., 4 Chiswell Street, London E.C.1.

P.V.C. Sintering Powders Developed by Vinatex for Fluid-bed Coating

THE success of polythene sintering powders has prompted manufacturers of plastics raw materials to investigate the possibility of producing sintering powders in other plastics. Vinatex Ltd., Carshalton, Surrey, have developed a new range of p.v.c. sintering powders for coating metal, glass and porcelain articles by the fluidised bed technique and other methods.

These new products are marketed under the name of Vinacoat. At present 2 grades are available, SDC/75/59/33 and SDC/80/60/145, which produce coatings of 75 and 80 Shore hardness respectively.

The use of sintering powders and the fluidised bed system are controlled by patents held by the Schori Metallising Process Ltd., and Knapsack-Greisheim AG, which are administered in this country by the Telegraph Construction and Maintenance Co. Ltd., Mercury House, Theobald's Road, London W.C.1. However, arrangements have been made to grant a free licence to users of Vinacoat if application is made to the Telegraph Construction and Maintenance.

Liverpool Catalysis Symposium

Crosfield's Show Production of Silica-alumina Catalysts

IN the visit to the works of Joseph Crosfield and Sons Ltd., symposium members saw the production of sodium silicate and silica-alumina cracking catalysts (13% Al_2O_3). The first stage in catalyst production was the preparation of silica hydrogel by the dilution and mixing of sodium silicate and sulphuric acid. In this stage ageing time is of particular importance and the two materials are mixed for some 20 minutes in the first 4,000 gall. tank and for a similar time in a second tank.

The symposium on catalysts in the petroleum and petrochemical industries was reported briefly in CHEMICAL AGE last week.

After ageing, the alkaline hydrogel is mixed with a solution of aluminium sulphate. Aluminium sulphate is made batch-wise by reacting alumina trihydrate with sulphuric acid to give a solution containing 65 g. Al_2O_3 per litre and some free acid. This solution is added to the silica hydrogel slurry to give 13 Al_2O_3 to 87 SiO_2. The alumina is then precipitated by the continuous injection of 30% ammonia liquor into the slurry stream.

Primary Filtration

The slurry containing silica-alumina catalyst as the solid and sodium sulphate and ammonium sulphate in solution then passes to four FEINC vacuum filters. These rotating drums, 8 ft. in diameter and 14 ft. across the face, have cypress ends and stainless steel filter-supporting mesh. Fitted with nylon cord discharge, the drums have filter cloth of Terylene and cotton. Three of the filters were imported from the F.E. Inc., Newark, N.J., and the fourth constructed to FEINC design in FMB 254 stainless steel by the Stockdale Engineering Co., Poynton.

The thixotropic cake passes from the primary filters to a continuous mixer for mixture with decationised water at 106°F before further handling by Mono pumps and high pressure pumps. Three Swenson spray dryers, each 22 ft. in diameter, were made in FCB stainless steel and fabricated by the A.P.V. Company, Crawley. The slurry is met by hot gases heated by Peabody furnaces to about 1,000°F, which on entering the dryer tangentially through slotted wind boxes are atomised.

The atomising nozzles comprise a 'whizzer' insert and an orifice. The 'whizzers' impart a rotary movement to the slurry before it passes through the nozzles, of tungsten carbide, as a hollow cone spray. Aperture of the orifice and size of the 'whizzer' are important in fixing the particle size of the microspheroidal catalysts.

Next stage in production of the catalysts is dust recovery. From spray drying, the hot gases pass out of the top of the dryer through four nests each of six Buell cyclones. About 6% of dryer output pass through the cyclones which have a recovery efficiency of 95%; fines are returned to the primary filter.

Properties of the spray-dried product, such as particle size, pore volume, diameter, specific surface area are by now determined. To remove undesirable impurities, the product is reslurried with decationised water before washing in a secondary filtering stage which comprises two Dorr-Oliver 13 ft. diameter stainless steel horizontal rotating vacuum-type filters, each with a filtering area of 130 sq. ft. The filters are divided into sections which are covered with stainless steel woven wire; this wire has a service life of about six weeks.

The filters first wash the product, then re-wash with dilute ammonium sulphate, a further wash with hot deionised water follows and the material is then dewatered to produce a catalyst with 50% moisture content. The impurity, sodium, is removed substantially either by dissolving out or by base exchange at this stage.

Final drying is carried out in a Raymond flash dryer, where gases at about 1,400°F and a negative pressure take the catalyst up a vertical ducting to a cyclone. From here the product, at 9-11% H_2O, passes to a Fluidor conveyor. Drawn from the main cyclone, the hot gases pass through four Buell cyclones in parallel from which fines are continuously collected. Dust collected at this stage (particle size is about 40μ) is discharged to a Fluidor conveyor, which takes it to a second conveyor to join the main stream on for discharge to silos.

Labour requirements of the catalyst plant are 13 men. Catalyst for U.K. use is shipped in bulk rail hopper wagons with a 17-20 ton capacity. Paper sacks, hessian bags or bulk containers of timber and hardboard are used for export shipments, which account for about 70% of output.

Fulbent Clay Used on Hyde Park Underpass Construction Scheme

CONTRACT for the supply of Fulbent clay for use on construction of the Hyde Park underpass has been awarded to Fullers' Earth Union Ltd., Redhill, a member of the Laporte Group. Fulbent is used in the construction of reinforced concrete revetment walls that is being carried out by Impresa di Construzioni Opere Specializzate (I.C.O.S.).

The I.C.O.S. process, introduced to the U.K. by Holland and Hannen and Cubitts (Great Britain) Ltd., enables reinforced concrete walls to be formed to a considerable depth underground without the need for conventional timber strutting of the trench excavation.

First stage of the process involves excavation of a shallow trench, lined with concrete, following the alignment of the I.C.O.S. wall. This guide trench is filled initially with a suspension of clay in water, in proportions that are varied to suit the nature of the soil to be excavated. More slurry is added as excavation proceeds, so that the trench is at all times kept full. The special properties of this clay slurry enable it to provide continuous support for the sides of the excavation, irrespective of the nature of the ground or the presence of ground water.

Supply of Fulbent clay to the Hyde Park site is being undertaken by the Fullers' Earth Union using their own 15-ton self-discharge bulk road vehicles.

Industry's Efforts to Cut Pollution Praised

IN his presidential address to the annual conference of the National Society for Clean Air held in Harrogate on 5-7 October, Sir Hugh Beaver praised industry for the efforts it was making, often at great expense, to reduce air pollution. All the new power stations were virtually smokeless, with very high performance grit arrestment plants, and the coking industry had a working party with the Alkali Inspectorate to investigate the problem of pollution from the charging of coke ovens.

Close-up of a bulk road tanker of the Fullers' Earth Union Ltd.

Yorkshire Imperial to Market I.C.I. Polythene Tubes

MARKETING of polythene tube by I.C.I. and Yorkshire Imperial Metals Ltd. is to be combined and on 3 October, Yorkshire Imperial assumed sole responsibility for marketing Alkathene polythene tube. The combined product of the two companies will be known as Polyorc-Alkathene.

Comprehensive stocks of Polyorc-Alkathene are maintained at numerous points throughout the country. The combination of the extensive research and development technical service and sales facilities of the two companies in the marketing of a single product will promote economy, efficiency and service to customers.

The idea of using Alkathene tube for carrying cold water originated in the technical service laboratories of I.C.I. Plastics Division in 1945. The tube was added to the I.C.I. selling range in 1949. By 1951 some 70% of Alkathene tube went into agricultural uses, mostly in rural areas where water supply services were non-existent or poor, and where this method of providing water supplies was economically attractive.

The manufacture of 'Polyorc A' polythene tube by Yorkshire Imperial Metals Ltd. (then Yorkshire Copper Works Ltd.) began in November 1954. Both makes have been specified for a large number of domestic water service installations and the larger bore tubes have been used in chemical plants and factories handling corrosive materials, as well as for industrial water service pipelines and laboratory waste systems.

International Rubber Exhibition and Symposium

The International Rubber Exhibition and Synthetic Rubber Symposium will be opened at Church House, Westminster, at 10 a.m. on Tuesday, 11 October, by the Minister for Science, Lord Hailsham. Whereas the symposium follows on the highly successful International Synthetic Rubber conference held in 1957, the Rubber Exhibition will be the first to be held in Britain since 1931.

The 87 stands at the exhibition will portray many facets of the rubber industry, including raw rubbers, latices, chemical ingredients, processing equipment, manufactured rubber products, research and education.

At the 2nd International Synthetic Rubber Symposium, most of the main rubbers will be covered, including the newer stereospecific 'natural-synthetic' rubbers, and rubbers with exceptional resistance to oil, chemicals, heat and cold.

Consolidation Order for Import Duty Exemptions

Under the Import Duties (Temporary Exemptions) (No. 10) Order, 1960, all temporary exemptions from import duty are consolidated as at 10 October. The Order has been published as S.I. 1960/1763.

Slow-down in Growth Rate of U.K. Chemical Exports

A SLOW-DOWN in the rate of increase in U.K. chemical exports is disclosed in the Trade and Navigation Accounts for the first eight months of 1960. In the period January to May exports were valued at a monthly rate of £26.9 million, or 10% up on the 1959 monthly rate of £24.4 million; in the three months, June to August, the monthly rate of £25.2 million showed a 6% rise over the 1959 average. Chemical exports in August, at £25.09 million, were 2.7% above the 1959 average and 4% above the August, 1959, total of £24.12 million.

Total exports for January to August, 1960, valued at £209,994,921, were 10% above the same period of 1959 when the total value was £190,854,912.

A big slow-down in the expansion rate of chemical imports was also recorded. For January-May, imports averaged £14.7 million, or 44% up on the 1959 monthly average of £11.5 million. For June to August, the monthly average chemical import bill was £14.6 million, an increase of 25% over the 1959 average. The August 1960 total of £15,576,686 showed a 35.6% rise over the 1959 average and a rise of 50% over the August 1959 total of £10,362,014.

The January-August chemical import total was £117,380,893, an increase of 36.5% over the same period of last year, when the total was £86,031,309.

Analysis of these figures shows that U.K. exports of chemicals to the European Economic Community in the eight months were valued at £37.11 million, an increase of 21%, while imports of chemicals from the E.E.C. were valued at £46.12 million, a rise of 32.7%. E.E.C. exports to this country have been expanding at a faster rate than our trade to that bloc. A year ago, E.E.C. shipments of chemicals to the U.K. were by value 13.19% higher than U.K. exports to E.E.C. countries; the gap has widened and imports from E.E.C. are now 24.2% higher by value than exports to the countries concerned.

Imports of chemicals from the U.S. and Canada both showed an increase, the eight months total so far as Canada was concerned was £7.50 million, up 40%; imports from the U.S. were valued at £33.39 million, up 65.2%. U.K. exports of chemicals to Canada and the U.S. were slightly down in each case. Exports to Canada were valued at £5.59 million, down 5.4%, while shipments of chemicals to the U.S., valued at £7.15 million, were lower by 5.8%.

No Cheap, Easy Way for Removing Oil from Coke-oven Waste

REPORT on further research into the carbonisation of vinyl polymers carried out at Hull University featured in the 1959 annual report of the British Coke Research Association published on 1 October. The work has been concentrated on two aspects of the carbonisation process: the determination of the amounts and the chemical nature of the liquid products evolved during carbonisation; and the identification and the quantitative estimation of the gaseous products given off during various temperature stages of the carbonisation.

Studies of the liquid products were confined to tars arising from polyvinyl chloride and polyvinyl acetate, which were investigated by methods previously applied to the study of tars evolved from the unoxidised polymer residues. The main substituent groups were identified and the aromatic carbon contents estimated from infrared spectroscopic absorption measurements. It was found that the tars are of predominantly aromatic nature and the results indicate the presence of oxygen-containing groups, such as ether and carbonyl groups.

The composition of each gas fraction was determined by gas chromatography. Preliminary results showed that hydrogen, carbon monoxide and methane are the major, if not only, constituents of the more volatile fraction.

1959 was the first full year of activity of the Coke Research Centre and during the year work was begun on almost all sections of the new programme of research which had been formulated by the programme working party. A subject studied in the repeatability series was the composition of benzole produced by a 10 tons test oven plant. The changes of benzole during carbonisation of coke had not been previously studied in detail.

The association continued to support and participate in research work on the amelioration of the coke-oven effluent problem. Biological treatment is now established as the most generally applicable and economic of the methods available, although an intractable residue still remains. However, it was found that if unlimed spent liquor, after biological treatment, was boiled with lime, the permanganate value of the final effluent was reduced by half and the colour materially improved.

In response to requests from a number of members, attention was given to the problem of removing oil from coke-oven wastes, but it was concluded that there was no suitable, cheap and simple method for the removal of oil down to trace amounts or very low concentrations.

50% Extra Chemicals Storage Space with New Pallet-leveller

A pallet, stacked with forty 56 lb. paper sacks of chemicals, being compressed in the new Heenan press. Centre, a similar pallet previously dealt with.

INSTALLATION of a new hydraulically operated pallet-levelling press in the warehouse of a large Midlands chemical company, has increased the existing storage capacity by at least 50%. The company, which produces several hundred tons a day of powdered chemicals, despatches most of its output in 56-lb. paper sacks which, after filling, are stacked 40 to a pallet and shifted to and from their storage quarters by means of fork lift trucks. Before installation of the new press, the loaded pallets could only be stacked to a height of two pallets and, as production increased, the existing warehouse facilities were becoming inadequate.

The Heenan hydraulic press, supplied by Heenan and Froude Ltd., Worcester, takes a fully loaded pallet, applying an even spread of pressure to the top of the pallet's load and reducing the overall height from approximately 4 ft. 2 in. to an average of 3 ft. 1 in. This compression, in addition to reducing the overall height of the loaded pallet by 26% also ensures a notable improvement in the stability of the stack, a combination of factors which makes it possible to store the pallets in tiers of three instead of two. Subject only to the height of the storage building and the maximum operating height of the fork-lift truck, it would be possible to stack the pallets in tiers of four.

A further advantage claimed for the compacted sacks is that loads for despatch by road transport ride more securely and, that as the 'pressed' effect on the sacks is reasonably permanent, their space-saving benefits are similarly appreciated by customers.

According to Heenan and Froude, the new hydraulic press could be applied successfully to practically any type of bagged material.

100 Gas Engineers Visit L.T.D.'s 150,000 Tons/year Tar Processing Works

NEARLY 100 gas engineers on Friday visited the Cadishead works of Lancashire Tar Distillers Ltd. This company, who operate seven tar distilling works, process annually about 320,000 tons of crude tar of which about 85% is produced by the North Western Gas Board, most of it from vertical retorts. The overall design capacity of L.T.D. is 360,000 tons, the marginal difference between the actual and potential figures being accounted for by a decline of some 5% over the past five years in delivery of gas works tar, against a forward design prediction of an increase of 2% per year.

Cadishead, whose rate of throughput is about 130,000 tons/year, have distillation capacity for 150,000 tons of crude tar and resembles a chemical works rather than a normal concept of a tar distillation plant. It produces tar acids, pyridine bases, naphthalene, benzole and solvents. Chemically rich fractions of tar are brought from other works (about 25% weight of the tar) to Cadishead for finishing. The plant for the hydrorefining of benzole by hydrogen at 28 atm. pressure is the only one of its kind at present operating in Great Britain.

Before the visit to Cadishead the directors of Lancashire Tar Distillers Ltd. entertained the gas engineers to lunch at the Lymm Hotel, where they were welcomed by Mr. J. C. Lord, chairman of the company.

B.L.W.A. Associate Membership

A new class of membership—Associate Membership—has been approved by the British Laboratory Ware Association; over 20 manufacturers and suppliers who have favourably considered such membership are being notified.

Letter to the Editor

Price of Book on Chemical Engineering

SIR,—I notice that on p. 355 of your issue for the 3 September this year you published a correction to the review of the book, 'Fundamentals of chemical engineering operations', which appeared in your issue of 13 August.

I have checked the carbon copy of my review and find that the error must have arisen in setting up the type for printing. The price of the book indicated in my original is, in fact, correct and therefore my suggestion that the book is expensive still holds good.

Yours, etc.,
D. C. FRESHWATER
Head of Department
Department of Chemical Engineering,
College of Technology,
Loughborough.

Odour in Packaging Meeting 'Sold Out'

THE Institute of Packaging conference 'Odour in packaging' to be held at the Connaught Rooms, London, on 24 and 25 November is said to be completely sold out less than a month after details were published.

Open to 400 delegates, it will discuss the food industries case; odour problems in the merchandising of foodstuffs; testing and quality control of packaging materials; the development and use of testing methods for the quality control of packaging odours in the food industries; the U.S. approach to odour in packaging of food; printed paper and board; printed films and film laminates; printed foils and foil laminates; odour problems in ink-making; paper wrappers and bags; film wrappers and bags; paperboard; cartons; plastics containers; laminated wrappers and bags.

Polythene Ball Chroffles Cut Plating Costs

SPHERICAL chroffles, made from 'Rigidex high density polyethylene' and about $1\frac{1}{4}$ in. in diameter, are being marketed by W. Canning and Co. Ltd. for use in plating and pickling tanks, where they float on the surface of the liquid and form an inert blanket. This blanket minimises spray and splashing of dangerous or objectionable solutions, which reduces busbar and ducting corrosion and provides an additional safeguard for plating sh p staff.

It is claimed that the chroffles also reduce heat losses from the surface of the bath and can save as much as 12% of the heating normally required. Fan exhaust can be reduced and in some cases dispensed with, and this results in appreciable savings in space heating.

Due to their shape, ball chroffles 'take up' uneven contours or projections on the articles being processed and thus maintain uniform coverage of the solution. Chroffles made from Rigidex by Lacrinoid are suitable for temperatures of up to 200°F and are resistant to most acids and alkalis.

SCIENTIFIC RUSSIAN WITHOUT TEARS

Part 2—Grammar

By Professor J. W. Perry

(University of Arizona, Tuscon, Arizona, U.S.)

THE previous part was devoted to the Russian alphabet and its use in spelling out the international terminology of science and technology. This international vocabulary—though important—is, of course, only part of the story. Scientific Russian makes use of many words of purely Russian character. Learning such words is facilitated by observing how they are used in phrases and sentences. This approach permits vocabulary and grammar to be learned simultaneously. (See Chapters 1-5, pages 1-48 of 'Scientific Russian' (2nd edn.)—Interscience Publishers, New York and London.)

First, some general observations on Russian grammar.

Since Russian belongs to the Indo-European family of languages, it is not too surprising that nouns, adjectives, verbs, adverbs, prepositions, etc., are used in much the same way as in English. The word order in Russian sentences is usually closer to English than is the case with French and German sentences.

But, of course, there are also differences. Russian uses endings much more extensively than English—and it is by no means uncommon for Russian to use an ending where English uses a preposition. Thus, the Russian genitive case often, though not always, is best translated by the preposition 'of' as illustrated by the following examples:

источник *энергии	source of energy
спутник земли	Earth satellite
движение *электронов	movement of electrons
поверхность *планеты	surface of planet
*кристаллизация солей	crystallization of salts
скорость света	speed of light
нагревание *газа	heating of gas
качество угля	quality of coal

Here the second of each pair of Russian words is in the genitive case—with *электронов and солей in the genitive plural and the others in the genitive singular. The corresponding nominative singular forms—as listed in dictionaries—are respectively *энергия, земля, *электрон, *планета, соль, свет, *газ, and уголь.

There are no Russian words that correspond to English 'the', 'a' or 'an'. In supplying these when translating, the context must provide guidance. If confronted with isolated phrases—or many simple sentences lifted out of context—it may be impossible to decide whether 'quality of coal', 'the quality of coal', 'the quality of the coal', 'the quality of a coal', etc., may be the appropriate translation for качество угля.

Beside the nominative and genitive cases, Russian has four others—but let us give attention for the moment to the nominative case.

*Hereafter the asterisk will be used to mark all Russian words for which we have closely related English words.

Both nouns and adjectives—as well as pronouns and other noun modifiers—have distinctive endings. The singular and plural endings of the great majority of Russian nouns in the nominative case may be illustrated by the following examples:

Singular		Plural	
	Masculine Nouns		
*атом	atom	*атомы	atoms
луч	ray	лучи	rays
спутник	satellite	спутники	satellites
рой	swarm	рои	swarms
*эпителий	epithelium	*эпителии	epithelia
растворитель	solvent	растворители	solvents
	Feminine Nouns		
*молекула	molecule	*молекулы	molecules
единица	unit	единицы	units
наука	science	науки	sciences
неделя	week	недели	weeks
*теория	theory	*теории	theories
соль	salt	соли	salts
	Neuter Nouns		
вещество	substance	вещества	substances
училище	school	училища	schools
поле	field	поля	fields
явление	phenomenon	явления	phenomena

These examples reveal, as is so often the case in Russian, a simple underlying pattern:

Masculine Nouns—Nominative Case
Singular: (i) Hard Consonant (i.e., no ending); (ii) -й; (iii) -ь
Plural: (i) -ы; (ii) (iii) -и

Feminine Nouns—Nominative Case
Singular: (i) -а; (ii) -я; (iii) -ь
Plural: (i) -ы; (ii) (iii) -и

Neuter Nouns—Nominative Case
Singular: (i) -о; (ii) -е
Plural: (i) -а; (ii) -я

Thus the nominative singular ending of a noun determines its gender. Exceptions are (i) nouns with nominative singular ending -ь,—some are masculine and others feminine—and (ii) certain irregularly declined nouns, e.g., время - time, which are neuter.

A concise summary is also possible for the nominative endings of adjectives—and other noun modifiers especially participles, such as *фильтрованный, filtered.

Adjectives—Nominative Case
Singular: *Masc.*-ый, -ой, -ий
Feminine -ая, -яя
Neuter -ое, -ее
Plural: *All Genders* -ые, -ие

The final letter in the stem of a noun or adjective is a decisive influence in determining which ending is to be used. (See § 128, page 145 of 'Scientific Russian', (2nd edn.) Interscience Publishers, New York and London.)

The following examples illustrate the use of the above listed endings:

*химический *элемент	chemical element
*химическая *лаборатория	chemical laboratory
*химическое изменение	chemical change
*химические заводы	chemical plants
*Американское *Химическое Общество	American Chemical Society
синяя соль	blue salt
*атомная *энергия	atomic energy
*атомный вес	atomic weight
*атомные *бомбы	atomic bombs
высокое давление	high pressure
высокая *температура	high temperature
обратимые *реакции	reversible reactions
бумажная промышленность	paper industry
щелочные *металлы	alkali metals
жидкий *гелий	liquid helium
*амфотерные соединения	amphoteric compounds
*органическое соединение	organic compound
хорошие проводники	good conductors
*структурная *формула	structural formula
маленькие *планеты	small planets
*металлический *алюминий	metallic aluminium
*советские спутники	Soviet satellites
*русская *история	Russian history
твёрдые вещества	solid substances
зашифрованный реферат	encoded abstract
расплавленный *металл	fused metal
излучённая *энергия	radiated energy
сжатые *газы	compressed gases
*опубликованное предложение	published proposal
предсказанный *эффект	predicted effect
рассеянный свет	scattered light

As these examples illustrate, the endings of adjectives (and other noun modifiers) agree as to case, gender and number with the nouns modified. For rare exceptions to this rule, see §393, page 655 and §371, page 604 of 'Scientific Russian', Interscience Publishers, New York.

Russian always avoids having one noun modify another, as in English 'sodium salts', 'electron microscope', 'earth satellite', 'room temperature'. The adjective endings are always used with noun modifiers and this means that various suffixes are often attached to nouns to convert them into adjectives. Thus we have:

натрий	натриевые соли
sodium	sodium salts
электрон	*элекронный *микроскоп
electron	electron microscope
комната	комнатная температура
room	room temperature
реферат	реферативный журнал
abstract	abstract journal

This use of adjectives plays an important role in Russian inorganic chemical nomenclature as formulated in the days of Mendeleev. As the following examples show, this situation requires careful attention:

сернистая кислота	H_2SO_3
серная кислота	H_2SO_4
сернистая медь	Cu_2S
серная медь	CuS
серномедистая соль	Cu_2SO_4
серномедная соль	$CuSO_4$

For a detailed analysis, see Chapter IV of 'Chemical Russian, Self-Taught', Chemical Education Publishing Company, Easton, Pennsylvania.

In English many adjectives are converted into adverbs by adding the suffix -ly. Similarly, in Russian many adverbs may be regarded as derived from adjectives by adding -о to their stems. For example:

*аналогичный,	analogous	*аналогично,	analogously
беспомощный	helpless	беспомощно	helplessly
*вертикальный	vertical	*вертикально	vertically
видный	visible, prominent	видно	visibly, apparently
возможный	possible	возможно	possibly
*горизонтальный	horizontal	*горизонтально	horizontally
лёгкий	easy, light (adj.)	легко	easily, lightly, gently
*молекулярный	molecular	*молекулярно	molecularly
опасный	dangerous	опасно	dangerously
*пропорциональный	proportional	*пропорционально	proportionally
редкий	rare	редко	rarely
скорый	rapid	скоро	rapidly
широкий	wide, broad	широко	widely, extensively
*экспериментальный	experimental	*экспериментально	experimentally

Adjectives whose stems terminate with -ическ- form adverbs with -ически. For example:

*адиабатический	adiabatic	*адиабатически	adiabatically
*каталитический	catalytic	*каталитически	catalytically
*логический	logical	*логически	logically
*периодический	periodic	*периодически	periodically
*химический	chemical	*химически	chemically
*эмпирический	empirical	*эмпирически	empirically

Overseas News

BIG INCREASE IN PHOSPHORIC ACID PRODUCTION AHEAD FOR ILLINOIS

A $1.5 m. plant to manufacture phosphoric acid, with a capacity of about 50,000 tons/year, will be built by Olin Mathieson Chemical Corporation at Joliet, Ill. The acid will be a 75% concentrate. Construction contracts have already been let and preliminary work is under way. The plant, at the Blockson operation of Olin Mathieson should be completed by the end of April 1961. Blockson was a pioneer in the wet process for the production of phosphoric acid for the manufacture of sodium phosphates.

Elsewhere in Illinois, at Marseilles, construction of the new phosphoric acid plant of the National Phosphate Corporation, New York, is 50% complete. The plant, designed by Chemical Construction Corporation, New York, will be capable of producing 54% P_2O_5 phosphoric acid by the wet process, using Florida phosphate rock and 93-98% sulphuric acid.

Chemico are including the most advanced filtration and concentration equipment, especially developed for phosphoric acid operation, as well as special process features to allow a substantial reduction in water requirements and elimination of fluorine from plant effluents.

Synthetic Resins to be Made in Trieste

Adria Chemie have been formed as a joint stock company in the Italian port of Trieste for the production of synthetic resins, lacquers and glues. A production unit is to be built in the Trieste port area as soon as possible.

Japan to Import LPG from Persia

The Gosho trading company, Japan, are holding negotiations with the National Iranian Oil Co., Persia, for the setting up of a joint company to export liquid petroleum gas from Persia to Japan. The company would have a capital of U.S.$1 million, of which Gosho and National Iranian Oil would each hold half. It would have the right to purchase up to 130,000 tonnes of natural gas from the Persian oilfields annually. A Japanese estimate puts the cost of the project at Yen 6,000 million.

S.D. Maleic Process for West German Company

Rheinpreussen A.G., Homberg, Neiderrhein, Germany, are to build a maleic anhydride plant using the Scientific Design process of fixed bed, catalytic, air oxidation of benzene. The plant, to be built at Meerbeck, will have an initial design capacity of 13.2 million lb./year of maleic anhydride. Scientific Design will provide complete process design, process engineering, general engineering and major equipment design. S.D. will also assist in training of operating personnel and will supervise start up.

Rheinpreussen are the first company in Germany to employ S.D.'s maleic anhydride process, and the 14th company in the world. The new plant will, it is stated, bring the total capacity of S.D.-designed maleic anhydride plants to almost two-thirds of world capacity.

Hüls Plans for Polybutadiene, P.V.C. and Styrene

Following successful pilot studies on polybutadiene, Chemiche Werke Hüls are to build a plant to produce 20,000 tons a year. Hüls, West Germany's largest p.v.c. producers, believe that sufficient new applications are being found to justify raising their p.v.c. capacity from the present 50,000 tons/year to 80,000 tons by 1961.

The company, which claims to be Europe's largest producer of styrene monomer, plans to raise capacity to 30,000 tons/year by the end of 1961. A 3,600 tons/year polypropylene plant should be in the commissioning stage by the end of 1960.

Dow Chemical's New Route to Organotin Polymers

Reported at the recent national meeting of the American Chemical Society was a method of making *o*-, *m*-, and *p*-lithiated polystyrenes, developed by research workers at the Framingham, Mass., laboratories of Dow Chemical. The technique is said to make possible organometallic or organic polymers that cannot be made from basic monomers. Such polymers could contain carboxyl, amide, epoxide, nitrile, halide, ketone, ester or other groups. The method makes possible new graft polymers.

To make lithiated polystyrenes, butyl lithium is reacted with bromostyrene polymers or copolymers. Poly-*o*-lithiostyrene is said to react with trisubstituted tin chlorides to make soluble linear organotin polymers.

Abbott Produce First Chemical-grade Isotope

High-neutron flux reactors are being used by Abbott Laboratories, Chicago, in the production of the first chemical-grade isotope, iodine-131, to be marketed by a private company in the U.S. Charges containing about 50 gr. of tellurium-130 are irradiated with neutrons and changed to tellurium-131, which is then degraded by beta disintegration to iodine-131. The high-neutron flux reactors are used to raise reaction rates and yields to the point where isotope production is economical. Half-life of the product is eight days.

A new method is stated to have been developed for the separation of irradiated iodine from tellurium, but with patents pending, details are not disclosed. It is stated, however, that an 'oxidising medium' is used to take the tellurium from a valence of four to a valence of six. Iodine is liberated in the un-ionised, gaseous form into a solution that prevents it from separating into ions. Iodine ions are then vapourised and trapped in a dilute solution of sodium hydroxide and sodium sulphite to avoid contamination.

Fluid Bed Process for Tetrafluorohydrazine

The process by which Stauffer Chemical produce tetrafluorohydrazine, developed under a contract with the U.S. Government, has been disclosed by the company. The material is a high energy oxidiser and in the process nitrogen trifluoride is reacted with carbon in a fluidised bed. The product is separated from unreacted NF_3 and the by-products, carbon tetrafluoride and nitrogen oxides, by fractional distillation.

The process gives temperature control to within 10°C and yields of 75% conversion of NF_3 with reaction times of only a few seconds.

Malayan Government to Ban Sodium Arsenite

Sodium arsenite, at present widely used by big estates in the country to kill weeds and lallang, is being banned in the Federation of Malaya, following continued complaints that arsenic poisoning was causing the death of cattle. It is stated that about $200,000 worth of livestock, equal to 150,000 lb. of meat, is lost annually owing to arsenic poisoning.

The ban will take effect a year from now in order to give ample time to estate owners to use up their present stock of sodium arsenite. The necessary legislation is being introduced.

Dow Sue Stauffer on Alleged Patents Infringement

A suit alleging infringement of U.S. patents has been filed by Dow Chemical against Stauffer Chemical. The latter firm is charged with infringing various processes for making perchlorethylene and carbon tetrachloride. Dow Chemical seek an injunction against further infringement of the patents concerned (U.S.P. 2,442,324, 2,577,388 and 2,727,076) and are asking the court to order an accounting for profits.

Pilot Plant Designed for Rubber Production nears Completion

Crawford and Russell, Inc., Stamford, Conn., are rapidly completing the final phases of the design and engineering of the recently announced $2 million pilot

plant to be built in Baton Rouge, La., by the Naugatuck Chemical Division of United States Rubber Co. for the production of new stereo regular synthetic rubbers on a trial basis. Construction of the new plant will begin this year and plant completion is expected in the autumn of 1961. Initial production will involve 'synthetic balata' and ethylene-propylene types of synthetic rubbers.

Another U.S. Firm to Make Benzene-via-Petroleum

Following announcements that Mobil Chemical are to make 30 million gall./year of benzene at Beaumont, Tex., and that Imperial Oil will produce a similar quantity at Sarnia, Ont. (CHEMICAL AGE, 24 September, p. 492), Plymouth Oil have stated that they will build a 15 million gall./year plant at Texas City. Using the Universal Oil Products hydrodealkylation process (Hydeal), this should be operating by the middle of next year.

Dow to Build Polythene Foam Plant

Ethafoam, a polythene foam, will be produced at Dow Chemical's Hanging Rock Plant at Irantoon, Ohio. To achieve this, a new extension will be built; construction will start early this autumn and is due for completion in June 1961. The new plant covering some 61,000 square feet will be adjacent to present facilities which produce Styron and Styrofoam, Dow's polystyrene and polystyrene foam.

The foam is flexible and of closed cell structure about 30 times lighter than water, and therefore has been used in a variety of buoyancy applications. New applications are also developing in the fields of package cushioning, construction and thermal insulation.

Maleic-fumaric Acid Process by Scientific Design

The Scientific Design Co., U.S., are reported to have developed a new process for the conversion of maleic acid to fumaric acid. Base material may be either pure or impure maleic acid solutions such as are produced in the manufacture of phthalic acid. These solutions are first passed through a cleansing tower, this process being followed by isomerisation with a special undescribed catalyst in two reaction chambers. The fumaric acid, which is produced in commercial quantities, is separated in a centrifuge and then dried.

Hüls and Houdry Form Joint Catalyst Company

Chemische Werke Hüls, Marl, West Germany, and Houdry Process Corporation, Philadelphia, are forming an equally-owned company to develop, manufacture and sell the two firms' catalysts. The new firm, Katalysatorenwerke Houdry-Hüls, GmbH, will be located at Marl, where catalysts will be produced and sold to the rapidly growing West European market.

Hüls are the fourth largest chemical concern in Germany, with 1959 sales of $150 million. Houdry are licensors of processes and manufacturers of catalysts. The association is described as the natural growth of a long relationship between Houdry and Hüls, who are licensees of Houdry's dehydrogenation process for butadiene. Hüls have also been licensed by Houdry to make 3-D platinum reforming catalysts.

The new company will market certain catalysts either now being made or which can be made at Marl under Houdry or Hüls licences. Additional catalysts will be produced in Germany when the market justifies commercial production.

Phosphoric Acid Expansion in Florida

American Cyanamid plan to bring their annual phosphoric acid capacity up to 400,000 tonnes by the erection of a further production unit at Brewster, Florida. The plant will be joined to an existing works and most of its output will go to the fertiliser industry. Cost of the plant is believed to be in the region of $6 million.

Dead Sea Chemical Expansion Planned in Israel

Technical plans for the expansion of potash, bromine and other products manufactured by the Dead Sea Works, Israel, have been completed pending the grant of a World Bank loan to cover the £21 million project. Of this sum the company expects to supply £7 million from internal sources in the next five years. It is hoped that just under half of the balance will be provided by the World Bank and that the remainder will be covered by issues in Israel and overseas.

The loan would enable the Dead Sea Works to raise potash production by 400% and to establish new plants at S'dom. An unusually rapid return on the heavy capital outlay is expected by General M. Makleff, director of the company, who says that operating costs will be very low. He reckons that exports would bring in between £9 million and £11 million a year within five years, compared with £1.8 million in 1960.

Already there has been a 25% rise in potash output this year and it is hoped that bromine production will be up by 50-60% by the year end. The Dead Sea Works continues to receive many more orders than it can handle; a severe world bromine shortage (see CHEMICAL AGE, 10 September, p. 381) and a recently reported shortage of potash are expected to take care of the increased production, according to market research carried out by the company and the World Bank.

Methane Process to Carbon Tetrachloride

A five-to-one mixture of chlorine and methane is used in a process for carbon tetrachloride that is reported by Chemische Werke Hüls to give yields of better than 70%. By-products are 20% perchlorethylene together with hexachlorobenzene and hexachloroethane as by-products.

The chlorine-methane mixture is fed through two reaction tubes, in the first of which it is ignited with a hydrogen flame. Temperature is maintained at 1,200°F and before entering the second reactor the gases are cooled to 840°F by a heat exchanger.

Ethylene can be substituted for methane, in which case perchlorethylene becomes the main product with carbon tetrachloride, hexachlorobutadiene, hexachlorethane and hexachlorobenzene as the by-products.

Du Pont to Set Up European Plant for Processing of Delrin

DELRIN acetal resin, produced at Parkersburg, West Virginia, is to be processed in Europe in a new plant to be built by Du Pont de Nemours (Nederland) N.V. at their site at Dordrecht, the Netherlands. The multi-million guilder processing plant is scheduled to begin operations in 1962, with construction to start immediately.

The new Dordrecht facilities will include plant for extrusion cutting, colouring, packaging and shipping of Delrin. Sales will be handled by Du Pont de Nemours International, S.A., Switzerland, through their distributors. Du Pont European expansion also includes the setting up of a plastics design laboratory in Geneva, which will provide design assistance to customers mainly on the use of Delrin and an experienced sales organisation.

Delrin was introduced commercially in the U.S. and Europe at the beginning of this year and is the result of 10 years of intensive research. A tough and rigid plastics material, it combines mechanical properties that make it suitable as a replacement for metals and other material used in the car industry, industrial machinery, packaging, electrical equipment and appliances, domestic hardware, plumbing fixtures and a wide range of other consumer products. More than 80% of potential applications involve replacement of metals, particularly die-casting alloys, because it is said to provide better products at less cost.

Delrin is a highly crystalline, high-melting thermoplastic polymer, known chemically as a linear acetal resin, or as polyoxymethylene. The dense crystalline structure accounts for many of its key properties—strength and stiffness, high temperature behaviour and solvent resistance. It is claimed to be the first plastics material with strength properties approaching those of the non-ferrous metals.

Extremely rigid without being brittle, Delrin is both tough and resilient. These properties are retained under adverse conditions of temperature and humidity, during an extended time under stress and during exposure to most solvents. The material is also tasteless, odourless and non-toxic. (See also 'Distillates', p. 574.)

A.E.A. Back-pedals on Thermonuclear Research

A DECISION not to proceed with its big thermonuclear research project —the Intermediate Current Stability Experiment—has been made by the U.K.A.E.A. Design studies, supported by experimental and theoretical work, have indicated that the very large apparatus required would probably cost £3 million —twice the original estimate—or even more. Furthermore, some 10% of the Authority's scientific research effort is now being devoted to thermonuclear research and the Authority feels that by proceeding with the Icse project it will be putting "too many eggs in one basket", as regards both the distribution of scientific brains and expenditure.

It is proposed, instead, to broaden the fusion programme with a number of smaller but important research experiments, improved methods of diagnostic measurements, and the further development of the advanced techniques needed to produce high-temperature plasmas.

The Icse apparatus was to have been a sucessor to Zeta, but bigger and more expensive, and would have been used to study the stability of a toroidal sheath of hot ionised gas carrying a large electrical current and subjected to applied magnetic fields which should keep the sheath stable.

It seems clear, from the decision, that experimental work on thermonuclear fusion has been running ahead of the available scientific background, and that the present state of knowledge of plasma physics does not justify the devotion of such a considerable proportion of the Authority's effort and resources to this field as would be involved in the Icse project.

Railways to Operate Oil Pipeline Service

A PLAN to set up a service for the transportation of oil and chemicals by pipeline, possibly with pipelines running alongside the railways, has been considered by the British Transport Commission, according to evidence, just published, which was given to the Select Committee on British Railways. The report of the Committee, rejecting complete autonomy for the railway regions, was published last July.

Sir James Dunnett, Permanent Secretary of the Transport Ministry, made it clear to the Committee that a point about which the B.T.C. had been thinking was the effects on the profitability of freight carriage by the development of pipelines for carrying oil and chemicals. It was difficult to make a judgment on how fast the business would develop, and to what extent the railways ought to be in it themselves, said Sir James.

"I would have thought myself that this particular way of carrying certain products is bound to grow," he added. "And to the extent that it is done in competition with the railways there will be some adverse effect on railway carryings."

CO Gassing Accidents in 1959 Lowest on Record

GASSING accidents due to carbon monoxide in 1959 were the lowest on record. Of the 56 accidents, six were fatal, the lowest number of deaths from this cause ever reported in one year. This was stated in the Annual Report on Industrial Health, 1959, obtainable from H.M.S.O. price 3s 6d.

Carbon monoxide poisoning, however, is still responsible for the highest proportion of the accidents due to gassing (see CHEMICAL AGE, 24 September, p. 488). Chlorine was the cause of the next highest proportion of accidents although there were no fatalities. Among the 14 cases of ammonia poisoning, the two fatalities were both the result of the bursting of a refrigeration plant.

The death of a man working alone and visited only at irregular intervals from exposure to benzole fumes, draws attention to the undesirability of men working alone at potentially dangerous processes. The man was found dead below a benzole washing vessel which had been overflowing for some considerable time. No one saw the accident.

Severe effects from phosgene poisoning which may not become evident until several hours after only slight exposure to the gas were illustrated by a case in which four men after inhaling phosgene although showing no ill-effects immediately afterwards, were sent home to rest, and later developed symptoms of pulmonary oedema.

Pneumoconiosis caused by carbon has mainly been the problem of the mining industry, although cases do arise from any occupation in or incidental to the manufacture of carbon electrodes, such as those used in the electrolytic extraction of aluminium from aluminium oxide. During 1959 a death occurred from pneumoconiosis thought to be due to exposure to carbon black over a period of 20 years in the rubber industry. Synthetic graphite is now being used extensively in the form of blocks as a moderator in nuclear power plant operation. Details came to the notice of the Medical Branch of a man who had worked for the past 17 years turning synthetic graphite on a lathe.

Two incidents of poisoning due to mercury and its compounds were reported in 1959. One case was of a man employed in processes concerned with the manufacture of mercuric chloride following several years in which he was engaged in the distillation of metallic mercury.

It is encouraging to note that in spite of the fact that chronic benzene poisoning may result from small dosages spread over a period there were no cases of this type of poisoning reported in 1959.

Polyclens 'Kills' Oil Pollution in Southend Demonstration

A DEMONSTRATION was staged off Southend Pier on 28 September to show that oil pollution of the sea can be 'killed' by spraying a suitable chemical on to the oil patches. The chemical used was Polyclens, manufactured by Polycell Products Ltd., which is a combination of surface-active agents and solvents and can emulsify 200 times its own volume of oil.

The demonstration was witnessed by scientific representatives of the Ministry of Transport, members of the Department of Scientific and Industrial Research, representatives of the Port of London Authority, the Admiralty Oil Laboratory, the scientific branch of the L.C.C., etc.

Southend, in common with a number of other seaside resorts, has been using Polyclens to clean up its beaches after oil invasion and the demonstration seems to indicate that when oil can be spotted floating in the sea it can be dealt with by sending fast launches to the spot. In the demonstration, Polyclens was sprayed from a jet motor-boat and a conventional speed-boat.

The demonstration showed that the emulsification of the oil begins immediately it is sprayed with Polyclens. Five gallons of oil were dealt with within seconds. The process is assisted by the agitation imparted to the water by the craft.

In a previous demonstration at Southend, organised by Specialist Business Services Ltd., a Danish invention, Oilsink, was demonstrated as an oil pollution preventive. Both Oilsink and Polyclens were the subject of previous notes in CHEMICAL AGE (25 June, p. 1056; 6 August, pp. 196 and 201).

The Oilsink test at Southend was also attended by members of the D.S.I.R. and other interested bodies, and here again 5 gall. of crude oil were released on the surface of the sea, but were then sprayed with Oilsink from an aircraft. After subsequent inspection from a motor launch the treatment was declared to have proved 100% efficient. Oilsink is said to "sink the oil and keep it sunk".

B.o.T. to be Responsible for Dextrins

From 3 October the Board of Trade has become the Production Department for dextrins and soluble and roasted starches, instead of the Ministry of Agriculture. From that date general inquiries should be addressed to the B.o.T. Industries and Manufacturers Department, Division 3, Horse Guards Avenue, London S.W.1.

Commercial News

- Glaxo Plan One-for-four-Scrip Issue
- Sto-Chem Formed with £200,000 Capital
- Hoechst 1960 Sales Will Top DM 2,500 M.
- Kali-Chemie Acquire Phosphates Company

Allen and Hanburys

Allen and Hanburys Ltd., a subsidiary of Glaxo Laboratories, have declared a dividend of 45% (30%) for the year ended 30 June. Group net profit was £381,099 (£339,769), after tax £350,489 (£314,827).

A.P.V. Company

An extraordinary meeting of A.P.V. Company Ltd. will be held on 27 October to approve the one-for-five scrip issue.

Glaxo Laboratories

Group profit of Glaxo Laboratories Ltd., after tax of £3,550,000 (£2,858,000) was £3,751,690 (£3,017,796) for the year ended 30 June. Pretax profits, at £7,302,000, were higher by 24%. A final dividend of 11%, making 18% (14%), is recommended. A one-for-four scrip issue is proposed.

Glaxo Benelux S.A., are a new company formed in Brussels to promote the sale and distribution of Glaxo products in Belgium. Major shareholders are Glaxo Laboratories and Union Chimique Belge S.A.

Murex Ltd.

At the annual general meeting of Murex Ltd. held on 29 September, it was decided to capitalise £1,650,000 of the company's reserves, for the purpose of paying up in full 1,650,000 ordinary shares of £1 each for distribution on the basis of three for four.

Sto-Chem Ltd.

Sto-Chem. Ltd., the new company by Witco Chemical and United States Rubber to produce synthetic rubber latices in the Midlands, has now been registered with a capital of £200,000. Directors are: George R. Vila, Thomas A. Clayton, Kennedy M. Nahas, Robert I. Wishnick, William Wishnick, Douglas Roberts and Robert Shacklady.

Stanley Earle, Hamilton

From 1 October the linseed oil refiners and processors, Stanley Earle and Co. Ltd. and John M. Hamilton and Co. Ltd. have been merged to form Stanley Earle, Hamilton Ltd. Oil processing will be carried out in the Kirkby Street, Hull, works and the remaining interests of John H. Hamilton and Co. Ltd. will be carried on under the name of Hamilton (Pitch) Ltd. from their works in Wincolmlee, Hull.

Whessoe

Whessoe are to set up a French subsidiary, and build a factory at Calais. The subsidiary will manufacture accessories, such as valves and pumps, for the storage of gas, oil and other fluids.

Australian Fluorine

Australian Fluorine Chemicals Proprietary Ltd. is a new company formed with a £A2 million nominal capital. Parent companies are Consolidated Zinc Proprietary and Monsanto Chemicals, Australia. As previously announced the new company will initially manufacture fluorocarbons; output will later include other products of mutual interest.

California Chemical

Consolidation of all of Standard Oil Company of California's world-wide industrial and agricultural chemical activities into one subsidiary has been announced. The new organisation, California Chemical Co., will co-ordinate and manage the manufacturing and marketing affairs previously handled by California Spray-Chemical Corporation and Oronite Chemical Company, and all of Standard's foreign chemical affiliations and marketing offices. Calspray and Oronite become the Ortho and Oronite Divisions of California Chemical Co.

Hooker Chemical

Hooker Chemical Corporation report sales of $112,210,900 for the nine months ended 31 August ($112,036,800). Net income for the nine months was $9,285,400 or $1.24 a share ($10,055,400 or $1.35 per share).

Hooker have acquired the assets of Butler Chemical Co., of Houston, Tex, a divison of the Houston Corporation. Producers of materials used as animal feed supplement, they will contribute to Hooker's programme of diversifying Phosphorus Division products.

Farbwerke Hoechst

Turnover in 1960 of Farbwerke Hoechst AG will, it is estimated, exceed DM2,500 million (£212.5 million), or about 13% above the 1959 figure. In the period January to August, nearly all products had a share in the expansion and the limits of capacity have almost everywhere been reached. The directors do not think there will be a need for a capital increase this year, but new finance will be required in 1961.

Phosphatfabrik Hoyermann

The Hanover phosphates producers, Phosphatfabrik Hoyermann GmbH, have now been taken over in a share transaction involving some DM 1 million of their shares by Kali-Chemie AG.

N.V. Titaandioxydefabriek

The new Dutch concern, N.V. Titaandioxydefabriek, The Hague, will produce and trade in titanium dioxide. Capital is Fl. 30 million (nearly £3 million) and shareholders are N.V. Billiton Maatschappij (majority) and Albatros Zwavelzuur- en Chemische Fabrieken.

NEW COMPANY

RESILEX LTD. Cap. £100. Manufacturers of and dealers in chemicals and chemical products, etc. Secretary: E. H. Rowley. Reg. office: Bedford Street, Hull.

Market Reports

CUT IN COPPER SULPHATE PRICE

LONDON Active trading conditions have been reported from most sections of the industrial chemicals market during the past week, and contract delivery specifications have covered good volumes. There has been a steady flow of overseas inquiry with the total export trade in chemicals for the first eight months of the year showing an increase over the corresponding period in 1959.

The price of copper sulphate was reduced to £77 10s/ton on 3 October, otherwise no significant price changes have been reported and the undertone generally is steady.

The position of most of the coal tar products is firm. Creosote oil and cresylic acid are in good request whilst supplies of tar acids and naphthalene are not easy.

MANCHESTER From the point of view of fresh bookings the Manchester market for heavy chemicals has been fairly active on both home and overseas accounts. Most of the bread-and-butter lines, including the potash, soda and ammonia compounds, are moving steadily into consumption. The price position generally is maintained, a notable exception being a cut of £2 a ton to £77 10s in copper sulphate. Among the by-products a steady demand is reported for the carbolic and cresylic acid, creosote oil, and the xylols.

SCOTLAND Conditions have shown little change during the past week, during the earlier part of which the market tended to be quiet but towards the latter part of the week a much more active position prevailed. Again the bulk of demands were mostly against immediate requirements with emphasis on delivery.

The level of prices showed little change and mostly remained firm. The demand for agricultural chemicals is following the usual seasonal pattern.

PEOPLE in the news

● **Mr. C. E. Wrangham,** deputy chairman of Davy-Ashmore, has joined the board of Simon-Carves Ltd.

● **Mr. Gordon Allen, B.A.,** has joined the London office of Roger Williams Technical and Economic Services Inc., at Hanover Court, London W.1. The firm are chemical market research consultants with head office at Princeton, N.J., and branches also in New York and Toronto. Mr. Allen will be engaged in market research studies for companies planning expansion or diversifications in the Common Market and European Free Trade Association. After graduating at Balliol College, Oxford, he has held appointments in marketing with Styrene Products (now Shell Chemical) and with F. W. Berk and Co. Ltd.

● **Dr. A. Koebner, B.Sc., D.Phil.,** chief chemist of Marchon Products Ltd., has been appointed to the board as research director. The company's research laboratories are being expanded and Dr. Koebner will be responsible for the whole of the company's research activities, which are concerned especially with the wide field of detergent chemistry.

● **Dr. D. B. Mulholland, M.Sc., Ph.D., A.R.I.C., M.I.Chem.E.,** has joined the staff of the West Ham College of Technology, London E.15, as head of the newly created Department of Chemical Engineering.

● As part of the company's further expansion programme, British Geon Ltd. have recently made several new sales and technical service appointments. **Mr. A. H. Fletcher** has been appointed sales manager, Geon p.v.c. resins and latices, and **Mr. H. A. Wardle** has been made sales manager for Hycar nitrile rubbers and acrylates. Both these appointments are promotions within Distillers Plastics Group. **Mr. D. J. Pretorius,** who has joined the company from National Chemical Products Ltd., South Africa, will act as sales manager, Geon p.v.c. compounds. The following have been promoted to new posts in British Geon's Technical Service Department: **Mr. E. J. Hoskins** to be technical service manager, Geon p.v.c. dispersion resins; **Mr. W. S. Mure** to be technical service manager, Geon p.v.c. pastes and latices. **Mr. S. Mottram,** at present technical service manager, becomes chief technical service manager.

Above left, A. H. Fletcher; above right, D. J. Pretorius; left, H. A. Wardle

● **Mr. M. H. Spieler** has been appointed a director of British Enka Ltd., a subsidiary of A.K.U., in succession to the late Mr. A. V. Conrad.

● **Mr. W. E. Aylwin, M.C., M.A.,** director and general works manager of Midland Tar Distillers Ltd., who joined the company in 1932, retired as general works manager on 30 September, but retains his seat on the board. He will be succeeded as general works manager by **Mr. W. F. Dines,** who was appointed to the board a short time ago.

● **Mr. M. H. M. Arnold,** director, Bowmans Chemicals Ltd., Widnes, is one of a party of British industrialists which flew to Western Australia on 1 October for a 10-day visit to explore opportunities for establishing new industrial capacity in the State and to stimulate general interest in the development of secondary industries there. The party also includes **Mr. M. J. Noone,** director, Whessoe Ltd., Darlington, and is headed by **Mr. J. O. Knowles,** a director of Metal Industries Ltd.

● **Mr. W. J. Ramsay,** for 21 years secretary to Scottish Agricultural Industries Ltd., Edinburgh, retired from active business on 30 September.

● **Mr. S. E. Mann** has been appointed a director of Ashe Chemical. **Mr. F. T. Wright** and **Mr. G. Keighley** have resigned from the board.

● **Mr. A. L. Stock** has been appointed a director of William Cory and Son Ltd.

● **Mr. H. A. White** has been appointed to the newly created position of assistant managing director of the Hercules Powder Co., London. A Canadian, he graduated from the University of Toronto with a Bachelor of Applied Science degree in chemical engineering in 1944, and joined the paper makers' chemical department of Hercules Powder Co. (Canada) Ltd. in 1947 as a technical representative. In 1952 he came to the U.K. and joined Hercules Powder's paper makers' chemical department there, again as a technical sales representative. In 1956 he was appointed sales manager of this department and on 1 January 1958, general manager. On 1 January 1959 he became a director of the company.

● **Mr. N. J. Travis** has been appointed deputy managing director of Borax Consolidated. He is also on the board of the parent company, Borax (Holdings).

● **Prof. G. H. J. Daysh** has been appointed to the board of Solway Chemicals Ltd. He is sub-rector of King's College, Newcastle, holds the Chair of Geography in the University of Durham. He was closely associated with the late Lord Adams in the rehabilitation of industrial West Cumberland, and took a special interest in the development of Solway Chemicals' anhydrite mine at Whitehaven.

● **Mr. A. Lindsay,** chief engineer of Marchon and Solway, has relinquished his seat on the board of Solway Chemicals Ltd., and has been appointed to the board of Marchon Products Ltd. This inter-company change has been made to facilitate Mr. Lindsay's control of the heavy responsibilities that will fall on the Marchon engineering department in the course of the major plant expansion at present in hand at Whitehaven.

● **Mr. B. J. Phipp,** technical sales manager of Artrite Resins Ltd., 44-46 Kingsway, London W.C.2, has been appointed technical manager; **Mr. P. Harryman** has been appointed marketing manager. Mr. Phipp has been given this new appointment in order to devote himself exclusively to technical matters because of the company's increased activities and to ensure a comprehensive technical service to customers. Mr. Harryman takes over the sales functions formerly carried out by Mr. Phipp.

● First governors of the proposed staff college for technical teachers, who will have **Sir Alexander Fleck, F.R.S.,** as their chairman, have now been appointed. These include **Sir David Anderson,** former principal, Royal College of Science and Technology, Glasgow, **Dr. R. W. Bolland,** head, Department of Chemistry and Biology, Bristol College of Technology, and **Sir Willis Jackson, F.R.S.,** director of research and education, Associated Electrical Industries Ltd.

● **Mr. D. J. Hodgson** has been appointed controller of research for B.T.R. Industries Ltd. and **Mr. L. W. Rodway** has become manager of market research and development.

● **Mr. J. S. Brough, M.I.Chem.E., M.I.Mech.E., M.Inst.F., F.Inst.P.,** has been appointed to the board of Mono Pumps Ltd. and assistant managing director. His previous career includes periods as general manager of production at Monsanto Chemicals Ltd. and technical director of Humphreys and Glasgow Ltd.

TRADE NOTES

Southern Analytical Ltd.

The analytical instrument activities of Southern Instruments Ltd. will in future be carried out in the name of Southern Analytical Ltd., a company newly formed for the purpose. Members of the board will include Mr. W. B. Horner, general manager, Mr. H. M. Davis, B.Sc., A.R.I.C., A.Inst.P. (late of U.K.A.E.A.), chief engineer, and Mr. J. A. Colls, A.R.C.S., B.Sc. The chairman is Mr. P. Sellars, vice-chairman of Southern Instruments Ltd.

More Epoxy Resin Price Cuts

Shell Chemical Company Ltd. have reduced the price of their liquid grades of Epikote epoxy resins—815, 828, 834 and solid casting resin Epikote 1040—by 1s lb. on all quantities. The cuts follow recent reductions in the price of the company's solid grades of Epikote resins, used in paint manufacture.

Monsanto's Tred 65

The latest rubber reinforcing resin developed by Monsanto Chemicals Ltd. to cater for the growing trend in footwear of thinner, harder and stiffer soles, is Tred 65. Compared with Tred 50 and Tred 85, which it supplements, Tred 65 offers high reinforcing properties approaching Tred 85, coupled with the easy processing of Tred 50, enabling it to be processed in internal mixers or open mills at normal processing temperatures. Tred 65 readily disperses and its flexibility in formulating enables economies to be achieved by combining with cheaper elastomers. It is compatible with all oil extended rubbers.

Polastor Resins

Polyester resins are now being produced for marketing under the trade name Polastor, at the West Drayton works of Astor Boisselier and Lawrence Ltd. Prices will, it is understood, be competitive.

Titanium Price Cut

I.C.I. Metals Division's cuts of between 10 and 15% in wrought titanium prices have been followed by Jessop-Saville Ltd., one of the B.S.A. group, who are to cut prices of all wrought titanium products by between 5 and 15% from 1 November. Forged billet will be 12.5% cheaper and rolled bar 15%. Jessop-Saville believe it is possible that demand for titanium in the chemical industry may surpass that of the aircraft industry.

Additions to B.D.H. Range

New entries to the B.D.H. catalogue for September are: nickel sulphamate, DL-*iso*-leucine low in allo-*iso*-leucine, an amylopectin sulphate potassium salt.

Change of Address

The chemicals sales office of Armour Hess Chemicals Ltd. will from 24 October be situated at 6 Arlington Street, St. James's, London S.W.1 (telephone: Hyde Park 7831). The Distec fatty acid sales office for the Greater London area will also be at that address.

Scientific Materials and Accessories

Prices for the biological stains and reagents supplied by George T. Gurr Ltd., 136/140 New Kings Road, London S.W.6, as well as for dyes used for other scientific purposes, are given in price list G, issued by the company. Gurr have also issued their illustrated list AC, which gives prices for a range of accessories for microscopy and biological science.

J. W. Towers Exhibitions

The full range of Gallenkamp-Towers products for the laboratory is to be shown at two exhibitions by J. W. Towers and Co. Ltd., Victoria House, Widnes. These will be held at the Guildford Hotel, The Headrow, Leeds, from 18 to 20 October and at the Queen's Hall, Widnes, from 22 to 24 November.

Piping and Ducting Components

Avica Equipment Ltd., of Hemel Hempstead, Herts, are expanding their general industrial service in the atomic, chemical, petroleum, liquid gases, industrial gas turbine, and other engineering fields, by the appointment of regional engineering agents taking in the whole of the U.K. This new service will cover the Avica industrial range of piping and ducting components.

Four agents for the North, South Midlands, Scotland and Wales have so far been appointed.

NEW PATENTS

By permission of the Controller, HM 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 2 November

Process for the liquefaction and reliquefaction of natural gas. Conch International Methane Ltd. **853 089**

Copolymers of styrene and methyl methacrylate. Dow Chemical Co. **853 239**

Alkylbenzene diisocyanates. Atlantic Refining Co. **852 988**

Synthetic liquid detergents. Diamond Alkali Co. **852 941**

Impregnated films of regenerated cellulose and their production. Badische Anilin- & Soda-Fabrik AG. **853 240**

Catalytic cracking and catalysts therefor. Metallgesellschaft AG. **852 943**

Process and apparatus for the dehydrogenation of hydrocarbons. Badische Anilin- & Soda-Fabrik AG. **853 242**

Production of ethinyl ionol. Badische Anilin- & Soda-Fabrik AG. **852 945**

Treating subterranean hydrocarbon formations. Oil Recovery Corporation. **852 769**

Polymerisation of alkylene oxides. Union Carbide Corporation. **852 947**

High molecular weight multipolymers and derivatives thereof. Esso Research & Engineering Co. **852 949**

Phosphinoborines and their production. American Potash & Chemical Corporation. **852 970**

N-substituted camphidine derivatives and processes for their preparation. Pharmacia A.S. **852 971**

Production of xylylene diamines. Badische Anilin- & Soda-Fabrik AG. **852 972**

Stabilisation of dyed polyester bres. General Aniline & Film Corporation. **852 977**

Low pressure polymerisation process. Esso Research & Engineering Co. **853 195**

Bis (phenoxyphenyl) alkanes. California Research Corporation. **883 095**

Preparation of alkyl borate esters. United States Borax & Chemical Corporation. **853 098**

Production of aryloxy fatty acids. Badische Anilin- & Soda-Fabrik AG. **853 099**

Process for the manufacture of agents suitable for making organic acetylene compounds. Ciba Ltd. **853 111**

Alkoxydisiloxanes. California Research Corporation. **853 368**

Method of producing diphenic acid by oxidation of phenanthrene with peracetic acid. Rütgerswerke-AG. **853 369**

Vinylidene chloride-acrylonitrile copolymer solutions. American Viscose Corporation. **852 866**

Preparation of 1-methyl-3-pyrrolidylmethyl alcohol. Mead Johnson & Co. **853 370**

2-Sulphamolbenzoic acid esters. Hamor, G. H. **853 199**

Process and apparatus for the preparation of urea from ammonia and carbon dioxide. Stamicarbon N.V. **853 220**

Process for the production of high purity diketene substantially free from acetic anhydride. Lonza Electric & Chemical Works Ltd. **852 865**

Cyclopentanophenanthrene derivatives and process for the preparation thereof. Syntex S.A. **853 293**

Process for the polymerisation of olefines. Farbwerke Hoechst Aktiengesellschaft Vorm. Meister, Lucius & Brüning. [Divided out of 853 309.] **853 310**

Cyclopentanophenanthrene derivatives and process for the production thereof. Syntex S.A. [Divided out of 853 298.] **853 299**

Open to public inspection 9 November

Curing of rubber latex and the production of articles therefrom. Dunlop Rubber Co. Ltd. **853 926**

Rubber latex adhesive compositions. Dunlop Rubber Co. Ltd. **853 572**

Manufacture of plastics. T.I. (Group Services) Ltd. **853 795**

Detergent sulphonic acid and sulphate salts of certain amphoteric detergents. Mannheimer, H.S., and McCabe, J. J. **853 440**

Polyester compositions. Chemstrand Corporation. **853 442**

Phenolic resin and moulding composition. Hooker Chemical Corporation. **853 940**

Polymerisation of olefins. Ethyl Corporation. **853 848**

Catalysis. Scientific Design Co. Inc. **853 849**

Cyclopentanophenanthrene derivatives and processes for the production thereof. Syntex S.A. **853 850**

Process for the production of cyclopentanophenanthrene derivatives. Syntex S.A. **853 851**

Unsaturated glycidyl ethers, polymers thereof and methods for producing them. Rohm & Haas Co. **853 619**

Inhibition of isoniazid acetylation. Horner Ltd., F. W. [Addition to 791 404.] **853 519**

Synthesis of acrylic esters. Montecatini. **853 621**

Use of osmium textroxide in the conversion of sulphoxides to sulphones. Kellogg Co., M. W. **853 623**

Production of phenothiazine derivatives. Egyesült Gyogyszer Es Tapszergyar. **853 633**

Manufacture of addition compounds of 5-nitrofurfuraldehyde semicarbazone. Norwich Pharmacal Co. **853 635**

Fungicidal compositions containing isocyclohexemide. Upjohn Co. **853 636**

Films from linear high polymers of propylene and process for their production. Montecatini. **853 637**

Carboxylic acid esters of 17-alkyl-19-nor-testosterones and the manufacture thereof. Schering AG. **853 735**

Steroids and the synthesis thereof. Olin Mathieson Chemical Corporation. **853 736**

Apparatus for the production of metal oxides. Soc. De L'Accumulateur Fulmen. **853 412**

Process for production of solid ethylene polymers and polymers so produced. Phillips Petroleum Co. **853 414**

Polymerisation of propylene. Du Pont De Nemours & Co., E. I. **853 594**

Irradiation of polymers. T.I. (Group Services) Ltd. **853 737**

Alkenyloxypolyethoxyethyl alkyl ethers. Rohm & Haas Co **853 577**

Polyurethane lacquers. Imperial Chemical Industries Ltd. **853 384**

Manufacture of aluminium and iron complex salts of the 4:4′:4″-trihalogen-trityl halides and of 4:4′:4″-trihalogentritanols. Farbwerke Hoechst Aktiengesellschaft Vorm. Meister, Lucius & Brüning. **853 785**

Starch manufacturing process. Corn Products Co. **853 773**

Dioxaphosphorinanes and their preparation. Hooker Chemical Corporation. **853 798**

Metal complexes of monoazo dyestuffs containing cyclic sulphonylamidine residues. Badische Anilin- & Soda-Fabrik AG. **853 786**

Diquaternary compounds and process of preparing same. Pfizer & Co. Inc., C. **853 799**

Production of unsaturated gaseous hydrocarbons and of synthesis gas. Badische Anilin- & Soda-Fabrik AG. **853 596**

Refining thermoplastic resins. Monsanto Chemicals Ltd. **853 802**

Production of organo-aluminium compounds. Imperial Chemical Industries Ltd. **853 725**

Process for the production of synthetic textile fibres. Montecatini. **853 726**

Polyvinyl chloride compositions and process for preparing same. Bataafsche Petroleum Maatschappij N.V., De. **853 804**

Process for the production of boron hydrides. Borax Consolidated Ltd. **853 727**

Production of dicarboxylic acid derivatives. Newby, H. (Chemische Werke Hüls AG.) **853 728**

Methods for producing ultra-pure silicon. Siemens-Schuckertwerke AG. [Addition to 805 246.] **853 729**

Manufacture of surface-active acylated hydroxy sulphonates. Unilever Ltd. [Divided out of 848 463.] **853 590**

Polyesters and polythioesters from isocinchomeronyl halides. Imperial Chemical Industries Ltd. **853 730**

Lakes of monoazo dyestuffs. Sandoz Ltd. **853 778**

Oxytetracycline composition and preparation thereof. Pfizer & Co. Inc., C. **853 462**

Process for the production of roasted pyrites of low arsenic content. Instituto Nacional De Industria. **853 741**

Catalytic reforming of hydrocarbons. British Petroleum Co. Ltd., Moy, J. A. E., White, P. T., and Burbridge, B. W. **853 744**

Production of isotactic hydrocarbon polymers and catalyst therefor. Phillips Petroleum Co. **853 781**

Methacrylate polymers. Du Pont De Nemours & Co., E. I. **853 886**

Production of unsaturated cycloaliphatic compounds. Esso Research & Engineering Co. **853 809**

Separation of hydrocarbons by means of molecular sieves. Esso Research & Engineering Co. **853 530**

DIARY DATES

MONDAY 10 OCTOBER

I.Chem. E.—London: R.I.—Albemarle St., W.1., 3—7.30 p.m. Symposium on 'Surface effects and liquid behaviour'.

TUESDAY 11 OCTOBER

C.S.—Hull: Chemistry Dept., Univ., 5 p.m. 'Some new aspects of aromatic substitution', by Dr. C. Eaborn.

Rubber & Plastics Age—London: Church Hse., S.W.1. Second International Synthetic Rubber Symposium until 13 October.

S.C.I.—London: 14 Belgrave Sq., S.W.1., 5.30 p.m. Scientific film evening.

S.C.I.—London: British Council Film Theatre, 2nd Floor, 6 Hanover St., W.1., 5.30 p.m. Film evening.

WEDNESDAY 12 OCTOBER

British Coal Utilisation Research Association.—London: Inst. Civil Eng., Gt. George St., S.W.1., 5.30 p.m. Ninth Coal Science Lecture: 'Hydrogenation of coal to methane', by Dr. F. J. Dent.

I.Chem. E.—Birmingham: Queen's Hotel, 6.30 p.m. 'Fundamental considerations in biological treatment of effluents', by A. L. Downing & A. B. Wheatland.

Inst. Fuel.—Manchester: Engineers' Club, Albert Sq., 6.30 p.m. 'Waste heat recovery', by G. H. Stewart.

Inst. Plant Eng.—Bristol: Main Lecture Theatre, Univ., 7.15 p.m. 'Steam for process', by L. G. Northcroft.

Plastics Inst.—Cardiff: Grand Hotel, 6.30 p.m. 'Plastics in construction of fluid control valves', by R. A. Price.

Plastics Inst.—Gloucester: Technical College, 7 p.m. 'Properties and applications of polypropylene', by D. J. Campbell.

R.I.C.—London: R.I. 21 Albemarle St., W.1., 7 p.m. Second Humphry Davy Lecture: 'Energy exchange in interaction of particles under electric discharges', by Prof. V. N. Kondratiev.

S.A.C.—Coventry: Lanchester College of Technology, Priory St., 7 p.m. 'Analytical chemistry of chromium & vanadium', by G. M. Holmes.

S.C.I. with S.A.C.—London: 14 Belgrave Sq., S.W.1., 2.45 p.m. 'Biological assay of insecticidal residues'.

S.C.I. with R.I.C.—Falkirk: Lea Park Rooms, 7.30 p.m. 'International Science', by Dr. F. N. Woodward.

THURSDAY 13 OCTOBER

C.S.—Bristol: Chemistry Dept., Univ., 5.15 p.m. 'Radioisotopes', by A.E.A.

C.S.—London: Large Chem. Lecture Theatre, Imperial College, S.W.7. Tilder Lecture: 'Recent Studies on many-membered rings', by Prof. R. A. Raphael.

C.S. with R.I.C. & S.C.I.—Street: C. & J. Clarks, 6.30 p.m. 'Vegetable tannins', by Dr. T. White.

S.C.I. with C. S. & R.I.C.—Belfast: Chemistry Dept., Q.U.B., 7.45 p.m. 'Some topics in alkaloid chemistry', by Dr. H. T. Openshaw.

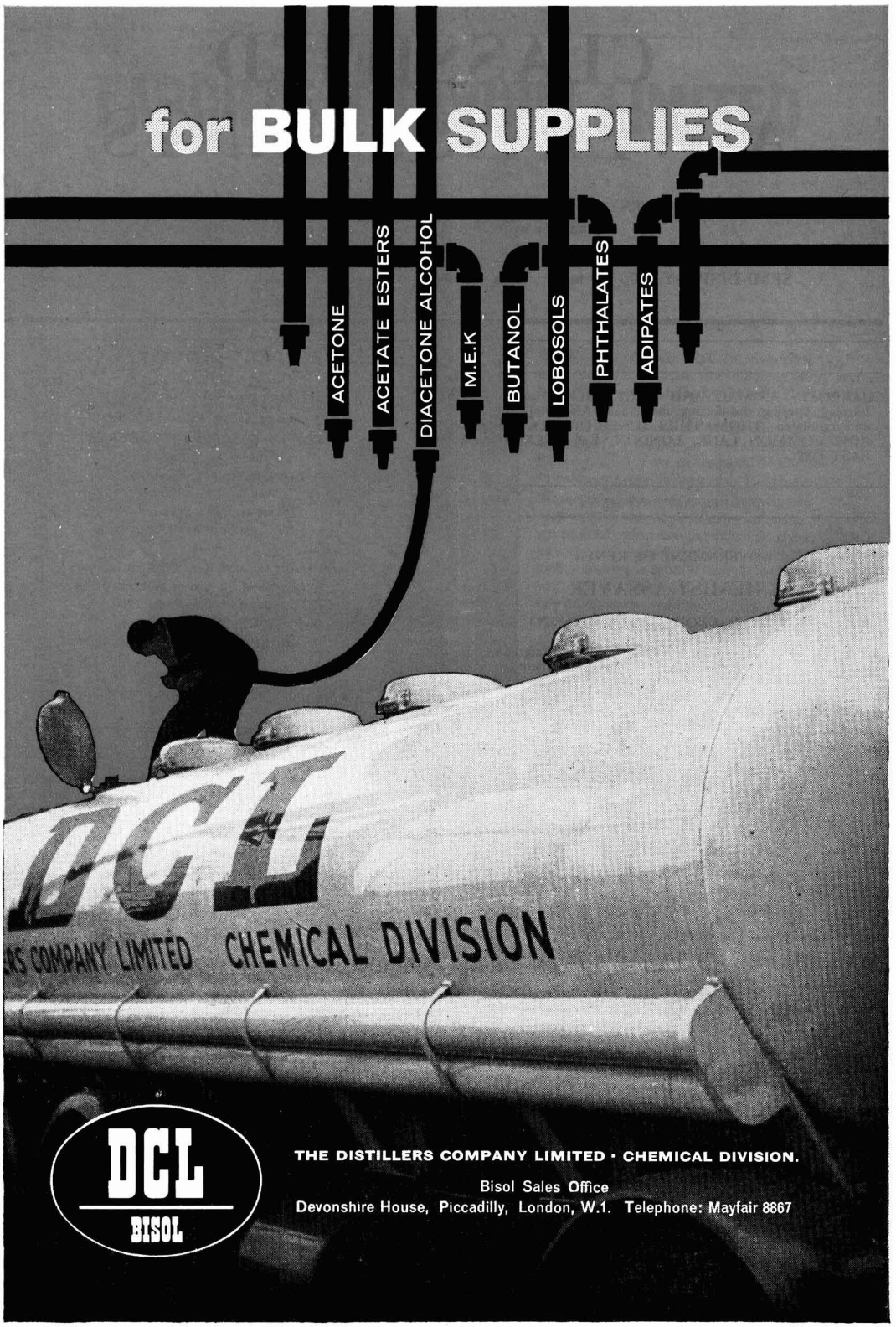
FRIDAY 14 OCTOBER

C.S. with R.I.C. & S.C.I.—Aberdeen: Robert Gordon's Technical College, 8 p.m. 'Structure of proteins', by Dr. M. F. Perutz.

S.C.I.—Plymouth: Technical College, 5.30 p.m. 'Radiochemistry', by A. B. Heslop.

S.C.I. with C.S. & R.I.C.—Aberdeen: Robert Gordon's Tech. Coll. 'Structure of proteins', by Dr. M. F. Perutz.

Soc. Inst. Tech.—Birmingham: Gosta Green Coll. of Tech., 6.30 p.m. 'Fundamentals of temperature measurement'.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PATENTS

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TECHNICAL MEETING

The Second International Synthetic Rubber Symposium and the first International Rubber Exhibition to be held in the U.K. since 1921 will be held at Church House, Westminster, on 11th, 12th and 13th October. Further information can be obtained from "Rubber and Plastics Age", Gaywood House, Great Peter Street, London, S.W.1.

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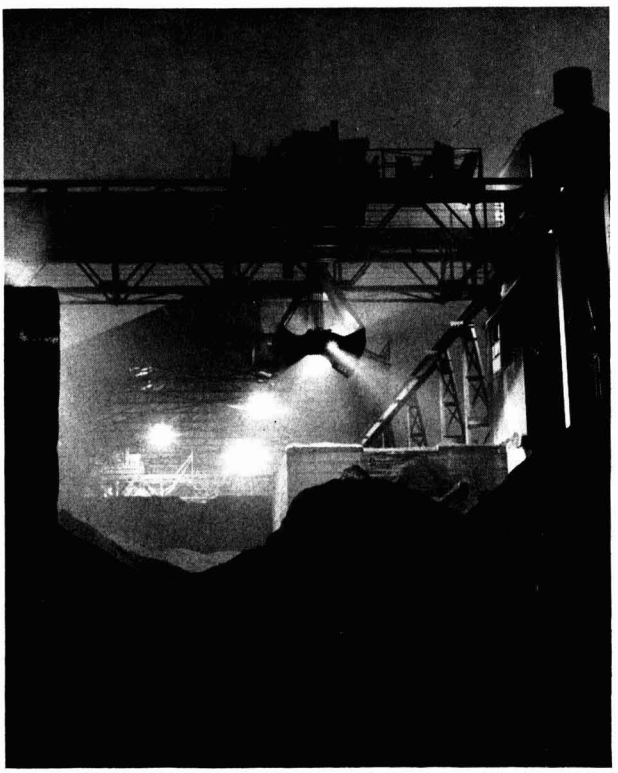

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