Chemical Age

incorporating

PETROCHEMICALS and POLYMERS

VOL. 85 No. 2189 24 JUNE 1961

INDEX TO ADVERTISERS

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

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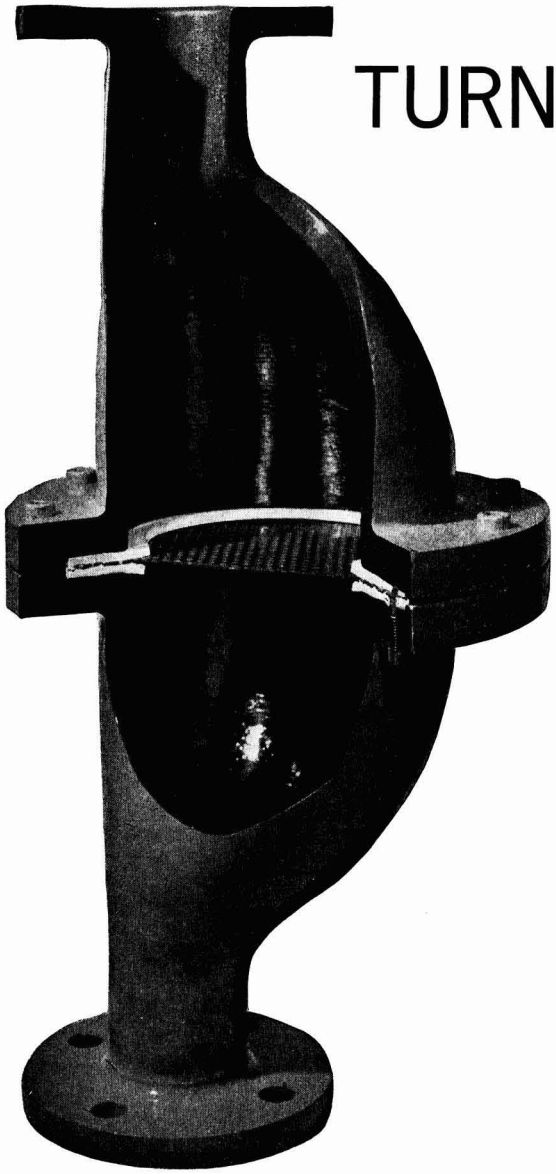
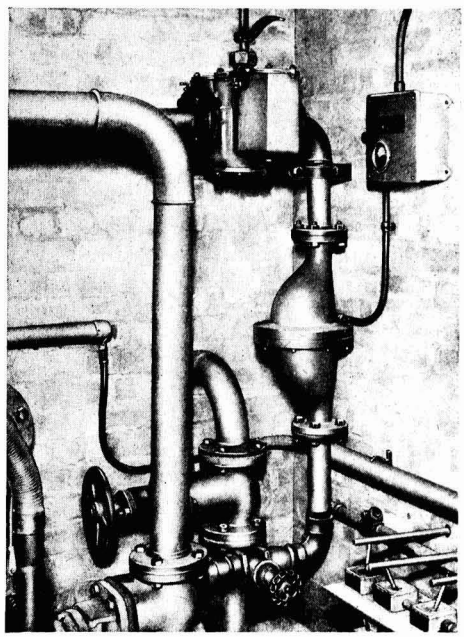


TURNING THE SCALE

The electrical water treatment pipe units, made by Aquastat Ltd and used to prevent scale, have their interior surfaces coated with Araldite. This epoxy coating resin is an excellent electrical insulator; it adheres strongly to the metal, is entirely impervious to water over very long periods, and is unaffected by chemicals found in all waters normally in use; it is also highly resistant to abrasion and scouring action. Aquastat Ltd have tested many forms of coating for their pipe units. Araldite, which has been used for the last five years, has proved the most effective and the most economical.



Araldite epoxy resins are used—

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- for producing glass fibre laminates
- for producing patterns, models, jigs and tools
- as fillers for sheet metal work
- as protective coatings for metal, wood and ceramic surfaces

May we welcome you to STAND No. CC 435 at the INTERNATIONAL PLASTICS EXHIBITION, Olympia, London.

Araldite *epoxy resins*

Araldite is a registered trade name

CIBA (A.R.L.) LIMITED

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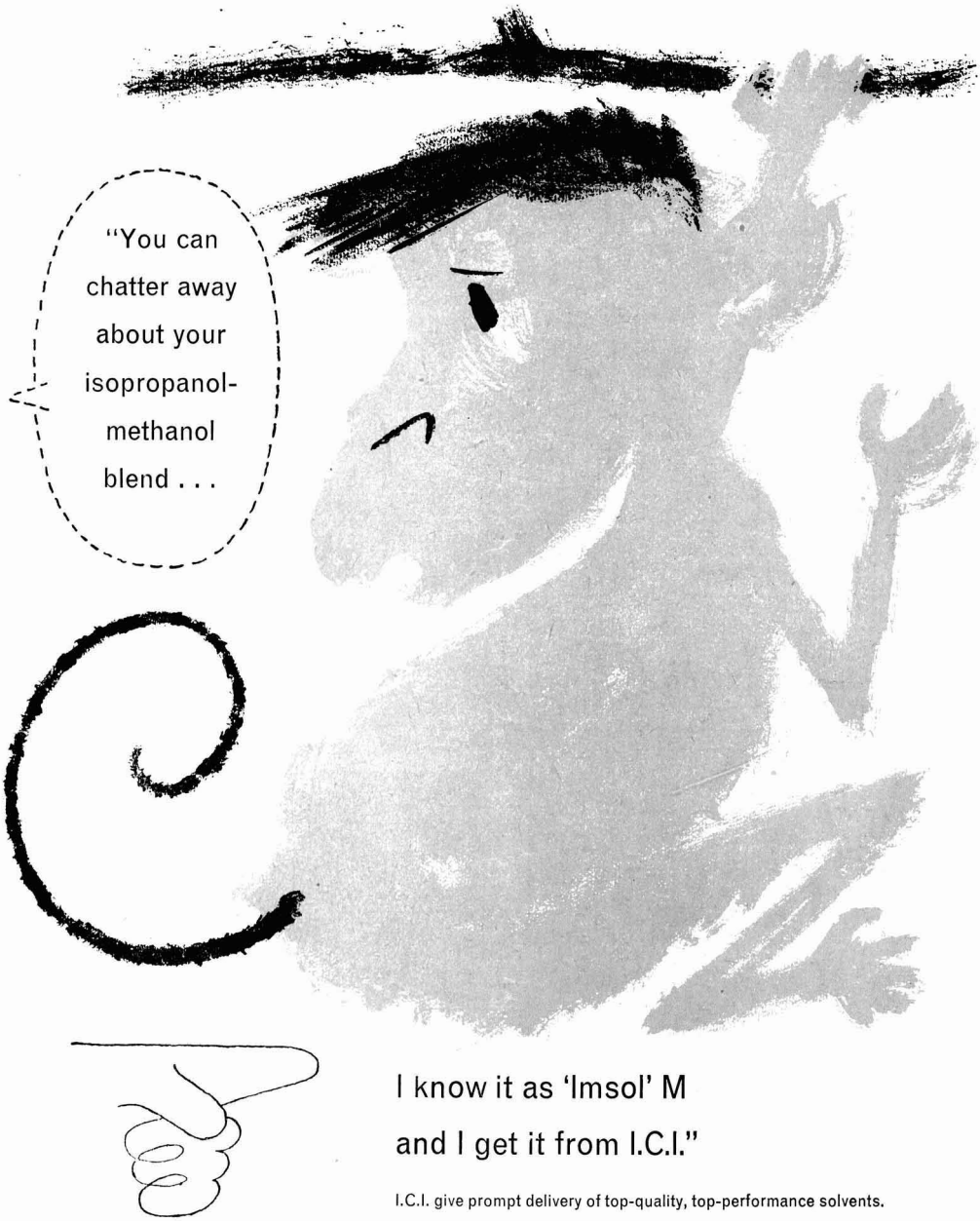

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and I get it from I.C.I."

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'IMSOL' M 'IMSOL' A ISOBUTANOL NORMAL BUTANOL
'AROMASOL' H 'AROMASOL' L ISOPROPANOL ACETONE

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get in touch with the
nearest I.C.I. Sales Office
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IMPERIAL CHEMICAL INDUSTRIES LIMITED, LONDON, S.W.1.

More Union Carbide* Morpholine

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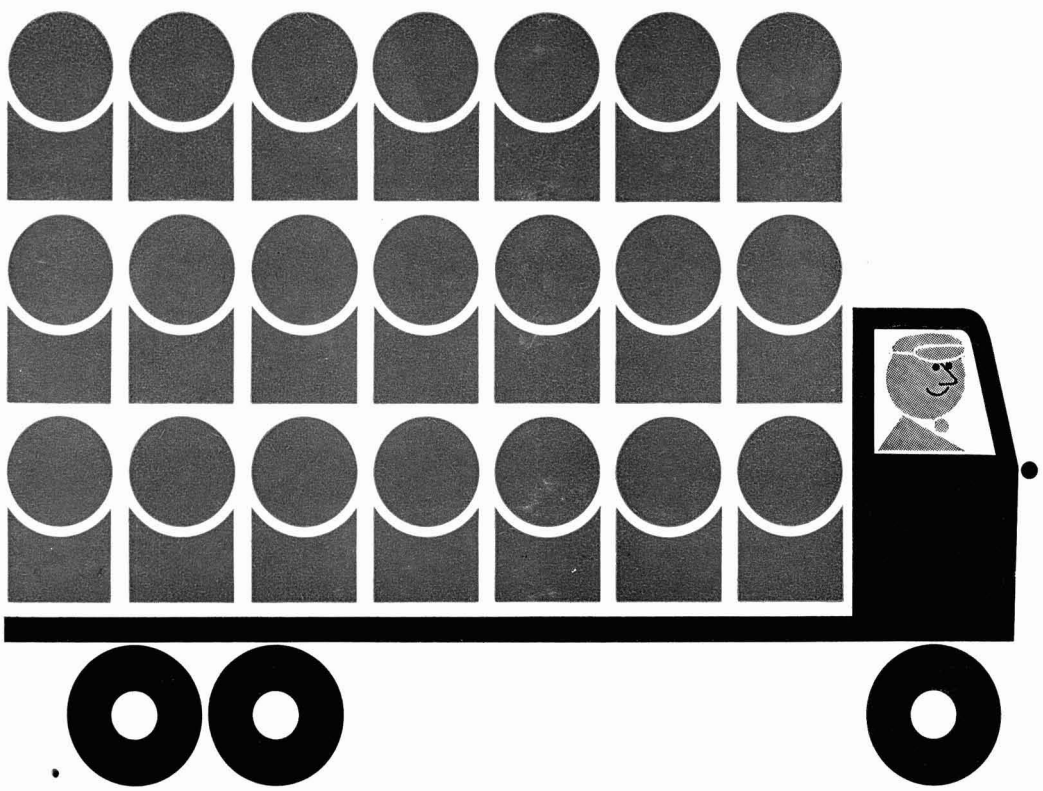
UNION CARBIDE



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IN THIS ISSUE

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PATTERNS OF PROGRESS

IN the past few years the British chemical industry has expanded in a number of different ways—by the introduction of new self-developed processes, by the purchase of 'know-how' from other companies, by the setting up of joint ventures, through diversification to secure raw materials or to take a company into end products and by the acquisition of other companies.

All these expansionist techniques have so complicated the world chemical scene that it is now extremely difficult to get a clear picture of the national chemical industries in different countries. If all these trends had been confined to the individual countries concerned it would not be so bad, but this has not been so. Know-how, joint ventures, diversifications and acquisitions have all stretched across frontiers so that total investment in any one country is today heavily loaded from outside sources.

An internationally sponsored survey into the growth ramifications of the world chemical industry would provide fascinating information but would be out-of-date long before it was printed so rapidly are developments taking place today. But the paper presented by Mr. F. Aftalion in New York recently (see p. 1031) performed a useful, if much more limited purpose. It draws attention to these large-scale growth patterns in the free-world's chemical industry and the dangers and advantages that accompany the various methods of expansion.

While there is a logical tendency for really large chemical companies to diversify into other and sometimes unrelated fields—fertiliser firms into drugs, intermediate producers into consumer products, electronics companies into drugs and heavy chemicals, etc.—Mr. Aftalion sees a danger in this approach. It is obvious that such moves will, if only temporarily, upset the balance of production and supply and disturb distribution and price trends. It is, however, unlikely that such moves will permanently upset the balance, because in the long run the law of supply and demand will operate.

The same is true of companies that diversify vertically, either to secure raw material supplies or to get into finished products. The advantages to a particular company of being able to integrate right throughout a process are great, but such moves are bound to disturb the established distribution pattern.

There is likely to be widespread agreement with Mr. Aftalion's views that internationally the best and most secure way to progress is through the purchase of know-how and joint ventures. Know-how purchase has opened the gate to new and lucrative pastures for many medium-sized firms unable to carry out the necessary research and development on their own behalf—although if carried to the extent now being practised in Japan the system would clearly involve a dangerous dependence. A healthy research programme is vital to any chemical company seeking long-term prosperity.

The joint-venture technique in which companies, usually from different countries, combine their skill in processing and marketing has been one of the greatest spurs to the European chemical industry. It has proved

(*Continued on page 1028*)

U.K. Drug Firms Must Earn Enough to Pay for Vital Research, Says Boots Chairman

ANY suggestion that great profits can be derived from supplying drugs to the National Health Service was wide of the mark, declared Mr. Willoughby R. Norman, in his first annual statement as chairman of Boots Pure Drug Co. Ltd. He pointed out that under the Board of Trade wholesale price index, pharmaceutical preparations rose 0.9% between 1954 and 1960, while over the same six years, all manufactured products rose fourteen times as much, by 13.1%. The great majority of countries spent a higher proportion of their national income on pharmaceutical services than did Britain.

In the coming year, total estimates of gross N.H.S. expenditure amounted to more than £800 million; but the cost of the pharmaceutical services accounted for only £96 million, or less than one-eighth of the total. Of that proportion, £23 million was paid in prescription charges, leaving the net cost to the Government as £73 miillion.

Unless British manufacturers could earn enough from drug manufacture to support complicated and expensive research, the industry would lose its place in world markets and have to import those vital products from overseas. New and improved drugs and compounds were the life-blood of the industry. Pharmaceutical manufacture in the U.S. was much more profitable than in the U.K. and in 1960 was able to support a research budget of £76 million. Spending in Britain was probably around £5.5 million and it was common knowledge that at least five of the biggest U.S. companies each spent more on research annually than all the British pharmaceutical firms put together.

Boots spending on research and development is now running at the rate of £750,000 a year and is rising. With present profit margins, the company could not hope to justify spending of that order solely from sales in the home market and so they were looking more and more to overseas outlets to increase production and help finance that cost. In the past year Boots had marketed a new anti-histamine drug, Febramine, which was particularly free from side-effects; two new saluretics, Aprinox and Abicol; and Furamide, an addition to the range for the treatment of amoebic dysentery.

British Investment in Belgian Chemicals

OF the $67 million foreign investments made in Belgium last year, a total of $9 million came from the U.K., compared with $11 million from Common Market countries and $46 million from U.S. companies.

British investments include the two joint subsidiaries set up by Glaxo Laboratories Ltd. and Fisons Fertilizers Ltd. with Union Chimique Belge; a joint fertiliser venture by British Glues and Chemicals Ltd. with another Belgian company; and a joint subsidiary formed between Foundry Services International and Soc. Generale des Minerais for the thermal processing of ores and metals.

New Balfour Workshops

Henry Balfour and Co. Ltd., Leven, Fife, are to build a £250,000 heavy fabrication shop as the second stage of the development programme launched a year ago by the opening of their £100,000 laboratory. The new building will be equipped with lifting capacity to 100 tons and will have glass curtain walling on three sides to give maximum daylight as well as facilities for extension as the necessity arises.

Swiss Trip for Geigy Employees

Photo shows a party of long-service employees of the Geigy Co. Ltd. and associate companies in the U.K. before leaving London Airport to spend a long weekend as guests of the parent company in Basle (see C.A., 10 June, p. 933)

New Virus Research Labs. for Pfizer

INVESTIGATION of Trachoma, a virus disease which causes blindness in Africa and Asia, is one of the important research projects to be undertaken in the Pfizer Group's new, specially designed building for research into virus diseases at Sandwich, Kent. The new building extensive laboratory and animal accommodation and is designed to preclude the possibility of infectious organisms escaping to the outside as well as preventing any contamination entering the building.

The unit consists of three sections; a group of laboratories and two groups of animal blocks of four wards each, all completely separate and designed so that movement of personnel and air between each is controlled. Each animal ward and laboratory has its own high intensity ultra-violet lock entrance. Sterile air is supplied to individual rooms and temperatures can be adjusted individually.

Obituary

Mr. F. E. Salt, manager of the process evaluation group in the central research department of the Distillers Co. Ltd., at Great Burgh, Epsom, Surrey, died suddenly on 19 June.

Patterns of Progress

(*Continued from page 1027*)

a great stimulus to firms in the Common Market and clearly will continue, probably on an accelerated scale if only because it helps to spread the burden of launching the large-scale enterprises that are essential in today's world of chemicals.

There is, however, one pattern of growth that is highly dangerous. This was referred to by Dr. H. Hoog of Royal Dutch/Shell at the recent Society of Chemical Industry meeting in The Hague (CHEMICAL AGE, 10 June, p. 929), when he spoke of the desires of some under-developed countries to set up massive petrochemical industries in areas where no chemical industry exists. Modern chemical operations based on oil as feedstock cannot be economically viable without an existing and thriving chemical industry. Such developments can bring no advantage to the country concerned and represent a threat to world chemical markets.

The latest country to seek its own petrochemical industry is the Sheikdom of Kuwait which has set up the Kuwait Petrochemical Co. to start production in 1963 of caustic, chlorine, ammonia, urea, p.v.c., acetylene, oxygen and hydrogen.

Project News

D.C.L. Acetic Acid Process Licensed to Japanese Firm

● THE process for manufacturing acetic acid by direct oxidation of light oil, developed by the **Distillers Company Ltd.**, and to be used by them in a new large-scale plant now under construction at Hull, has been licensed to **Dainippon Kasei Co.**, a subsidiary of Dainippon Celluloid Co., of Japan. Mr. T. Kamioka, managing director, and Mr. S. Mizobuchi, director of the Japanese company recently visited D.C.L. in the U.K.

The process directly converts readily available petroleum hydrocarbon feedstock to acetic acid, avoiding the isolation of acetylene or ethylene. Minor quantities of formic, propionic and succinic acids are obtained, but these can be eliminated to an extent which meets the strict specifications demanded both for industrial and edible needs. The process arose out of research programmes into the chemistry of the oxidation of hydrocarbons carried out at the D.C.L. Research and Development Department.

Quarrying being carried out by the Fullers' Earth Union Ltd. at Nutfield Priory, near Redhill. Mr. P. D. O'Brien, chairman of Laporte, this week reveals that this subsidiary has under construction substantial new activating plant employing a new process. It is due for completion next year

Permutit Polymer Plant Nears Completion

● THE new duplicate plant being set up by the **Permutit Co. Ltd.** in South Wales to produce the polymer emulsions of the U.B.S. Division of A. E. Staley Manufacturing Co., Decatur, Ill., is nearing completion and is due on stream this summer. The first plant went into production in the autumn of 1960.

Water Treatment Plant for Iran Drug Factory

● CONTRACT for water demineralisation plant for a factory manufacturing pharmaceutical products in Iran has been placed with **William Boby and Co.**, Rickmansworth, Herts., through **Allen and Hanbury's.**

Compounding Extension for W. J. Bush

● A NEW five-storey building to house the essence compounding department of **W. J. Bush and Co. Ltd.**, of the Albright and Wilson Group, is now under construction at their Hackney works.

Gas Cleaning Plant for Steel Furnaces

● GAS cleaning plant for the first two of the six new steel melting furnaces to be installed at the Templeborough Works of **Steel Peech and Tozer** (Branch of the United Steel Companies Ltd.) has been ordered from the Gas Cleaning Division of **W. C. Holmes and Co. Ltd.**, as a part of a £10 m. scheme for the replacement of all existing open hearth steel melting furnaces by six 110-ton oxygen lanced electric arc furnaces.

The gas cleaning installation for each of the two furnaces consists of a direct fume extraction system, an electric precipitator and a common water treatment plant. Completion of the first installation is scheduled for 1 October 1962 and the second for 1 February 1963.

Holland Orders £3,000 of U.K. Glassware

● ORDERED just before the Achema exhibition opened on 9 June and all delivered to Holland before the exhibition closed on 17 June—this was the story of £3,000 worth of standard glass chemical plant and pipeline ordered from Q.V.F. Ltd., Stoke-on-Trent, the order being booked by their agent in the Low Countries for distribution to a number of companies in Holland. This quick-delivery record makes a refreshing change from complaints of retarded delivery by British companies.

Q.V.F. Ltd., some 40% of whose output now goes to export, reported outstanding success at the Achema.

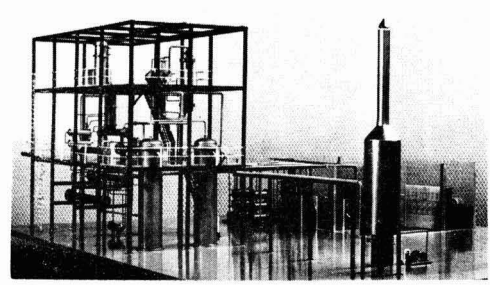
Hydrorefining Plant for Show in Moscow

● Illustrated is a model of a **Newton Chambers and Co. Ltd.** design for a hydrorefining plant, to be shown in Moscow next August at the French Trade Fair, on the stand of Speichim, chemical engineers with whom Newton Chambers have a reciprocal licence agreement. Newton Chambers have world rights for the manufacture of plant to operate a process of hydrorefining crude benzole, naphthas and other hydrocarbon oils resulting from research in which Newton Chambers co-operated with the Coal Tar Research Association.

B.P. Raise Capacities at Continental Refineries

● Two new plants at **B.P. Group** refineries in France and Germany have recently been commissioned. At the Dunkirk Refinery of B.P.'s French associates, Soc. Francaise des Petroles B.P., throughout capacity has been raised from 2,300,000 to 2,900,000 tons a year on mixed Middle East/Saharan crude oil. This expansion has been achieved by the adaptation of existing equipment.

In Germany at the Neuhof lubricants refinery near Hamburg of B.P.'s associate, Oelwerke Julius Schindler GmbH, a new Edeleanu dewaxing unit has been commissioned. This plant, which has a nominal capacity of 2,000 b.p.s.d., substantially increases Schindler's potential for producing high viscosity index lubricants.



Model of the hydrorefining plant

CLEARLY the next few years will be critical so far as the profitability of British chemical producers is concerned. Quite apart from rising costs and temporary difficulties in U.K. consumer industries, the big squeeze on profits will come from mounting competition from producers in Europe, the U.S. and Japan.

This will be particularly true of the newer heavy organic chemicals and plastics, products in which Britain has enjoyed a good export trade. Rising capacities throughout the world, giving big surpluses in many cases, will accelerate the price cutting process.

Vital factors in the coming struggle for markets were recently summarised by Mr. L. H. Williams, a deputy chairman of I.C.I. To keep the initiative, quality must be maintained and costs reduced. So more than ever before research will be the key to success; research to improve existing processes and research to find new, more economic, processes, as well as new products.

IT is a constant surprise to me to find readers who do not see CHEMICAL AGE until two, three, four or even more weeks after publication. This is because they work in firms or organisations where journals are circulated internally, often taking months to complete the full circuit. This system is all very well for the weightier monthly or quarterly technical reviews, but is quite inappropriate to a weekly *newspaper* like CHEMICAL AGE. It is like having *The Times* or *Financial Times* come through your letter box a fortnight late.

The staff of CHEMICAL AGE make every effort to ensure that each issue is packed with the latest news of technical, economic and commercial happenings in the chemical and allied industries. No executive who wants to keep abreast of his field can afford to miss this information, or see it too late. He should therefore oppose vigorously the archaic system which makes no discrimination between ordinary scientific and technical literature and vital urgent news, and should insist on having his own personal copy of the journal on his desk, in 'mint' condition, on the day it is published.

ICARUS and hydrogen peroxide seem strange bedfellows, but if this character of Greek mythology had 'lived' in this age of chemical technology he would have survived his legendary attempt to fly with the birds. Modern counterpart of Icarus, but no myth, Harold Graham of Bell Aerosystems last week donned his S.R.L.D. (small rocket lift device) and flew 380 ft. at a speed of about 20 m.p.h.

A twist of the throttle, a turn of a lever and Graham leapt from the ground, his own personal rocket belt strapped to his back. He hovered, flew over a 30 ft.-high hill and made a 3-point landing on two feet. His support was a twin-nozzle thrust of hydrogen peroxide which when forced into a gas generator, where it meets a catalyst, is decomposed into steam. Discharged through two nozzles directed toward the ground this provides the necessary thrust.

Bell, who have held a development contract for the U.S. Army Transportation Research Command since last summer, have been dabbling in man-rocket research since 1954. The current device is strictly a feasibility model and was aimed at proving the concept and not at attaining maximum performance. It seems that traffic-jammed readers who would like to emulate this space age Icarus have only to secure a supply of hydrogen peroxide—and I am sure Laporte Industries would be only too pleased to oblige.

WITH a direct air oxidation process that accounts for nearly 700 million lb./year or about one-third of the world's ethylene oxide capacity, Scientific Design Co., New York, will be coming up with new chemical processes in the next few months. S.D. also claim some two-thirds of the world's maleic anhydride—or 250 million lb./year.

Recently introduced new processes have been for adipic acid by air oxidation of cyclohexane; a combined Goodyear-S.D. route to isoprene from low-cost propylene; and the A.F.G.O. polythene process.

New technology on the way from this company includes phenol, cyclohexanone, cyclohexanol, caprolactam from cyclohexane, epichlorohydrin, new isomerisation and crystallisation techniques for the production of *o*-xylene, *p*-xylene and ethylbenzene from mixed xylenes, vinyl acetate and styrene.

STANDARD OIL of New Jersey have been having their troubles recently what with the break-up of Stanvac and more recently the winding-up of Stannic, the company they owned jointly with ANIC. On a somewhat different scale, Standard Oil N.J. have declared war on a South American newspaper *El Comercio*. A recent two-page spread taken in the competitive *Peruvian Times* is headed 'The Profits of Standard Oil Co. (New Jersey)'.

It seems that *El Comercio* attacked Standard Oil's 1960 profits ($588.5 million) without mentioning that this represented only 6% of world-wide investments now totalling more than $11,500 million, or that last year their investments totalled $720 million in plant and equipment and $200 million in the search for petroleum.

The same issue of the *Peruvian Times* carries an interesting advertisement on the development of the new protein (FP 605—Pronit) by Capri S.A., Madrid, in conjunction with Soc. Pronit S.A., Lisbon. Comergeral Peruana, their Lima agents, allege that Peruvian fishmeal interests, as well as some European companies, have stated that the new protein did not exist and that it represented an attempt to keep down prices of fishmeal. But big claims are made for the new protein and tests are to be made in Peru to substantiate these. On completion of these experiments, attempts will be made to reach agreement with producers of animal proteins throughout the world before placing FP 605 on the market.

I HEAR from Richard Klinger Ltd. of their development of a very fine monofilament of p.t.f.e. of only 0.007 in. diameter which can be woven or knitted into a mesh. Until recently the smallest diameter rod of p.t.f.e. generally available measured about 0.050 in.

This new development in plastics means that p.t.f.e.—one of the most chemically resistant materials known to man and unaffected by temperatures from absolute zero to 300°C—can be used to replace metal in filters, demisters, separators and similar items of equipment.

Several companies likely to be interested in p.t.f.e. filament have been asked for their opinions of this newly developed material. As a result there is already a heavy demand for it although Klinger's have yet to go into full production.

ATOMIC war has been waged on death-watch beetles in the Entomology Section of the Forest Products Research Laboratory, D.S.I.R. According to 'Forest Products Research 1960' (H.M.S.O. 5s) blocks of oak sapwood containing active larvae were given dosages of gamma radiation varying from 4,000 to 8,000 roentgens.

It was reported that the stronger dosages (6,000 roentgens upwards) appeared to be fatal as no beetles emerged from the treated blocks. (Would any beetle with any sense?)

Some beetles survived the 4,000 roentgen treatment and subsequently emerged and laid eggs, but only a few of the eggs hatched. What happened to these newborn beetles is not reported—presumably they 'beetled off' as fast as they could.

Alembic

Growth by Integration Upsets Pattern of Chemical Markets, Says Aftalion

Joint Ventures are 'Best Bet'

THE part played by the purchase of know-how, joint ventures, and vertical and horizontal integration, in the growth of the world's chemical industry and its concentration in larger units, were the subject of a paper given recently by Mr. F. Aftalion, general manager, Soc. Française d'Organo-Synthèse, Paris, at a meeting of the American Section, the Société de Chimie Industrielle. Mr. Aftalion's paper was entitled 'Problems of dimension and growth in the chemical industry.'

Mr. Aftalion thought there were dangers in expansion by diversifying either horizontally or vertically and that the best future lay in the further development of co-operation and joint ventures.

The possibility of buying know-how and even complete package plants from independent engineering companies gave medium-sized chemical firms the chance of starting production of such important chemicals as ethylene oxide, phthalic or maleic anhydride, p.v.c. and polythene, without having to maintain highly developed research and engineering departments. An alternative was the setting up of ventures with companies owning processes and patents. A great many of Europe's post-war chemical developments have in fact been based on this combination of know-how purchases and joint ventures.

Joint Participation

Joint participation has enabled the respective associates to benefit from one another's experience. For example, petrochemicals growth has been due in most cases to oil companies like Shell and B.P. joining forces with chemical companies such as Saint Gobain, Distillers, Bayer and B.A.S.F. Certain new developments which otherwise would have been too heavy for a single company, have been undertaken co-operatively, as is the case for the synthetic rubber plants recently erected in France (Socabu, Elastomères de Synthèse) and in Germany (Huls, B.A.S.F., Hoechst and Bayer at Marl).

This procedure enables medium-sized companies to take part in several new projects while spreading the risks involved. Thus Progil are associated in France with Ugine in a big cumene-phenol project under Distillers and Hercules licence; with Bayer and Ugine in the new isocyanate unit now being built near Grenoble; and with Oronite, through Orogil, for the manufacture of alkylphenols.

Most of the recently formed companies in the French plastics industry have this type of structure. For p.v.c. there is Solvic (Solvay-I.C.I.); for polystyrene, Monsanto-Boussois and Plastichimie (Dow-Pechiney); for polythene, Ethylene Plastiques, Soc. Normandie de Polyethylene, Naphtachimie, Petroplastique (Ste El Paso Natural Gas—C.F.R.).

The very existence of the joint-venture system, only possible under flexible anti-trust legislation, makes it very difficult to analyse the structure of the chemical industry in France and other European countries. But it offers foreign companies a ready means of getting into business locally with partners who can better solve common administrative difficulties and who have a thorough knowledge of the national market.

Situation in U.S.

This technique has not been widely favoured in the U.S., being used only when necessary for technical or other specific reasons. Instances quoted were Dow-Badische (Reppe chemistry), Mobay, a link between Monsanto and Bayer (polyurethane and polycarbonate resins), Fiber Industries (I.C.I.-Celanese of America) for polyester fibres, and I.C.I.-Cyanamid for methylmethacrylate.

Other cases were exceptional, as that of Jefferson and Petro-Tex, while the Chemstrand joint venture had ended by Monsanto purchasing the 50% participation of American Viscose. Often proposed associations would be opposed by the Department of Justice, as witnessed recently by Penn-Olin in the field of chlorates.

Another path to growth lay through vertical integration backward and forward, or by horizontal integration, through diversification in new fields of activity or through purchases of competitive companies. This trend could be limited by anti-trust laws or by decartellisation. The existence of Hercules Powder and Atlas Powder was due to the breaking down before World War I of the Du Pont explosives monopoly. After the more recent war, decartellisation broke up I.G. Farben and the Japanese Zaibatsu (Mitsui, Mitsubishi and Sumitomo). Today, however, such decentralisation moves are exceptional, many of the modern chemical giants—Hercules, I.C.I., Olin, and F.M.C.—being the result of a policy of mergers and acquisitions.

Vertical Integration. Many oil companies, particularly in the U.S., are getting deeper into chemicals and competing with existing producers of plastics and organic intermediates instead of offering hydrocarbon raw materials such as ethylene, propylene, benzene, toluene and xylene. In turn, some big chemical firms, threatened by such inroads or unwilling to tie themselves to a single supplier, have secured sources of raw materials which they could have gone on buying from oil companies under long-term contracts. Thus, Monsanto purchased Lion Oil, Grace have linked with Cosden and I.C.I. at Wilton and Montecatini at Ferrara, and others, have their own cracking units.

In finer chemicals, suppliers of pharmaceutical intermediates have moved into ethicals, thus forcing their customers, the pharmaceutical laboratories, into the synthesis of elaborate chemicals in bulk. In another field, some producers of plastics raw materials are trying to secure an outlet for their products by purchasing plastics fabricators—Distillers' bid for British Xylonite, or Reichhold's acquisition of Alsynite, are examples.

Synthetic Fibres

In synthetic fibres, Allied Chemical and B.A.S.F. still restrict themselves to selling polyamides to filament producers; others like Du Pont, Monsanto through Chemstrand, Bayer, and Rhone-Poulenc through Rhodiaceta, have long offered yarn and filament to the textile trade. Some chemical producers go much further, reaching the final consumer, as exemplified by Carbide offering glycol in carloads and glycol anti-freeze in cans, by Du Pont selling pigments, vehicles and paints and more recently by Dow who have set up a consumer department to market their polymeric films. On the other hand, the large publicity budgets required have led chemical firms away from the consumer field and Monsanto a few years ago sold their packaged detergent operations to Lever Brothers.

Many inroads by chemical suppliers into their customers' fields of interest are aided by their technical service laboratories, particularly when expected sales volumes are not attained.

Frequently, the problems of how far to integrate vertically is a difficult one for management to solve. For instance, should a basic producer of ethylene oxide, of acrylic monomers or of cresol, confine himself to the sale of those chemicals to manufacturers of derivatives? Or instead should they make them in competition with established producers

Even in custom chemicals, important producers, like Koppers and Cyanamid, have been moving in offering to work on a custom basis, an activity that is

very different from their normal large-scale operations.

Horizontal Integration. The prosperous years from the end of the war until recently have tempted many chemical managements into using their profits for diversification in other fields. In France, Saint-Gobain, specialists in glass and inorganics, Pechiney and Ugine, skilled in aluminium, have launched big pro-programmes for organics. The high returns of the pharmaceutical world have tempted Olin Mathieson (Squibb), Dow (Allied Labs.), Atlas (Stuart Co.) and even Colgate (Lakeside). In the U.K., Fisons, previously concerned with fertilisers, are trying to get deep into pharmaceuticals; while in the same country, Courtaulds, basically textile producers, have through Celanese taken an active interest in chemicals.

The Dutch Philips electronics group, are diversifying in many European countries and making vitamins and pharmaceuticals, either alone or through subsidiaries or joint ventures (in France with Quinoleine and Clin-Byla).

Mr. Aftalion asked whether one management could usefully apply its skills in fields so widely different as textiles, chemicals, soaps, electronics, explotives, etc. It was not certain that the absorption of a pharmaceutical laboratory was a wise move for companies who by tradition were exclusively concerned with bulk chemicals.

He thought that while lower tariffs and greater measure of free trade would make small and inefficient companies extremely vulnerable, the method of speedy growth through vertical or horizontal integration could well have adverse effects on the chemical industry as a whole.

In trying to secure their own raw materials or in their search for ready and profitable outlets for their existing products, many companies were dangerously altering the pattern of normal relations between customers and suppliers. In addition, the entry through diversification in fields of firms which had no tradition very often went against the very aim of greater efficiency which initiated the move to diversify.

Mr. Aftalion declared "If we want to avoid the degeneration of freedom into anarchy or State intervention, and that increased competition becomes synonymous of ever decreasing profits, it might be desirable—in the limits tolerated by our respective laws—to establish a greater degree of self-discipline and of co-operation between chemical firms of different sizes and nationalities."

The method of joint-ventures adopted, particularly in France, for new chemical developments offered a good way of promoting a closer co-operation between partners in the chemical industry and it was to be hoped that many U.S. firms would find it attractive for future growth in Europe or elsewhere.

B.D.H. Shareholders Seek Meeting After News of Proposed U.S. Link

A GROUP of shareholders of British Drug Houses Ltd. is canvassing support for an extraordinary meeting to discuss the board's current negotiations with a U.S. group. Aim of the protest is to consider any recent offers that might have been made for B.D.H. shares and to seek news of the oral contraceptive, about which the board have expressed high hopes, and which was the grounds for the rejection of the bid by Fisons. Two months ago, B.D.H. maintained their dividend on reduced profits.

A closer tie-up with Mead Johnson and Co. of Evansville, Indiana—one of the leading pharmaceutical manufacturers in the U.S.—is sought by British Drug Houses Ltd., who are currently engaged in discussions with the American firm "with the object of extending and making closer the relationships which have existed between the two firms since 1957, covering collaboration in the field of research and the cross-licensing of each other's products".

These discussions may lead to Mead Johnson taking a financial interest, which could include a minority equity holding, in B.D.H., but according to B.D.H. "there is no intention on either side that any such financial interest should involve the making of a take-over bid for B.D.H. or affect its continued independent existence".

It will be recalled that last year B.D.H. rejected a share and cash offer from Fisons, while towards the end of the year B.D.H. reached the preliminary stages of exploring the possibility of a merger with another company, but this did not develop any further (C.A., 29 October 1960, p. 709).

B.D.H. are at present engaged in a comprehensive development programme at Poole, and have also formed a new subsidiary company in the Republic of Ireland, B.D.H. (Ireland) Ltd., where a factory is being built.

Slow Acceptance of Electrodialysis

ELECTRODIALYSIS has been a disappointment to date, in relation to the money spent during the last few years, declared Mr. R. T. Pemberton, chairman and managing director of the Permutit Co. Ltd. in his annual statement.

He added, "As well as our own considerable contribution to this development, we have co-operated with the leaders in this field in the U.S., Europe, South Africa and in other parts of the world and shall continue to do so".

Acceptance of the process, however, had been slower than they would have wished and immediate prospects of a wide development for the technique had not come up to expectations.

In Parliament

Lords Debate Use of Chemicals in Food

Arguments for and against further measures to protect consumers against the contamination of foodstuffs by chemicals were heard in the House of Lords when Lord Douglas of Barloch painted what another peer described as an extremely gloomy and frightening picture of the situation. Lord Douglas claimed that many more chemicals had been brought into use without adequate knowledge of their effects, and that chemicals previously thought harmless had proved to be dangerous. He urged that the use of synthetic chemicals be banned completely with the possible exception of some substances that after long use seemed to be beyond suspicion. Also, all foods should be labelled to show the additives included.

Both Lord Amherst of Hackney and Lord Hastings pointed out that Lord Douglas's picture of the situation was unduly pessimistic; the health of the people had improved enormously since the war, pointing to a far higher nutritional standard. Lord Hastings said it should be remembered, when talking of the use of preservatives and synthetic additives, that the human body had excellent mechanisms for disposing of substances for which it could find no use.

Continental Fertiliser Prices

During discussion on the Draft Fertiliser (U.K.) Scheme, 1961, which was approved, Earl Waldegrave, Parliamentary Secretary, Ministry of Agriculture, told the House of Lords on Monday that the low price sometimes quoted for some Continental fertilisers should be treated with reserve. These prices were often quoted only for export sales and were considerably lower than the domestic selling price; in many cases they did not represent the cost of production.

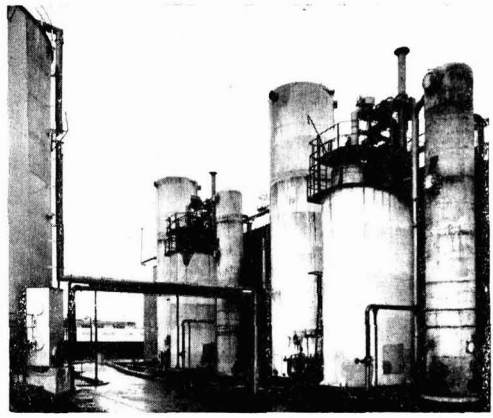
Protein Extract from Green Fodder

PREPARATION on a pilot plant scale of protein extract from green fodder was inspected by some 80 members and guests of the London Section, Royal Institute of Chemistry, when they recently visited the Rothamsted Experimental Station at Harpenden. Members also visited the various laboratories and experimental plots.

Recent visits have also been made by the London Section to the Radio Chemical Centre, Amersham, where in the new organic laboratories, members saw the wide range of compounds containing carbon-14 and tritium, and to the Mill Hill laboratories of the National Institute for Medical Research. Here accounts were heard of advances in the chemotherapy of malaria and the isolation and action of 'queen bee' substance; demonstrations were given of automatic counter-current distribution techniques, ion exchange chromatography of amino acids, and extension of gas chromatography in the study of fatty acid biosynthesis.

TONNAGE OXYGEN FOR LURGI GASIFIERS

Novel Features of S.G.B.'s Oxygen Plants at Westfield



The two tonnage oxygen plants at Westfield. In each plant can be seen the air separation unit (left), regenerator (centre) and direct cooler (right)

BEGINNING of a new era in town's gas production in the U.K. is seen in the Scottish Gas Board's Lurgi plant for oxygen-steam gasification of coal at Westfield, Fife, of which a general description was given in CHEMICAL AGE, 3 June, p. 893. The plant is due to be officially opened by the Queen on 27 June. Unique features of the Westfield operation include the two tonnage oxygen plants, each with an equivalent capacity of 100 tons/day of pure oxygen (actual output 233,000 cu. ft./hr. of 95% pure oxygen). These were designed, built and installed by The British Oxygen Co. Ltd. for Humphreys and Glasgow Ltd. (the main contractors) to the order of the Scottish Gas Board.

Design of the oxygen plants is geared to two essential requirements:

(1) Constant and reliable output to meet the Gas Board's obvious duty to maintain an unbroken supply of town's gas.

(2) Flexibility of output to meet differing town's gas demand, as between winter and summer.

A stand-by tank of liquid oxygen ensures continuity of supply, regardless of plant breakdowns unless these are of a most exceptional nature, while flexibility is ensured by having two plants and by being able to reduce output to about 70% of normal.

By J. A. LOW, M.Sc., A.M.I. Chem. E.

(The British Oxygen Co. Ltd.)

The role of oxygen in the Lurgi process is simple, but vital. If coal is reacted with steam at sufficiently high temperature it can be completely converted to gas, apart from the residual ash. However, the process requires heat to be supplied continuously—and here lies the importance of oxygen. When part of the coal is burnt in oxygen, the necessary heat is provided without dilution with nitrogen, which would be introduced if air were used.

Oxygen is obtained from atmospheric air in a production process which consists basically of cooling the air, liquefying it, and distilling the liquid air to separate the oxygen and nitrogen. Air is first filtered to remove dust, then compressed in a turbo compressor to about 75 p.s.i.g. The heat of compression is removed by cooling the compressed air directly with water.

The cooled air is divided into two streams, the smaller of which is further compressed to about 2,000 p.s.i.g. and purified from moisture and carbon dioxide. The larger stream is cooled nearly to liquefaction in either one of a pair of special-type exchangers (regenerators) packed with stones, which are periodically cooled by outgoing nitrogen. As this cooling takes place, moisture and carbon dioxide are frozen out on the packing and revolatilised when outgoing product nitrogen returns through the regenerator.

The high pressure air stream is also cooled in a separate system of heat exchangers, partly by the outgoing oxygen which has been pumped from the distillation column as liquid and is thereby vaporised under pressure and warmed to atmospheric temperature, and partly by some of the nitrogen which is similarly warmed up. A portion of the high pressure air is withdrawn at about −20°C and expanded through an expansion engine to the same pressure as the remaining low pressure air (i.e. about 72 p.s.i.g.). The remainder is cooled almost to dew point and expanded through a valve to the same pressure. About 30% of the total air is produced as liquid.

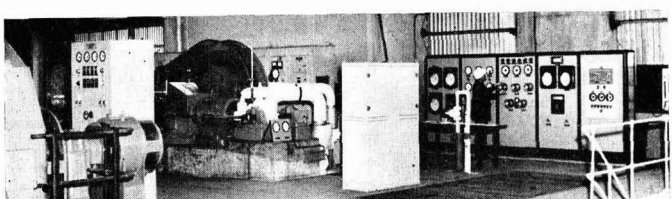
The combined air streams (liquid and vapour) enter the distillation column which consists of two columns, one above the other, connected by a condenser. In the lower part of this column an oxygen-rich liquid collects at the base. The liquid stream is passed through a filter-silica gel purifier system to remove residual impurities as well as traces of acetylene; it then passes through a subcooler before entering the upper column as feed.

The lower column operates at pressure of about 70 p.s.i.g. and carries a condenser. In this, nitrogen at lower column pressure is condensed by liquid oxygen boiling in the sump of the upper column. The liquid nitrogen serves as reflux for the top of both columns, that for the upper column being passed through the subcooler before expansion into the upper column.

The nitrogen fraction is withdrawn from the top of the upper column and is passed through the subcoolers before leaving the air separation plant through the regenerators and heat exchanger system.

The liquid oxygen is delivered under pressure by a pump to the heat exchanger in which, through cooling by high pressure air, it is evaporated under pressure (425 p.s.i.g.) and warmed to atmospheric temperature. The nitrogen is also warmed up as it leaves the plant, partly by cooling some of the high pressure air and partly by cooling the packing in one or other of the regenerators, which serve to cool the bulk of the incoming low pressure air. The compressed gaseous oxygen passes, together with steam, to the Lurgi gasifiers in which the primary gasification occurs.

Since oxygen boils at approximately −183°C and nitrogen at about −194°C, considerable problems have had to be



Inside the oxygen plant building: air compressors, expansion engine and instrument and control panel

C

overcome in the design, fabrication and maintenance of tonnage plant equipment, such as heat exchangers and distillation columns to withstand the low temperatures involved and the stresses which occur during cooling. The whole plant, apart from the compressors and their motors and starters and the control valves and instruments, is designed for outdoor erection. The cold parts are constructed in package units for ease in field erection and are contained in well-insulated shells, or 'cold boxes'.

A special feature of the Westfield tonnage plants is that the gaseous oxygen is produced directly at the pressure required for the Lurgi gasifier (425 p.s.i.g.). The plants are also designed to produce up to 10% of their rated output as liquid oxygen, which is stored in a 550-ton capacity insulated tank as a readily available reserve to cover peak periods or periods of down time for maintenance and other purposes, since it can be vaporised under pressure in suitable steam-heated heat exchangers.

The by-product nitrogen is used partly for purging other parts of the gasification plant, and partly for diluting the final town's gas to give the correct calorific value and density.

Activated Sludge Plant Developments Discussed at Sewage Conference

PROGRESS in the development of activated sludge plants for sewage purification operations is reported at the Diamond Jubilee Conference of the Institute of Sewage Purification (Brighton, 20-23 June) by A. L. Downing, A. G. Boon and R. W. Bayley of the Water Pollution Laboratory. Dealing first with the performance of aeration systems, the authors observe that most of the aerators used in activated sludge plants have aeration efficiencies under typical operating conditions at sewage works of 1,000-2,000 g./kwh. While higher values have been reported from some new types of brush and aeration cones there seems little prospect of achieving efficiencies much greater than about 3,500 g./kwh. with any existing process.

The providing of plants with oxygenation capacities at rates up to 10 or 20 times those common in Britain seems to present no difficulty, but it is not yet possible to assess how far detention periods might be reduced without adversely affecting effluent quality. From preliminary work at sewage works it is concluded that nitrification of ammonia does not take place until the concentration of dissolved oxygen in the mixed liquor exceeds values of the order of 0.5-0.7 p.p.m. Thereafter the conversion rate is approximately constant at, where dissolved oxygen concentration is above the critical level, about 0.5 p.p.m./hr. per 1,000 p.p.m. activated sludge in the mixed liquor.

Rates of removal of five-day B.O.D. from the liquid phase, during aeration of mixed liquor, were initially very high but decreased rapidly, and after about half an hour were equal only to about 1-3% of the initial B.O.D. in the sewage per hour. Rates of consumption of dissolved oxygen in the mixed liquor appeared to be substantially independent of the concentration of dissolved oxygen down to about 0.5 p.p.m. and were of a similar order at each works, the total range being from 33 to 67 p.p.m./hr.

These preliminary studies have shown that much more work will be required to determine quantitatively the effects of the many factors which influence the performance of activated-sludge plants and to assess the scope for further development of the process.

The conference also included delivery of the 6th J.B. Croll Memorial Lecture by Prof. F. H. Garner, O.B.E. (University of Birmingham) on 'The chemical engineer and purification of polluted water'.

In his presidential address, Mr. M. Lovett, O.B.E. (Chief Inspector, Yorkshire Ouse River Board) submitted that the Institute's interests would, in the future, be vitally concerned in the concept of water conservation by reclamation of used water. Such reclamation called for pollution control, and for efficient treatment of sewage and trade effluents, which in turn demanded skilled design, construction and management of treatment plants.

Scientific Research in British Universities

Latest edition of 'Scientific Research in British Universities'—that for 1960-61—is now available from H.M. Stationery Office, price £1 12s 6d net. Published by the Department of Scientific and Industrial Research, this is the only publication of its kind in the U.K.

It provides brief notes on scientific research in British universities, university colleges and associated institutions. Nature of the projects is described in sufficient detail to indicate the scope of the research done by the various science departments and individual teams of investigators.

U.S. Chemical Guide to Canada and S. America

A new guide to the chemical industry of Canada and Latin America—entitled 'Chem-Petro Guide'—has been published by Noyes Development Corporation, 38 East 57th Street, New York 22, price $12 post paid. The book describes the 500 leading chemical and petroleum firms in the two areas, indicates the names and addresses of associated companies and shows the various subsidiaries of U.S. and European companies. Product ranges of the companies listed are included.

Dow Insecticide Checks Fly-spread Disease in Dairy Cows

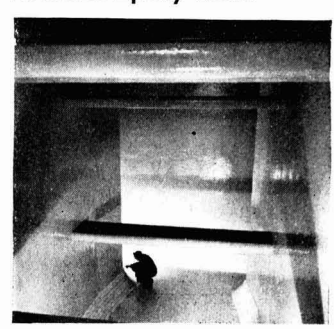
NANKOR, new insecticide made by Dow Agrochemicals Ltd., King's Lynn, Norfolk, has been found to give control of flies and other insect parasites that plague dairy animals. Dr. W. E. Ripper, managing director, states that extensive tests have shown that when Nankor is applied to milking cows by means of a back rubber, no residue is discovered nor is there any trace of taint in milk or fat.

As a result, the Ministry of Agriculture has approved Dow's recommendations for the use of the product by dairy farmers—the first time in the world that after thorough scientific research a residual wide spectrum insecticide has obtained such official approval.

Nankor, introduced into Britain late last summer, is an organo-phosphorus compound, the formulation being 0, 0 dimethyl O-2, 4,5-trichlorophenyl phosphorothioate. This is chemically identical with Etrolene, Dow's systematic warble fly drug.

Tests were carried out over a four-week period on four groups of cows. Two independent methods of analysis were used. One was developed in the U.K., by Mr. D. J. Webley at the laboratory of the Government Chemist; the other was adopted from a U.S. method by Professor A. N. Worden at the Nutritional Research Unit, Huntingdon. Both Mr. Webley and Professor Worden found the same result—a nil residue in both the milk and fatty tissues of newly slaughtered animals. There was also no taint in the milk.

Soak-tank Coated with Araldite Epoxy Resin



This large ground-wood soak tank at the Reed Paper Group works, Aylesford, Kent, has been given a protective coating based on Araldite epoxy resins. The original method of fixing the tank lining, which consisted of white tiles, did not stand up to the constant flow of wood pulp. To keep dust and particles of rust or cement out of the process, a smooth and hard-wearing coating was needed that required little maintenance and which would prevent pulp particles from adhering to the walls and decaying. The Araldite-based coating was applied by E. E. Cheeseman and Son Ltd.

Alkali Inspector's Report

Mist Emission from Acid Plants May Have to be Dealt With at Design Stage

TWO pointers to future policy so far as regulating emission of sulphuric acid mist in waste gases is concerned are contained in the 97th annual report of the Chief Inspector of Alkali, &c. Works, 1960 (H.M.S.O., 4s).

The Chief Inspector for England and Wales, Dr. J. S. Carter, C.B.E., states that if production is via the anhydrite route, mist formation seems almost inevitable and "we shall ask that means be taken to deal with it at the design stage. If production is to be via brimstone, there may or may not be a mist problem and we shall ask that space be left for the intercalation of mist arrestment plant should such be found to be necessary".

A new note for the annual report is that some of the older processes are the subject of historical and technical reviews. This year, alkali, cement and tar are treated in this way; there is also a review of alkali waste tips. Next year, phosphatic fertilisers and chlorine works will be reviewed more fully.

In the 1960 listed infractions were confined to pre-1958 processes and were: alkali 1, sulphuric acid (chamber) 1 and (contact) 8, chemical manure 1, nitric acid 1, muriatic acid 1, hydrofluoric acid 1. In all cases remedies were applied and there was no need to institute proceedings.

Mist Composition

The acid mists complained of seem to consist of nuclei of sulphur trioxide with an envelope of molecules of water vapour around them. This mist is almost unaffected by passage through standard absorption plant irrigated with liquids in which sulphuric acid is readily soluble. The phenomenon is largely a post-war one and is made more apparent by the greatly increased scale of acid production units.

It is pointed out that modifications which decrease mist formation at one works may have the opposite effect at another. Electrical precipitation is one answer, but an expensive one. The report adds 'The mist problem is one which must receive our attention for some years to come.'

The number of chamber and tower process works registered has fallen over the year from 36 to 30, and the number of individual plants is 46. Production was 349,000 tons (318,000 tons in 1958). Number of contact process works registered rose from 41 to 43 and at the end of 1960 there were 73 individual plants, some being commissioned during the year, with a further five units under construction.

The make of acid in England and Wales, calculated as monohydrate, was 2,475,000 tons in 1960, compared with 2,213,000 tons in 1959 and 821,000 in 1938. Trade uses in 1960, in tons of monohydrate, were:

	Tons
Bromine from seawater	23,000
Dyestuffs & intermediates	86,000
Hydrochloric acid	52,000
Hydrofluoric acid	15,000
Oil refining & petroleum products	68,000
Rayon & transparent paper	267,000
Sulphate of ammonia	276,000
Superphosphate & other phosphatic fertilisers	474,000
Tar & benzole	23,000
Titanium oxide	468,000

In raw material consumption, usage of anhydrite rose from 100,000 tons of monohydrate in 1946 to 475,000 tons in 1960; spent oxide from 233,000 tons to 318,000 tons; recovered sulphur from 3,000 tons to 123,000 tons, and hydrogen sulphide from 7,000 tons to 19,000 tons.

Alkali Works. There are now 11 works registered for the 'saltcake' process, two of which have not operated. In the great days of the Leblanc route, about 1880, there were more than 100 works processing some 650,000 tons of salt a year. New techniques for the production of soda and hydrochloric acid have seen a fall in the consumption of salt. Salt consumption was: 1929, 83,000 tons; 1938, 52,900 tons; 1946, 60,000 tons; 1958, 56,200 tons; 1959, 53,300 tons; 1960, 57,000 tons.

In the heyday of the 'wet copper' process, 400,000 to 450,000 tons of burned pyrites were processed each year to give some 15,000 tons of copper, 2,000 oz. of gold, and 300,000 oz. of silver. The process was last operated in 1946.

Nitric Acid Emissions

Nitric Acid. Production of nitric acid by the oxidation of ammonia is carried out at seven of the 78 registered works and there is recovery of nitric acid from various nitration, etc., operations at 10 works. One difficulty of the larger plants is the colour of the emission to air. This has been overcome on the new units built by the Thames Estuary by the catalytic combustion technique. The acidity of the waste gases has not been reduced so far as had been hoped, in that complete reduction to nitrogen has not yet been effected. The whole question of emissions from these large units will continue to receive "most serious attention".

Muriatic Acid. The number of salt works is slowly decreasing as vacuum evaporation techniques replace the old open pan process. The real problem here is now one of smoke elimination, the remedy being the use of mechanical stokers. At the end of 1960, of the 80 open pans under inspection, 67 were fitted with mechanical stokers.

Carbon Disulphide. An accident occurred at one works, where experimental retorts were undergoing trials, resulting in the escape of hydrogen sulphide and the deaths of two operatives. Plant design has been studied and modifications to prevent a recurrence are under review.

Sulphuric Acid—Tons (100%)

England and Wales	1960 Tons	1959 Tons
Production	2,475,000	2,213,000
Percentage of plant in use	89.4	82.1
Percentage made by:		
Chamber & Tower	14.1	14.4
Contact	85.9	85.6
Raw materials used:	Tons	Tons
Pyrites	295,000	288,000
Sulphur	397,000	330,000
Spent oxide	198,000	192,000
Anhydrite	760,000	748,000
Scotland	Tons	Tons
Production	169,000	164,000
Percentage of plant in use	78.4	75.7
Percentage made by:		
Chamber & Tower	28.8	31.5
Contact	71.2	68.5
Raw materials used:	Tons	Tons
Pyrites	47,000	22,000
Sulphur	32,000	43,000
Spent oxide	8,000	7,000

Ammonia Products

England and Wales	1960 Tons	1959 Tons
Conc. ammonia liquor from by-prod. liquor (25%)	109,800	114,200
By-prod. ammonium sulphate	284,200	282,500
Syn. ammonium sulphate	948,400	906,700
Scotland		
Conc. ammonia liquor from by-prod. liquor (25%):		
From gas works	2,930	3,740
From coke ovens	—	58,000
By-prod. aammoniumsulphate:		
From gas works	—	—
From shale works	98,000	7,320
From coke ovens	6,734	10,280

Paraffin Oil Works. Annual throughput of crude and process oils in England and Wales in 1960 was 40.5 million tons (2.5 million tons in 1938), almost all of which was dealt with at eight refineries. In connection with Petrochemicals Ltd., it is stated that the discharge of waste boiler gases by the 375 ft. chimney has had no effect on the general level of sulphur dioxide pollution in the area.

Tar Works. Following co-operative schemes and consequent concentration of the tar distillation industry, the number of registrations has fallen from 341 in 1930 to 162 in 1950, 136 in 1955, 109 in 1959 to 107 at the end of 1960. By the same token present-day distilleries are larger than 20 to 30 years ago. At 60 of the 107 works there is distillation of crude tar and at 20 of those there

is also distillation of creosote, light oils or tar acids. At 33, registration is in respect of distillation of creosote, light oils, benzole wash oil or tar acids, no crude tar being distilled. The remaining 14 registrations concern miscellaneous processes—dewatering of water-gas tar, impregnated fibre pipes, production of lampblacks, and special carbons.

In 1894, there were 110 registered works and the amount of tar then distilled was around 0.7 million tons, rising to about 1 million tons by 1909. The maximum number of works registered in any one year for tar distillation was 378 in 1924 and 1926, when the yearly distillation rate was about 1.5 million tons. The amount distilled reached a maximum in 1956 and 1957, 2.6 million tons being distilled yearly. Tar distilled in 1960 was 2.5 million tons, rather less than might be expected due largely to reduced carbonisation of coal owing to production of towns gas by other routes and to the use of crude tar as a fuel at some steel works.

Some 75% or more of present distillation of crude tar is via continuous pipe stills, production from which has more than doubled since 1944.

Benzene Works. Due to continuing concentration of the coal carbonisation industry the number of registered works fell from 235 to 219. Production of crude benzole in 1960 in England and Wales was 118 million gall.

Pyridine Works. National production at the 34 registered works in terms of general pyridine bases was of the order of 300,000 gall./year.

Bromine Works. Of 41 registrations, two related to the production of bromine from sea water and the rest to the use of bromine in the chemical and allied industry. Only British producers are Associated Ethyl at Hayle, Cornwall, and Amlwch, Anglesey. Capacity is of the order of 50 million lb. of bromine a year. As sea water contains only about 60 p.p.m. of bromine massive volumes of sea water need to be processed; merely to acidulate the sea water to the necessary pH value calls for some 20,000 tons of suulphuric acid a year. About 2 million lb. of bromine is imported each year from Israel. Most bromine produced is converted to ethylene dibromide. The remaining uses, responsible for all but two of the 41 registrations, relate to between 7 and 8 million lb./year, mainly in dyestuffs, pharmaceuticals and photographic industries.

Gas and Coke. The number of registrations, 430 compared with 454 in 1959 and 477 in 1958, shows the effect of continuing concentration. The tonnage of coal carbonised in gas works in England and Wales in 1960 was 20.4 million tons. A total of 26.9 million tons of coal was carbonised at 62 coke oven works, four of which closed during the year.

Scottish Report

IN HIS annual report on the provisions of the Alkali &c Works regulations in Scotland, the Chief Inspector, E. A. Balfour Birse, says that manufacture of sulphuric acid was carried out at two sets of premises by the lead chamber process, with two other registrations for tower plants.

Raw Materials Used in Registered Works, Scotland

	1960 Tons	1959 Tons
Decomposed salt in saltcake process	1,485	1,400
Mineral phosphate dissolved in chemical manure works ...	177,910	186,870

Chemical Manure. Registration for the manufacture at Premises No. 18 was not renewed, marking the severing of a very long connection with chemical manufacture in Glasgow.

Nitric Acid. Bulk production of nitric acid is based entirely on the catalytic oxidation of ammonia gas. For economy in the use of stainless steel, it has been common practice to carry out oxidation at comparatively high pressure, thus enabling a substantial reduction in the volumetric capacity of the plant.

Steel Production. Extensive use of oxygen lancing is being considered at one works, experiments to include the treatment of the very dense fumes of iron oxide which arise in the lancing. Treatment by electrostatic precipitation is under consideration. At another works preliminary talks have been held about the installations of a L-D converter; a firm undertaking was given that the dense fumes arising would be effectively treated. At the end of the year a firm decision had not been reached as to whether a dry or a wet method of treatment would be used. It was quite clear that if there is general adoption of tonnage oxygen in steelmaking, the treatment of dense fumes will be a substantial part of the capital cost.

Research Chemicals Specialists, L. Light Celebrate 25th Anniversary

THEIR 25th year of continuous development is now being celebrated by L. Light and Co. Ltd., Colnbrook, Bucks. Founded in 1936 by Dr. Louis Light and Dr. Henry de Laszlo, the company has built up an extensive business in manufacturing and supplying the rarer organic chemicals to research workers throughout the world.

Since moving to Colnbrook in 1950, Light's turnover has increased over 20% a year and, during this period, 60% of their sales have been exported to every country in the world where research is conducted.

Their laboratories were among the first to produce the Choline drugs, synthetic hormones—stilbœstrol and dienœstrol, carcinogenic hydrocarbons—benzpyrene and methyl cholanthrene, reagents—2,-2′-dipyridyl, ninhydrin, naphthoresorcinol, 2, 2′-diquinolyl, tetrahydroxyquinone, DL-α-alanyl-β-naphthylamide HBr., barium azide, nitro BT, etc. They were also first to produce DL-methionine, α-alanine, threonine and several other amino acids.

In the field of natural products they made glycogen (ex mussels), hemin (ex blood) bilirubin (ex gallstones), rare porphyrins (ex parrot feathers, porphyritic animal urine, etc.) and recently the important 8-hydroxyquinoline and phenolphthalein glucuronides utilising the urine of animals specially fed for the purpose.

Since 1960, work on zone-refining of organo-scintillators and the preparation of ultra-pure white and red phosphorus (for solid state physics) have been successfully concluded. Recent preparations include boron triodide, mannan, uricase, urobilinogen, tetracyanoethylene, *m*-quinquephenyl and N-acetylneuraminic acid.

Larger offices, stores and laboratories are now under construction, and the company looks ahead to the next 25 years with enthusiasm.

Consultants to be Listed in C.A. Directory

THE CHEMICAL AGE DIRECTORY AND WHO'S WHO, 1962, will for the first time include a list of consultants in chemistry, chemical engineering and related fields. Those consultants, with full-time practices, who would like to be included in this feature, which will appear in the editorial section of the 'Directory' and who have not received a form, should write as soon as possible to the Editor, CHEMICAL AGE, 154 Fleet Street, London E.C.4, giving the following details.

Name of practice, names of principal or partners, with qualifications, address and telephone number, subjects covered by the practice, and titles of associations or societies in which the principal or partners hold membership. An indication should also be given as to whether laboratory facilities are available.

British Plastics Federation's Progress

THE British Plastics Federation has published a booklet, 'Aims and Objects', describing its organisation and showing how the Federation, formed in 1933, has kept in step with the increasing production of plastics materials—a 20-fold increase since 1938, and last year amounting to more than 560,000 tons.

Eight groups cover raw material supplies, material manufacture, moulding, fabricating, laminated and fibrous products, packaging, reinforced plastics, and engineering. Four of the groups have sections; the material manufacturers, for instance, cover moulding materials, synthetic resins, sheet, p.v.c. compounders, surface coating resins, and calendered p.v.c. sheeting.

Copies of the booklet are obtainable from B.P.F., 47-48 Piccadilly, London W.1.

Review of Achema Exhibition

New Trends in Chemical Plant Design and Operation

THE Achema 1961 Exhibition-Congress, organised by the Deutsche Gesellschaft für chemisches Apparatewesen (Dechema) and held in Frankfurt-am-Main, W. Germany, 9-17 June, brought forth a large number of new developments in chemical plant, laboratory techniques and automatic analysis and control. To describe them all in a brief review such as this is clearly impossible; however, many of the new developments were discussed in the special preview of the Achema which appeared in C.A., 10 June, and some further novelties, along with some of the more striking general trends, are noted below.

Unit Operations. In the field of chemical plant for unit operations, the exhibition revealed not so much any startling new designs as the adaptation and modification of existing techniques to meet the needs of continuous, automatic processing, and the introduction of new combinations of materials of construction to cater for higher temperatures and pressures and the handling of aggressive media.

This trend was perhaps most evident among the filtration equipment shown, such as the new development of **F. H. Schule GmbH,** Hamburg—a filter press with a mechanical plate transport device for semi or fully automatic operation. The machine is operated pneumatically, the filter cake being removed by compressed air. Designed for compactness and labour-saving is the diaphragm filter press shown by **Borsig AG,** Berlin; this was developed for the production of filter cakes with a high solid content from dispersions that are difficult to filter. To illustrate the development of filters for corrosive service we have a vacuum drum filter of glass fibre reinforced polyester construction, shown by **Dorr-Oliver GmbH,** Wiesbaden. Primarily applied to the sifting and screening of dry materials, on both the laboratory and plant scale, the sonic sifting machines of **Rhewum** (Rheinische Werkzeug-und Maschinenfabrik GmbH, Remscheid-Luettringhausen), are now being further developed for wet screening and can therefore be said to have entered the field of filtration.

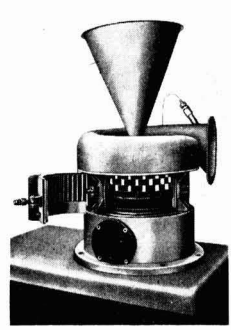
Among other separation operations, evaporation was also outstanding for the number of innovations. Examples include the Kontro film evaporator shown by **Samesreuther und Co. GmbH,** Butzbach, this operating on a centrifugal principle and consisting essentially of a rapidly revolving rotor inside a heated pipe; and the Rotafilm thin layer evaporator shown by **Carl Canzler,** Duren, in which the liquid is evenly distributed and continuously mixed by a rotating wiper system, depositing a film on the inner side of the evaporator tube. A new, completely continuous crystalliser for salt solutions, designed by B.A.S.F. in co-operation with **Zahn und Co. GmbH,** Hameln, was exhibited by the latter firm. The cylindrical cooling surface rotates in the solution, which is kept in lively motion by an additional agitator; this new design is claimed to ensure completely continuous operation and a uniform product.

On display by **John C. Carlson Ltd.,** Newman Street, Ashton-under-Lyne, were their 60 cm., 40 cm., and 20 cm. sheet filters, and a range of laboratory filters as well as a representative selection of Carlson original filter sheets. Sheet filters have been developed that are not only more versatile and easier to operate but also facilitate cleaning. The emphasis, however, is on the material of construction—stainless steel. Carlson have paid particular attention to the filter plates and present two types, manufactured in stainless steel. The first is of expanded metal design and the second has a corrugated metal insert.

Gravity Separator

An improved gravity type separator for refinery effluent, designed by engineers of Royal Dutch/Shell Group companies in the Netherlands, was among the features of the **Shell** stand. The new separator gives about 40% reduction in the oil content of the effluent compared with the conventional type of gravity separator, the improvement being effected by incorporating parallel plates in the separator which function as collecting surfaces for the oil globules in the effluent. The plates are tilted to guide the movement of the oil towards the surface and the sludge towards the bottom.

Mixing and Grinding. The new Super series of Cowles Dissolver models, incorporating an improved power transmission system that is capable of delivering over 90% of motor horsepower to the impeller even at the lowest speeds.



Micro-mill by Artur Simon

These machines were demonstrated on the stand of **Morehouse International,** Los Angeles.

Particularly suitable for the grinding of tough, moist and plastic materials (e.g. p.v.c., Teflon, Vulkollan, cellulose and rubber) and of materials with low fusion emollient points are the Asima-Mikro grinders exhibited by **Artur Simon Maschinenbau GmbH.,** Poller Kirchweg 60/68, Cologne-Deutz. The unit, shown at the exhibition in operation, is fed continuously. All component parts are exchangeable and the division of the housing in several segments linked by wing-nut fittings simplifies the opening up of the machine for cleaning.

An Airmix laboratory mixer and an emulsifier of the same make were shown in action on the stands of **Gebrüder Grün KG,** Lissberg/Oberhessen. Also shown by Grün were an 800-litre Airmix mixer whose housing acts also as centrifugal separator, a Sprühmix unit for the jet introduction of liquids into dry products for the production of an even granulate and a new rotary cell filter. Grün shared its stands with the British and Commonwealth licensees John Kimbell and Co. Ltd. and Wm. Gardner and Co. Ltd. and its franc-zone licensee Airmix S.A.

Gewerkschaft Eisenhütte Westfalia, Wethmar, showed the latest design of a spiral heat exchanger, developed in co-operation with Didier Werke AG, which is claimed to offer the advantage of perfect sealing between the medium and the heating or cooling liquid passing in countercurrent. Basis of the design is a series of rings into which are cast helical channels.

A new rapid dryer for granules was shown by **Robert Muenster,** Muttenz, Switzerland, this being aimed at overcoming the "bottleneck" problem experienced in tray drying. In the new design, air does not merely pass over the surface of the product but is sucked through the mass. In this, it is stated, each individual granule is exposed to a stream of heated dry air and gives off its moisture content in the shortest possible time.

Instrumentation and Control. Here again the emphasis is no longer on completely new techniques; the dominant tendency in this field is to improve reliability and precision, to increase robustness and to simplify operation. Here, too, is evidence of new efforts to overcome the problems of operation in aggressive, inflammable or explosive media, as for instance in the radioactive isotope method of tank level control demonstrated by **AEG** (Allgemeine Elektricitäts-Gesellschaft). From indication at a single point we pass to complete electronic control of a plant for the treatment of waste water, this having been developed by **Dr. Erich Asendorf**—Abwassertechnik, Bad Homburg. The Robot measurement and control apparatus exhibited on this stand is fully transistorised, insensitive to fluctuating temperatures, moisture and corrosion. It is stated that measuring and amplifier units can even be flooded with acids and

poisons without affecting their operation.

Analytical and Measuring Apparatus. Under this heading, the most impressive advances being made are in the newer automatic methods of analysis, bringing us nearer the completely automatic laboratory, while for the less spectacular but no less essential operations such as measurement of pH, temperatures, etc., equipment is still being steadily made simpler to operate.

A new automatic X-ray fluorescence spectrometer for the routine analysis of large numbers of samples in solid, liquid or powder form is the Fluroprint, exhibited by **Hilger and Watts Ltd.**, London. Changeover from one type of analysis to another is done simply by pulling out a plug-board and substituting another. Particle size spectrometry has been subject of research work carried out by the Physics Division of the **Battelle-Institut e.V.**, Frankfurt, and on their stand they showed a unit which serves for determining the particle size distribution of any polydispersed disperoids. Up to 800 individual particles per second are measured by this model.

Showing their new Massflow thermobalance for the first time were **Stanton Instruments Ltd.**, London, this providing for a continuous record of changes of weight of a sample in a furnace in a pressure range from 10^{-4} Torr to +700 g/sq. cm. as a function of time and temperature. Designed to permit also the examination of materials in pure gas atmospheres, these instruments are claimed to represent a considerable advance in the field of thermo-gravimetric analysis.

Described by the makers as combining the advantages of the thermo-balance with those of the differential thermo-analyser is the Derivatograph, a Hungarian development exhibited by **Metrimpex**, Budapest—the Hungarian trading company for instruments. On the same stand appeared a new high-frequency titrimeter, primarily designed for use in aqueous media but also applicable to non-aqueous solutions.

New developments shown by **A. Gallenkamp and Co. Ltd.**, London, included the Lloyd gas analysis apparatus, a compact, portable unit for rapid O_2 and CO_2 determinations; the ballistic bomb calorimeter which is stated to give 10 results an hour and to have an accuracy of 1%; and the Bierkerud apparatus for hydrogen in steel determinations.

Materials. The engineer or scientist especially concerned with materials of construction could find something of interest not only in the exhibition hall specially devoted to materials but throughout the displays of plant, apparatus and instruments. Thus, a tour of the stands showing laboratory apparatus revealed an increasing use of plastics for many types of apparatus previously made of glass, while a number of chemical engineering exhibits revealed new ideas in lining plant with carbon, ceramics and other materials.

Société le **Carbone-Lorraine**, Paris, whose normal line of manufacture is Polybloc carbon and graphite heat exchangers and components, reveal a new interest in the development of filter membranes in porous p.t.f.e., these being produced in a range of pore radiuses from 2 to 500 microns, and in thicknesses of 0.7, 1.5, 2 and 3 mm. according to the duty. Resistant to temperatures up to 290°C, these membranes withstand the most corrosive media including nitric, sulphuric and hydrochloric acids.

Progress in acid-proof stoneware was revealed on the stand of **Deutsche Steinzeugwarenfabrik** fur Kanalisation und chemische Industrie, Mannheim, further attention having been paid to the development of special compounds, such as stoneware resistant to temperature fluctuations, iron-free stoneware and technical porcelain.

The newer metals such as titanium and tantalum were evident not only on the stand of I.C.I. Metals Division (see Preview) but also in various other exhibits elsewhere; for instance, Carl Canzler showed a number of welded items in titanium and tantalum.

Carbon Exhibits

A full range of their chemical equipment in Delanium carbon and graphite was exhibited by **Powell Duffryn Carbon Products Ltd.**, Springfield Road, Hayes, Middlesex. The exhibits include the conventional Powell Duffryn cubic and long tube heat exchangers; new viscose units; the new cartridge condenser; a full range of graphite bursting discs, with demonstrations at certain times during the day; the new graphite centrifugal vertical spindle pump; and a full range of mechanical carbons and graphites.

Sigr.-Kohlefabrikate GmbH, (13b) Meitingen über Augsburg, revealed that their materials Diabon (special electrographite) and Durabon (special hard-burnt carbon) are now available with improved chemical resistance, as well as their excellent resistance to temperature changes, by reason of being impregnated with a special pitch.

For the production of hydrochloric acid a novel improved Diabon chlorine combustion furnace has been developed in co-operation with B.A.S.F., while a further development featured is an air-cooled Diabon heat exchanger with finned plates.

Miscellaneous. Labour-saving in the laboratory can be applied not only to the operation of apparatus but also to routine servicing duties, as is shown by the washing and rinsing machine for laboratory glassware shown by the firm of **Herbert Adam**, Koblenz. This is an all-electric appliance with rotary drums holding stainless steel baskets containing the various types of glass containers and accessories.

Among tablet-making machinery, a notable exhibit was the new Layerpress of **Manesty Machines Ltd.**, Liverpool this being capable of making both ordinary and two- or three-layer tablets.

The continuous production of alkyl phenols is the purpose of plant now being constructed by **Arbeitsgemeinschaft Chemische Verfahrenstechnik** (ACV), Cologne, the principal products being p-tert. butyl phenol, p-isononyl phenol and p-dodecyl phenol. The process is that developed by the firm Elprochine of Fribourg. A special feature is that the use of high pressure storage containers and dosing devices for liquid gas is eliminated by employing di- or tri-iso-butylene or mixtures of these substances, both polymers being liquid at ordinary temperatures.

Purified water for pharmacy, chemistry and electronic manufacture as well as for general laboratory work and research is provided instantly and at high flow rates by the Elgastat E 101 mixed bed deioniser with pre-purifier introduced by **Elga Products Ltd.**, Lane End, Bucks. This is a fully mobile unit, the raw water influent point being connected to the mains and, by setting the selector to Elgalised water, flow commences instantly at a flow rate of 50 gall./hr.

Exhibits of **Sarnen S.A.**, P.O.B. 29, Sarnen, Switzerland, include the Aerotron electro-filter, for use where compressed air of a high degree of purity is required. It is described as permitting both a centralised and a decentralised supply of compressed air. Versions are available for purifying compressed gases, blast furnace gas, flue gas, and for removing dust in the operation of carbide furnaces, etc. Air conditioning in chemical and pharmaceutical works, food processing plants, etc., is a further application.

Three recently developed items of industrial apparatus for use in the chemical industry were on show in the display of **Alfred Kärcher,** Leutenbacher Strasse 30/40, Winnenden bei Stuttgart. These are: an addition to the Kärcher range of oil-fired high-speed steam generators capable of producing 500 to 1,000 kg./hr. of high-pressure steam at 3-10 atm., production starting a matter of minutes after start-up; a tank cleaner for the spraying of tank interiors at pressures of 20-50 atm.; and a hot oil generator for the indirect heating of tanks containing substances requiring a certain level of heat to remain in liquid form—with a boiler efficiency of over 85%, this has an oil circulation of some 10,000 litres/hr.

New Seed Dressing

A new liquid seed dressing formulation particularly effective against wireworm and which, at the same time, minimises risk to wild life, has been developed by Shell Chemical Co. Ltd. Called Kotol, it contains lindane (not less than 99% gamma BHC) in a non-phytotoxic solvent; used as a seed dressing, lindane is considered to be the insecticide least hazardous to wild life. And a vital point about this product is that it is based on a new and special formulation which minimises the risk of phytotoxicity with which BHC has always been associated in the past. A red dye is incorporated in the product to make for easy recognition of the treated seed.

Will

Mr. John Leonard Armstrong, financial director of I.C.I., who died on 7 January, intestate, aged 67, left £58,671.

Overseas News

ITALIAN LUBE-OIL PRODUCTION WILL TOTAL 365,000 T.P.A. BY 1963

THE recent announcement that Esso Standard Italiana will build, in co-operation with RASIOM, a large lube-oil plant at Augusta, Sicily, has not aroused the interest it deserves. The new plant, which will be able to produce about 200,000 tonnes of high-quality lubricants a year, will radically alter the lubricating oil situation in Italy.

For some years, Italian consumption has been growing steadily, increasing from 82,759 tonnes in 1958 to 109,442 tonnes in 1960.

During the same period, there has been also an increase in the home production of lube-oils, but this increase has not kept pace with the consumption and, thus, increasing quantities have had to be imported (17,873 tonnes in 1958, 31,374 tonnes in 1959, and 56,275 tonnes in 1960). This, however, has not prevented the build-up of exports which (together with bunkering of outward bound ships) totalled 22,292 tonnes in 1958, 22,628 tonnes in 1959, and 26,567 tonnes in 1960.

The new Esso plant will go on stream in 1963 and by then Italian production potential will rise to 365,000 tonnes (not counting various smaller new plants which are likely to open in the meantime). By then Italian consumption of lubricants will increase to some 320,000 tonnes a year, and thus, there will be a margin for exports.

At present the major Italian consumers are road transport (about 48% of the total), industry (37%), agriculture (6%), and railways (3%).

U.C.B.'s New Plant for High-quality Benzene

A new rectification unit installed by Union Chimique Belge at their Havre-Ville site has a capacity of some 30,000 tonnes/year of high-quality benzene, toluene and xylene. Part of the benzene will be used in a large maleic anhydride unit now under construction on the same site.

Japanese Polypropylene Dispute Settled

A three months' dispute between five leading Japanese fibre producers concerning the scale of their respective manufacturing facilities for polypropylene has now been settled by the Japan Chemical Fibre Industry Association's sub-committee on polypropylene. The Toyo Rayon, Mitsubishi Rayon and Toyo Spinning companies had secured licences from Montecatini. A fourth company, Shin Nippon Chisso Hiryo (New Japan Nitrogenous Fertiliser), is planning to use a process developed by the AviSun Corporation of America. Disagreement arose over the admission to the sub-committee of the Asahi Chemical Industry, who propose to produce polypropylene by a technique developed domestically, the other four companies objecting that they had had to pay royalties to acquire the foreign know-how.

According to the terms of the new agreement Toyo Rayon and Mitsubishi will produce 10 tons daily, Toyo Spinning and the New Japan Nitrogenous Fertiliser company 3 tons a day and Asahi one ton. The settlement has been referred to the Textile Ministry for formal approval.

Amoco Refinery for Queensland

Standard Oil (Indiana) have approved the plans of their Australian subsidiary to build a refinery in Queensland costing £A11 million. The subsidiary—Amoco (Australia) Pty. Ltd.—proposes to build the refinery at the mouth of the Brisbane River. The refinery will be the biggest in Queensland.

Polymer Butadiene Plant May Use Shell Acetonitrile Route

Fluor Corporation (Canada) will build the new butadiene extraction plant of Polymer Corporation Ltd. at Sarnia, Ont. It is reported in *Chemical Week* that the unit may be the first in the Western Hemisphere using Shell Development's acetonitrile extractive distillation process that yields a high-purity product.

U.S. Impose Duty on Toluene, Xylene Imports

When produced from a petroleum feedstock, toluene and xylene imported into the U.S. will in future carry a duty of ¼ cent per gallon. Formerly duty-free, these products have been reclassified as liquid derivatives of crude petroleum.

U.S. Catalyst Plans for Japan are Opposed

Nippon Oils and Fats Co., and other peroxide manufacturers, are opposing the setting up of a joint company by Yoshitomi Pharmaceutical Industries Ltd. and Wallace and Tiernan Inc., U.S., to produce peroxide catalysts for the production of polythene. Nippon Oils state that the catalyst can be produced by a domestic process and are themselves planning the production of organic peroxides such as methyl ethyl ketone peroxide and fatty acid peroxides for use in unsaturated polyester resins. This company has plant now nearing completion and is considering expansion into catalysts of a type to be used for Mitsui Polychemical's polythene, which will be produced by the Du Pont process.

Joint Dutch-French Drug Venture in France

Philips-Duphar, the pharmaceutical division of the Netherlands Philips concern and Clin-Byla, the French pharmaceutical producers, will set up a joint production affiliate in France under the name Duphar-C.B. Production will be marketed by Clin-Byla.

Bayer Insecticide Enterprise in El Salvador

Farbenfabriken Bayer AG and financial circles in El Salvador have founded a company in El Salvador for the production of liquid plant protection chemicals for cotton. The new firm, called Bayer de El Salvador S.A., will produce about 1 million litres of liquid insecticide a year.

French-U.S. Venture Strikes Oil in Sahara

A French State-controlled oil company in association with the U.S. Philips Oil concern has struck natural gas in the Sahara, the Oil Exploration Bureau reports in Paris. A borehole at Gassi Touil drilled by Compagnie des Petroles France-Afrique in a joint venture with Philips and Omnirex (a private French oil exploration company) yielded during tests 1 million cu. m. of gas per day. This is as much as the wells at Hassi Rmel, the Saharan gas deposit at which industrial production was started last month.

It was stated that it would be necessary to drill other boreholes to determine the extent of the gas deposit as Gassi Touil.

Du Pont's G.M. Shares Disposal Appeal Fails

The U.S. Supreme Court, by a four to three vote, has rejected the request of E. I. du Pont de Nemours and Co. to ease the 10-year requirement for getting rid of its General Motors stock. The Court had ruled (C.A., 27 May, p. 857) that Du Pont must get rid of its 63 million G.M. shares in order to remedy completely its violation of the Clayton Anti-Monopoly Law.

The four-man majority said the divestiture must take place within 10 years of the final order by Federal District Judge Walter J. Labuy, of Chicago, even though the Government did not insist on this time limit. In a petition of modification of the opinion Du Pont said the time allowed should be left to Judge Labuy.

Rumianca Plan Petrochemical Complex in Sardinia

Details of a petrochemical project for the Italian island of Sardinia have been revealed by the Italian chemical pro-

ducer Rumianca, of Turin. Products concerned will include electrolytic soda, chlorine, polyvinyl chloride and polythene, as well as other, as yet unspecified products. Local salt will be used and between 400 million and 500 million kwh from the local Carbosarda concern. Construction is expected to take two or three years. Investments required are put at 30,000 million lire, this to come from aid from the so-called Southern Fund, the Sardinian rehabilitation scheme, current bank credit and a Rumianca capital increase and loan issue to be announced before the start of next year.

Alkyl Lead Products from New Nalco Plant

Nalco Chemical Co., Chicago, are to erect a new plant for the production of alkyl lead compounds. Working to a new process, the plant will have an anticipated capacity based on the processing to alkyl lead compounds of some 13,000 short tons of lead per year. Site of the new plant is on the Gulf coast.

Silicon Carbide Plant for Norway

A new plant for the production of initially 4,000 annual tonnes of silicon carbide is to be built in the Orkanger district of Norway, output to start in 1963. Manufacturers are to be the Orkla Gruber A/B, working in co-operation with another Norwegian undertaking and with U.S. interests. The plant's initial capacity will possibly be doubled by a later date.

Joint French Venture for Acetic Acid Plant

The end of next year is announced as the probable running-on date of a new plant at Pont-de-Claix, France, for the production of acetic acid and other fatty acids. The producing company, which will also market the acids, will be a new concern to be formed jointly by the two French chemical companies Rhône-Poulenc and Progil under the name of Société Rhône-Progil. Pont-de-Claix is also the site of the isocyanates plant being constructed by the Franco-German consortium concern Progil-Bayer-Ugine.

Grace to Quadruple Phthalic Capacity in Brazil

Phthalic anhydride capacity of Quimica Produtos Ftalicos S.A., Sao Paulo, Brazil, a subsidiary of W. R. Grace, is to be boosted from 60 tons to 240 tons/month. W. R. Grace are also planning a 60 tons/month phthalic unit at Bogota, Colombia, and in the U.S. are raising capacity to 2,000 tons/month.

Durgapur Urea Plant May be Built by Japanese

Negotiations to establish a urea plant in Durgapur, West Bengal, with a projected capacity of 160,000 tons/year are in hand between Durgapur Fertilizer Manufacturing and Mitsui Bussan. Japan would invest Yen 1,500 million and export the entire plant including patent rights and know-how. India would invest Yen 2,300 million.

The new plant would utilise the 1 million cu. m. coke oven gas produced by the British built Durgapur Steel Works. Should Mitsui Bussan succeed in their bid to build this plant—against competition from Westinghouse and other U.S. companies—they would use the Grande Parois ammonia synthesis process.

Methanol, Vinyl Acetate Units for Borden

New plants to be built at Geismar, La., by Borden Chemical are a 25 million gall./year methanol unit and a 50 million lb./year vinyl acetate monomer unit. These will be adjacent to the acetylene and vinyl chloride monomer plants under construction for Monochem, owned jointly by Borden and U.S. Rubber. Morton Chemical are to built a plant for the production of anhydrous hydrogen chloride at Geismar.

Liquid CO_2 Plant Starts Up in Central Italy

To the plant which Societa' Chimica Pergine operate at Pergine, near Arezzo, Italy, has been added a new unit for the production of liquid carbon dioxide. This plant is claimed to be the most modern and the largest in Italy. As about 60% of the consumers of this gas reside in Northern Italy, it is transported in specially designed tank lorries in which it remains in the liquid state.

Knapsack Acrylo Monopoly for Japan on 3% Royalty Basis

Japan Gas-Chemical have secured monopoly rights in Japan to the use of the Knapsack process for acrylonitrile, via acetaldehyde (see also C.A., 17 June, p. 1004). Royalty payment to Farbwerke Hoechst will be 3%; design and engineering will come from Friedrich Uhde. Initially a 2-3 tons/day pilot plant will be built, to be followed by plant with first-stage capacity for 20 tons/day.

Japan Gas-Chemical claim that the cost of producing acrylonitrile by the Knapsack process will be lowered by 20%.

Two Anhydrous Ammonia Terminals Planned

American Oil Co. are to construct a 15,000 tons refrigerated terminal for anhydrous ammonia on the Des Plaines River, near Joliet, Ill. Ammonia will come from the Whiting, Ind., plant of Calumet Nitrogen, who are owned by Sinclair Oil and Refining and Standard Oil of Indiana, parent company of Amoco. A 15,000 tons anhydrous ammonia terminal is also to be built on the Mississippi by Monsanto Chemical Co.

Agreement on £13 m. Rhodesian Refinery

Agreement has been reached between American Independent Oil and Shell on participation in a joint-venture £13 m. refinery in the Federation of Rhodesia and Nyasaland. The agreement is the result of talks held in London with Shell representing four other marketers—B.P., Vacuum, Caltex and Total.

The scheme could be in production by end-December, 1963. Plans for the proposed £5 million Beira-Salisbury oil pipeline will probably now proceed as a result of the refinery agreement.

A.D.L. Research Provides Heat up to 6,000°F in Boosted Burner

A NEW, economical heat source for industrial use—the result of a 'marriage' of chemical and electrical energies—was described recently to members of the American Gas Association. Under development by Arthur D. Little Inc., for the past two years, the Combex-ADL burner is a patented invention of Bela Karlovitz, of Cumbustion and Explosives Research Inc., Pittsburgh, Pa. It can supply heat in the 3,000° to 6,000°F range for chemical and metallurgical processes.

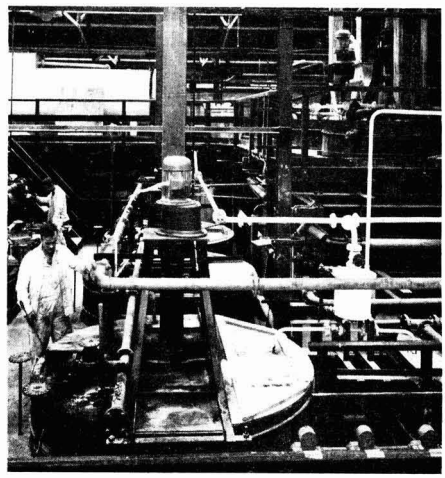
The burner 'boosts' the energy from ordinary combustion of a fuel-oxidant mixture by superimposing on the flame electrical energy from a low-current, high-voltage, alternating-current discharge. A.G.A. members heard reports about the research programme on the thermodynamic properties of the boosted burner when fuelled with natural gas.

It was stated that the addition of electric power equal to one-half the chemical combustion power at an optimum air-fuel ratio boosted the gas specific enthalpy (heat content) from 1,100 B.Th.U./lb. to 1,600 B.Th.U./lb. Enthalpies of 1,900 B.Th.U./lb. were obtained with fuel-rich flames, and still higher figures are expected from increased electrical power. The higher temperature, high specific enthalpy product of the burner is a potential heat source when either rapid, high temperature heating or an intense localised heat source above 3,000°F is desired. Heating of materials to a very high temperature by feeding directly into the flame is a logical use for the new device, especially when organic materials are used since slower methods would destroy the molecules and form carbon and various oxides.

Reduction of three metal oxides—aluminium, boron and magnesium—were cited as potential applications for the Combex-ADL burner.

The meeting learned that the use of cheap chemical energy supplemented by relatively expensive electrical energy to obtain higher than normal temperatures is the basis for the burner's operating economy. Operating costs depend on the fuels, oxidants, and electric power used and the temperatures required. Design flexibility makes possible utilisation of any commercially available fuel—natural gas, fuel oil, powdered coal, or hydrogen—with a range of oxidisers from air or oxygen to fluorine or exotic mixtures.

Laporte Increase Stake in Fluorine Chemistry with New Acquisitions in Glebe Mines Area



In the catalysts section of the Peter Spence works at Widnes. In his first report on Spence, Laporte's chairman describes their product range as "a balanced blend of chemicals, some of which fit well into the existing business of the group and some leading us into new fields that we seek"

DURING the year ended 31 March 1961, Laporte Industries Ltd. acquired Cupola Mining and Milling Co. Ltd., consisting of mineral deposits and a fluorspar processing plant capable of substantial development. In addition a rich mineral-bearing area known as Longstone Edge was also acquired. These steps were revealed by Mr. P. D. O'Brien, chairman of L.I.L., in his annual statement; he described these two acquisitions as representing a major advance in the group's interests in fluorine chemistry.

Both acquisitions are in the area of Glebe Mines Ltd., who with the Sheffield Chemical Co. Ltd. and James Wilkinson and Son Ltd. were acquired in the previous financial year.

Laporte Chemicals Ltd. Experience with the AO peroxide process at Warrington is excellent and output by this process is now being expanded and is due for completion shortly. The company from which Laporte acquired the sodium chlorite process, now at work at Luton, Elektrochemische Werke Munchen, had since been acquired. Mr. O'Brien said that while the outcome of a merger between the Common Market and E.F.T.A. was uncertain, the directors decided that an established position in Europe was in the best interests of the group. He believed that with EWM, Laporte stood a great change of reaping some of the rewards that should arise from manufacture and sale within the European Economic Community.

Barium Modernisation

Laporte Chemicals were modernising their various processes to manufacture barium salts.

Laporte Titanium. The £3 million expansion scheme at Stallingborough is up to schedule and already some benefit is being reaped from the sale of increased output of titanium pigment. An additional large sulphuric acid plant was commissioned during the year and output of the three acid plants at Stallingborough now makes Laporte completely independent of external sources of supply.

Fullers Earth Union. Substantial new activating plant using a new process is under construction and is due for completion next year.

G. D. Holmes. Laporte Titanium and Laporte Acids take a large tonnage of raw materials into their works by barges from the Humber. The group has now acquired one of the barge firms concerned—G. D. Holmes Ltd. and who embrace Goole Docks Fresh Water Boat Co. Ltd. These companies operate some 32 vessels.

Overseas. Due to depressed economic conditions, Laporte Chemicals (Australia) Pty., Sydney, suffered reduced trading profit. A £4 million titanium oxide plant is to be established at Bunbury, Western Australia. In Canada, plans are in hand to install additional plant for new products of Howards and Sons (Canada) Ltd.

Design teams on both sides of the Atlantic are working on plans to produce titanium oxide in conjunction with American Potash and Chemical on the West Coast. In India, a new company will make titanium oxide under an agreement with Laporte Titanium Ltd. The L.I.L. interest will be substantial, but a minority one.

Research. Most Laporte Group companies have their own research teams which deal largely with the development of their own particular products. A pressing need is seen to devote attention to longer range research in broader fields and greater stress is being put on setting up a stronger group research team to give added impetus to the growth of Laporte in years to come.

Concluding, Mr. O'Brien said that to bring the group's plans to fruition would involve heavy capital spending and it would be necessary to raise additional finance in one way or another—possibly within the next 18 months.

British Oxygen's 75 Years of Progress

IMPRESSED by a small scale plant for producing oxygen shown at a London exhibition in 1885 by the French brothers, Leon and Arthur Brin, an English stoneware manufacturer, Henry Sharp, decided to form a company to develop the process. It was first registered under the name "Brin's Oxygen Co. Ltd." on 26 January, 1886. The process was based on heating barium oxide to form a peroxide; on further heating this generated oxygen with the reformation of barium oxide.

In 1887 output was 142,116 cu. ft. of oxygen, rising to 953,213 cu. ft. by 1889. By 1906 the barium oxide route had had its day, when a Linde plant was erected in Westminster alongside the former plant. With the introduction of the new liquid process, the name was changed to "The British Oxygen Co. Ltd." The acetylene interests of Allen-Liversidge Ltd., who had collaborated with British Oxygen for many years, were acquired in 1930. Quasi-Arc Ltd. joined the group in 1936 and by 1939 Coxete and Son Ltd. and A. Charles King Ltd., long-established medical apparatus makers were acquired.

The modern research department was set up at Morden in 1945 and today the Scientific Centre has a staff of 400 trained research workers. The first tonnage oxygen plant went into operation at Margam for the Steel Company of Wales in 1956 and by 1959 plans were made to raise British Oxygen's liquid oxygen capacity from 900 to 2,200 tons/day; the figure has recently been revised upwards to 3,500 tons/day. The first tonnage acetylene plant was opened in Northern Ireland in June last year.

Duty Drawback for Vinyl Copolymers

The Board of Trade are considering an application for the allowance of drawback of duty on imported copolymers of vinyl chloride and vinylidene chloride in the form of powder, when used for the production in the U.K. of lay-flat tubing, bags, and film in rolls, these being for export.

Representations by interested parties should be addressed in writing to the Board of Trade, Tariff and Import Policy Division, Horse Guards Avenue, London S.W.1, not later than 10 July.

PEOPLE in the news

● **Mr. P. E. Rousseau**, managing director of SASOL, has left South Africa on a month's visit to Britain, Holland, Germany, and the U.S. He is expected to return home on 9 July. Purpose of his trip is to discuss financial aspects of contracts which SASOL expect to conclude with overseas firms in connection with their expansion plans. **Mr. D. P. de Villiers,** managing director of SASOL Marketing Company, has been in Europe for the past seven weeks negotiating for the expansion of exports of SASOL products.

● **Mr. Torsten Berg** has been appointed technical director of A. Johnson and Co. (London) Ltd. He joined the Johnson organisation in 1938 and has been concerned with various aspects of their production and sales of stainless steel plant and equipment for the chemical and food industries. In addition to his technical work Mr. Berg will continue to be responsible for the company's sale of chemical and food plant.

● Following his retirement from executive duties with the Distillers Company Ltd., **Mr. William Reid** has been appointed chairman of United Glass Ltd. in succession to **Mr. L. A. Elgood.** Mr. Reid has been a director of United Glass for 24 years, as well as chairman of its closure making subsidiary, Kork-N-Seal Ltd., since 1955. Mr. Reid spent most of his career with the D.C.L. potable interests, becoming chairman of the group's management committee.

W. Reid

G. P. Phillips

● **Mr. G. P. Phillips,** general sales manager, has been appointed to the main board of Prodorite Ltd. as sales director. He joined Prodorite in 1938 and since then his activities have been mainly concerned with the company's sales. Mr. Phillips has recently returned from a three months' visit to South Africa.

● **Dr. A. M. McKay,** I.C.I. Billingham Division's engineering director, has been appointed managing director of the European Council, one of whose responsibilities is to develop the 300-acre site near Rotterdam. Dr. McKay was deputy chief engineer when he joined the Billingham Division board in 1954 as personnel director; he became engineering director the following year. He will be succeeded by **Mr. W. B. Duncan,** who holds a senior post in the division engineering design department. Both these appointments take effect on 18 September. **Dr. P. W. Reynolds,** technical department manager, joins the division board in December as technical director on the retirement of **Mr. P. Mayne. Mr. R. S. Wright,** research director of I.C.I. Dyestuffs Division, will join the Billingham board on 1 September as managing director (technical), jointly with **Mr. K. H. L. Cooper** (commercial) and **Mr. W. d'Leny** (technical).

● At a meeting of Reichhold Chemicals Ltd. **Mr. G. S. Bache** was formally appointed chairman of the company and **Dr. G. Swann,** assistant managing director of the subsidiary, Beck, Koller & Co. (England) Ltd., was appointed as an ordinary director of the parent company to fill the vacancy on the board resulting from the recent death of Mr. W. H. Breuer.

● **Dr. W. Watson,** sewage works manager, Borough of Keighley, has been elected an hon. fellow of the Institute of Sewage Purification. Other new fellows include **Mr. A. L. Abbott,** city chemist, City of Cape Town, and **Mr. E. Hodgson,** sewage works manager, Croydon, and hon. assistant editor to the Institute.

● **Dr. A. R. Pinnington** has been appointed sales manager (development) of the Fullers' Earth Union Ltd., Redhill, Surrey.

● **Dr. J. H. Hamence,** a director of Dr. Bernard Dyer and Partners, was re-elected president of the Association of Public Analysts at the recent annual meeting. Other officers re-elected were: vice-president, **D. D. Moir;** hon. treasurer, **R. C. Spalding;** hon. secretary, **F. A. Lyne,** 220 Elgar Road, Reading; hon. editor, **Dr. E. C. Wood.**

● **Mr. Thomas J. Milligan,** assistant sales director of Du Pont's Electrochemicals Deparment, has been appointed managing director of Du Pont de Nemours International S.A., Geneva, from 1 August. Mr. Milligan succeeds **Mr. William D. Eaton,** who has been promoted to assistant European director of the Du Pont Co.'s International Department. Mr. Eaton will be responsible for the affairs of the European Division in Wilmington and will return there in August. Due to rising European business, **Mr. C. R. Faust,** assistant European director in Wilmington, will be transferred to Geneva on 1 July, and will be concerned with Du Pont activities in Europe.

● **Sir William Garrett, M.B.E.,** a director of Monsanto Chemicals Ltd., and chairman of the Association of British Chemical Manufacturers, is a British representative on the newly formed Consultative Council of the European Free Trade Area. The council's task is to provide E.F.T.A. member governments with a vehicle for discussion of common problems in the commercial, industrial and labour sectors.

● **Mr. R. S. G. Lea,** deputy chairman and managing director, CIBA (A.R.L.) Ltd., Droxford, has been appointed a director of CIBA Clayton Ltd., Manchester.

R. S. G. Lea

H. Shepherd

● **Mr. Harold Shepherd,** who, as stated last week was awarded the M.B.E. in the Birthday Honours, is chief chemist of Armoride Ltd., Earby. He has carried out considerable research on coated fabrics, particularly those used by the Admiralty and other Government Departments. Mr. Shepherd serves on various B.S.I. Committees and represents Armoride on the technical committee of the Leathercloth and Coated Fabrics Manufacturers' Association.

● **Dr. James Burns, G.M.,** deputy chairman of the North Thames Gas Board, has been elected president of the Institute of Fuel to take Office in October 1961. **Sir Harold Hartley, G.C.V.O., M.C., F.R.S.,** has been made an hon. member of the institute. He was chairman of the D.S.I.R. Fuel Research Board during the period 1932 to 1947; he was president of the World Power Conference from 1950 to 1956.

● **Mr. R. M. Currie,** head of I.C.I.'s work study department, is to be invested by Earl Mountbatten with the badge of office of president of the Institute of Work Study at a ceremony at the Guildhall, London, on 3 July. Mr. Currie has received international recognition for his pioneering efforts in the work study field and last week, in Heidelburg was elected first president of the newly-formed European Work Study Federation.

● The Dechema Medal for exceptional services in the field of chemical plant has been conferred upon **Senator-Prof.-Dr. Kurt Riess, Dipl.Ing.,** of Leverkusen, and **Dr. Erich Schott,** of Hainz, the latter particularly for his work in the development of technical glass and in the re-establishment of the JENAer Glaswerkes Schott und Gen. in Mainz.

Commercial News

- **Horlicks Bid for Burt Boulton Fails**
- **Laporte Assets Increase 40% in One Year**
- **Counter Bids for Chemical Process Co., U.S.**
- **Rumianca Profit Higher by 40%**

Air Products

Air Products have acquired sole ownership of their U.K. subsidiary, Air Products Ltd. by the purchase of Butterley Co.'s 49% interest for $2.4 million. Sales of the U.K. company are over $5 million a year.

Castrol

Castrol Ltd. have contracted to acquire 75% of the share capital of Melwood Thermoplastics Ltd., Harpenden, and the entire share capital of Tensile Products Ltd. Melwood produce high-quality thermoplastic extrusions and are extending their facilities to meet the growing demand for specialised plastics products. Tensile Products produce plastics fabrications and provide a finishing service for customers of Melwood Thermoplastics.

Horlicks/B.B.H.

Horlicks Ltd. admitted on Monday that it seemed as if their attempt to gain control of Burt Boulton and Haywood Ltd. had failed. By 24 June, Horlicks, who previously held about 11% of B.B.H. equity, had raised their stake to more than 30% as a result of the offer. Horlicks had been buying B.B.H. shares for about three years because it was felt that Burt Boulton were a very good investment. Shares now held would be retained as an investment; the holding might be increased if shares become available at the right price.

Johnson Matthey

Group profits of Johnson Matthey and Co. Ltd. for the year ended 31 March totalled £1,368,890 (£980,130), after tax of £1,356,513 (£965,169). Profit attributable to the company was £1,362,940 (£954,465). Final dividend of 12% on ordinary makes 15% (12%).

Laporte Industries

Despite a generally satisfactory level of trade and the inclusion in the accounts of a year's income from Peter Spence and Sons Ltd., and other smaller acquisitions, group income of Laporte Industries Ltd. for the year ended 31 March totalled £3,333,525, a small advance on the 1960 figure of £3,147,943. The group has had to face higher expenses, increased competition and reduced profit margins, states Mr. P. D. O'Brien, chairman, in his annual report.

Mr. O'Brien added that over the last 10 years the history of Laporte had been one of growth, but between each major advance there had been a period of consolidation. Laporte were broadly in that position today; they were reaping the benefit of past capital spending, but new plants which were being built were not yet contributing to group earnings. New companies had been acquired and would add to the group's profitability. Total net assets rose from £18.9 million at 31 March 1960 to £26.5 million at the end of March 1961. These figures included the assets of Howards and Sons Ltd., but owing to the date of acquisition, no profits made by that company were included in the consolidated profit and loss account.

Market value of issued ordinary capital has risen from about £3 million in 1952 to around £37 million today. A £50 investment in L.I.L. made in 1952 would today be worth £440. (See also p. 1041.)

Midland Tar

Net profit of Midland Tar Distillers for the year ended 31 March was £190,690 (£206,805), after depreciation of £240,743 (£206,805) and tax of £166,130 (£165,551). Dividend is being maintained at 12½%.

Pfizer Ltd.

Agreement in principle has been reached for the acquisition by the Pfizer Group of the assets and product range of the Bayer Biological Institute at Exning, Suffolk. The agreement will provide for Pfizer's marketing of veterinary chemotherapeutic agents, excluding products in the canine hepatitis field. The new link will increase the range of activities of Pfizer's Agricultural and Veterinary Division, particularly in the biological field. Addition of the Bayer facilities to those of the Pfizer vaccine units at Sandwich should lead to further progress in the field of veterinary biologicals.

Chemical Process Co.

Following a counter-bid from Commercial Solvents of $15 per share, Diamond Alkali have raised their offer to a similar level for the shares of Chemical Process Co., manufacturers of ion exchange resins, polyester resins and adhesives. Previously Diamond Alkali and Chemical Process had agreed on merger terms which valued the latter company's shares at $12 a unit.

Deutsche Erdol

The Hamburg oil company Deutsche Erdöl AG announce that of the total company investment of DM100 million for the current year and of the same amount again for 1962, some 30% will be spent on petrochemical development. The share of chemical industry in the oil company's total turnover—last year of 5.7%—is to be increased considerably. DEA are 50% owners (with Continental Oil Co., of Houston, U.S.) of Condea Petro Chemie GmbH and joint owner (with Reichhold Chemie AG, Hamburg) of Oleonaphta Chemische Fabrik GmbH. The former company is to produce synthetic fatty alcohols and the latter alkyl phenols in the north German port of Brunsbüttelkoog. DEA are to pay a 1960 dividend of 12% (11%) on a capital of DM282 million.

Rumianca

The Turin, Italy, chemical producer Rumianca, whose capital now stands at 10,000 m. lire, announces for last year a turnover 17% higher than the 1959 figure of 8,050 m. lire despite marketing difficulties in the fertiliser field. After depreciations of 800 m. (750 m.) lire, 1960 net profit totalled 828 m. (590 m.) lire, permitting the payment of a dividend of 10% (same).

INCREASES OF CAPITAL

CHEMISCHE WERKE HÜLS AG is to increase its capital of DM180 m. in the "near future", according to its 50% owner Chemie - Verwaltungs - AG, of Frankfurt-on-Main. The nature of the capital increase is not yet known.

NOURY-RUMIANCA S.P.A., the company formed jointly by Noury-van der Lande, Holland, and the Rumianca concern of Turin to produce citric acid and calcium citrate at a plant being built at Avenza, Italy, is to raise its capital from 500 m. lire to 800 m. lire.

PECHINEY, the French chemical group, proposes an increase in its capital to a maximum of NF850 m. from the current level of NF423.2 m. This would either be carried out by incorporation of reserves of a cash issue, or both operations in one or several stages.

PFIZER LTD., Ramsgate Road, Sandwich, Kent. Increased by £1 million beyond the registered capital of £3 million.

SCHENECTADY-MIDLAND LTD., manufacturers of and dealers in wire enamels, varnishes, chemicals, etc., Springfield Chemical Works, Oldbury, Birmingham. Increased by £159,000 beyond the registered capital of £100.

SOUTH WALES CHEMICAL WORKS LTD., Frith Park, Walton on the Hill, Tadworth. Increased by £39,000 beyond the registered capital of £1,000.

YARSLEY RESEARCH LABORATORIES LTD., The Laboratory, Oaklands, Clayton Road, Chessington, Surrey. Increased by £19,000 beyond the registered capital of £1,000.

BRITISH CHEMICAL PRICES

GENERAL CHEMICALS

Acetic Acid. 10-ton quantities, 80% tech. in bulk, £77 per ton; in casks, £90 per ton; 80% pure in bulk, £83; in casks, £94; glacial, 98/100% in bulk, £93; in drums, £100.

Acetic Anhydride. Ton lots d/d, £128.

Alum. Ground, f.o.r., about £25.
MANCHESTER: Ground, £25.

Aluminium Sulphate. Ex-works, d/d, £15 10s to £18.
MANCHESTER: £16 to £18.

Ammonia, Anhydrous. Per lb., 1s 9d-2s 3d.

Ammonium Chloride. Per ton lot, in non-ret. pack, £33 2s 6d.

Ammonium Nitrate. D/d, 4-ton lots, £37 10s.

Ammonium Persulphate. Per cwt., in 1-cwt. lots, d/d, £6 13s 6d; per ton, in min. 1-ton lots, d/d, £123 10s.

Ammonium Phosphate. MAP., £106 per ton; DAP, £100 10s, per ton, d/d.

Antimony Sulphide. Per lb., d/d UK in min. 1-ton lots; crimson, 5s 8d d/d to 6s 2d; golden, 3s 11d d/d per lb. to 5s 4d d/d.

Arsenic. Ex-store, £45 to £50.

Barium Carbonate. Precip., d/d, 4-ton lots or more, bag packing, £41 per ton.

Barium Chloride. 2-ton lots, £45.

Barium Sulphate [Dry Blanc Fixe]. Precip. 2-ton lots, d/d, £39.

Bleaching Powder. Ret. casks, c.p. station, in 4-ton lots. £30 7s 6d.

Borax. Ton lots, in hessian bags, c.p. Tech. anhydrous, £60 gran., £47 10s; crystal £51; powder, £52; extra fine powder, £53; BP, gran, £56 10s; crystal, £60; powder, £61; extra fine powder, £62. £1 cheaper in 5-ply paper bags.

Boric Acid. Ton lots, in hessian sacks, c.p. Comm., gran., £78 10s; crystal, £87 10s; powder, £85 extra fine powder, £87; BP gran., £91 10s; crystal, £99 10s; powder, £97; extra fine powder, £99. £1 cheaper in paper bags.

Calcium Chloride. Ton lots, in non-ret. pack; solid and flake, about £15.

Chlorine, Liquid. In ret. 16-17 cwt. drums d/d in 3-drum lots, £41.

Chromic Acid. In 1-ton lots, per lb., 2s 2¾d.

Chromium Sulphate, Basic. Powder, d/d, per lb., 8½d; per ton, £79 6s 8d.

Citric Acid—Granular. In kegs, 1-4 cwt. lots, per cwt., £10 1s; 5-19 cwt. lots, per cwt., £9 17s; 1-ton lots, per cwt., £9 16s; packed in paper bags, 1-4 cwt. lots, per cwt., £9 13s; 5-19 cwt. lots, per cwt., £9 9s; 1-ton lots, per cwt., £9 8s.

Cobalt Oxide. Black, per lb., d/d, bulk quantities, 13s 2d.

Copper Carbonate. Per lb., 3s 6d.

Copper Sulphate. £79 5s. per ton less 2% f.o.b. Liverpool.

Cream of Tartar. 100%, per cwt., about £11 12s.

Formaldehyde. In casks, d/d, £40.

Formic Acid. 85%, in 4-ton lots, c.p., £91.

Glycerine. Chem. pure, double distilled 1.2627 s.g., per cwt., in 5-cwt. drums for annual purchases of over 5-ton lots and under 25 tons, £11 2s. Refined technical grade industrial, 5s per cwt. less than chem. pure.

Hydrochloric Acid. Spot, per carboy, d/d (according to purity, strength and locality), about 12s.

Hydrofluoric Acid. 60%, per lb., about 1s 2d.

Hydrogen Peroxide. Carboys extra and ret. 27.5% wt., £115; 35% wt., d/d, £138.

These prices are checked with the manufacturers, but in many cases there are variations according to quality, quantity, place of delivery, etc.

Abbreviations: d/d, delivered; c.p., carriage paid; ret., returnable; non-ret. pack., non-returnable packaging; tech., technical; comm., commercial; gran., granular.

All prices per ton unless otherwise stated

Iodine. Resublimed BP, under 1 cwt., per lb., 11s 6d; for 1-cwt. lots, per lb., 11s 3d.

Iodoform. Under 1 cwt., per lb., 24s 1d; for 1-cwt. lots, per lb., 23s 5d; crystals, 3s more.

Lactic Acid. Edible, d/d, 50% by wt., per lb., 16¾d; 80% by wt., 26½d; C.P., 50% by wt., per lb., 14½d; 80% by wt., 23d; dark tech., ex-works, 44% by wt., per lb. 9d. 1-ton lots, loaned containers.

Lead Acetate. White, about £154.

Lead Nitrate. 1-ton lots, about £135.

Lead, Red. Bases prices: 15-cwt. drum lots, Genuine dry red, £99 5s per ton; orange lead, £111 5s per ton; Ground in oil: red, £121 5s, orange, £133 5s.

Lead, White, Bases prices: in 5-cwt. drums, per ton for 2-ton lots, Dry English £112 5s; Ground in oil, £132 10s.

Lime Acetate. Brown, ton lots, d/d, £40; grey, 80-82%, ton lots, d/d, £45.

Litharge. In 5-cwt. drum lots, £104 5s per ton.

Magnesite. Calcined, in bags, ex-works, about £21.

Magnesium Carbonate. Light, comm., d/d, 2-ton lots, £84 10s under 2 tons, £97.

Magnesium Chloride. Solid (ex-wharf), £19 7s 6d per ton.

Magnesium Oxide. Light, comm., d/d, under 1-ton lots, £245.

Magnesium Sulphate. Crystals, £14 15s, ex-works.

Mercuric Chloride. Tech. powder, per lb., for 1-ton lots, in 28-lb. parcels, 20s; 5-cwt. lots, in 28-lb. parcels, 20s 6d; 1-cwt. lots, in 28-lb. parcels, 20s 9d.

Mercury Sulphide, Red. Per lb. for 5-cwt. lots in 28-lb. parcels, £1 10s 6d; 1-cwt. lots, in 28-lb. parcels, £1 11s.

Nickel Sulphate. D/d, buyers UK, nominal, £170.

Nitric Acid. 80° Tw., £35 2s.

Oxalic Acid. Home manufacture, min. 4-ton lots, in 56 lb. paper bags, c.p., about £125-£130.

Phosphoric Acid. TPA 1,700 ton lots, c.p., £103; BP (s.g. 1,750). ½-ton lots, c.p., per lb., 1s 4d.

Potash, Caustic. Solid, 1-ton lots, £95 10s; liquid, £36 15s.

Potassium Carbonate. Calcined, 96/98%, 1-ton lots, ex-store, about £76.

Potassium Chloride. Industrial, 96%, 1-ton lots, about £24.

Potassium Dichromate. Gran., per lb., in 5-cwt. to 1-ton lots, d/d UK, 1s 2¼d.

Potassium Iodide. BP, under 1 cwt, per lb., 9s 0d., per lb. for 1-cwt. lots, 8s 9d.

Potassium Nitrate. 4-ton lots, in non-ret. pack, c.p., £63 10s.

Potassium Permanganate. BP, 1-cwt. lots, per lb., 2s 0¼d; 3-cwt. lots, per lb., 1s 11¾d; 5-cwt. lots, per lb., 1s 11¼d; 1-ton lots, per lb., 1s 11d; 5-ton lots, per lb., 1s 10½d. Tech., 1-ton lots in 1-cwt. drums, per cwt., £10 3s; 5-cwt. in 1-cwt. drums, per cwt., £10 5s; 1-cwt. lots, £10 14s.

Salammoniac. Ton lot, in non-ret. pack, £47 10s.

Salicylic Acid. MANCHESTER: Tech., d/d, per lb., 2s 6d, cwt. lots.

Soda Ash. 58% ex-depot or d/d, London station, 1-ton lots, about £16 11s 6d.

Sodium Acetate. Comm. crystals, d/d, £75 8s.

Soda, Caustic. Solid 76/77%; spot, d/d 1-ton lots, £33 16s 6d.

Sodium Bicarbonate. Ton lot, in non-ret. pack, £12 10s.

Sodium Bisulphite. Powder, 60/62%, d/d 2-ton lots for home trade, £46 2s 6d.

Sodium Carbonate Monohydrate. Ton lot, in non-ret. pack, c.p., £64.

Sodium Chlorate. 1-cwt. crums, c.p. station, in 5-ton lots, about £87 per ton.

Sodium Cyanide. 96/98%, ton lot in 1-cwt. drums, £126.

Sodium Dichromate. Gran. Crystals per lb., 1s. Net d/d UK, anhydrous, per lb., 1s 1¾d. Net del. d/d UK, 5-cwt. to 1-ton lots.

Sodium Fluoride. D/d, 1-ton lots and over, per cwt., £5; 1-cwt. lots, per cwt., £5 10s.

Sodium Hyposulphite. Pea crystals, £38; comm., 1-ton lots, c.p., £34 15s.

Sodium Iodide. BP, under 56 lb. per lb., 11s 3d; 56 lb. and over, 11s 0d.

Sodium Lactate. Edible, 75%, per ton, £168, d/d free drums, 1-ton lots.

Sodium Metaphosphate. Flaked, paper sacks, £136.

Sodium Metasilicate. (Spot prices) D/d UK in 1-ton lots, 1-cwt. free paper bags, £29.

Sodium Nitrate. Chilean refined gran. over 98%, 6-ton lots, d/d c.p., per ton, £29.

Sodium Nitrite. 4-ton lots, £32.

Sodium Perborate. (10% available oxygen) in 1-cwt. free kegs, 1-ton lots, £129 10s; in 1-cwt. lots, £139 5s.

Sodium Percarbonate. 12½% available oxygen, in 1-cwt. kegs, £170 15s.

Sodium Phosphate. D/d, ton lots: di-sodium, crystalline, £40 10s, anhydrous, £89; tri-sodium, crystalline, £39 10s, anhydrous, £87.

Sodium Silicate. (Spot prices) 75-84° Tw. Lancs and Ches, 6-ton lots, d/d station in loaned drums, £12 10s; Dorset, Somerset and Devon, per ton extra, £3 5s; Scotland and S. Wales, extra, £2 17s 6d. Elsewhere in England, not Cornwall, extra, £1.

Sodium Sulphate [Desiccated Glauber's Salt]. D/d in bags, about £19.

Sodium Sulphate [Glauber's Salt]. D/d, up to £14.

Sodium Sulphate [Salt Cake]. Unground, d/d station in bulk, £10.
MANCHESTER: d/d station, £10 10s.

Sodium Sulphide. 60/62%, spot, d/d, in drums in 1-ton lots, solid, £38 2s 6d; broken, £39 2s 6d. Flakes, £40 12s 6d, crystals, £29 10s.

Sodium Sulphite. Anhydrous, £71 10s; comm., d/d station in bags, £27-£28 10s.

Sulphur. 4 tons or more, ground, according to fineness, £20-£22.

Sulphuric Acid. Net, naked at works, 168° Tw. according to quality, £11 10s—£12 10s per ton; 140° Tw., arsenic free, £9; 140° Tw., arsenious, £8.

Tartaric Acid—Powder and Granular. Per cwt.: 10 cwt. or more, in kegs, 300s; in bags, 292s per cwt.

Titanium Oxide. Standard grade comm., rutile structure, £178; standard grade comm., anatase structure, £163.

Zinc Oxide. Per ton: white seal, £100, green seal, £98; red seal, £95.

SOLVENTS AND PLASTICISERS

Acetone. All d/d. In 5-gal. drums, £124; in 10-gal. drums, £114; in 40-45 gal. drums, under 1 ton, £89; 1-5 tons, £84;

5-10 tons, £82; 10 tons and up, £80; in 500-gal. tank wagons, £79. In bulk minimum 2,500 gal. £75 per ton.

Butyl Acetate BSS. 10-ton lots, £165.

***n*-Butyl Alcohol BSS.** 10 tons, in drums, d/d, £137 10s.

***sec*-Butyl Alcohol.** All d/d. In 5-gal. drums, £168; in 10-gal. drums, £158 in 40-45 gal. drums, under 1 ton, £133; 1-5 tons, £130; 5-10 tons, £129; 10 tons and up, £128; in 400-gal. tank wagons, £125.

***tert*-Butyl Alcohol.** 5-gal. drums, £195 10s; 40/45-gal. drums: 1 ton, £175 10s; 1-5 tons, £174 10s; 5-10 tons, £173 10s; 10 tons and up, £172 10s.

Diacetone Alcohol. Small lots: 5-gal. drums, £185; 10-gal. drums, £175. 40/45-gal. drums: under 1 ton, £148; 1-5 tons, £147; 5-10 tons, £146; 10 tons and over, £145, in 400-gal. tank wagons, £142.

Dibutyl Phthalate. In drums, 10 tons, d/d per ton, £216; 45-gal. 1-4 drums, £222.

Diethyl Phthalate. In drums, 10 tons, per ton, £201; 45-gal. 1-4 drums, £207.

Dimethyl Phthalate. In drums, 10 tons, per ton, d/d, £194; 45-gal. 1-4 drums, £200.

Dioctyl Phthalate. In drums, 10 tons, d/d, per ton, £287; 45-gal. 1-4 drums, £293.

Ether BSS. 1-ton lots, drums extra, per lb., 1s 11d.

Ethyl Acetate. 10-ton lots, d/d, £137.

Ethyl Alcohol Fermentation grade (PBF 66 o.p.). Over 300,000 p. gal., 3s 10½d; d/d in tankers, 2,500-10,000 p. gal. per p. gal., 4s 0¾d. D/d in 40/45-gal. drums, p.p.g. extra, 2d.
Absolute alcohol (74.5 o.p.), p.p.g. extra, 2d.

Methanol. Pure synthetic, d/d, £40.

Methylated Spirit. Industrial 66° o.p.: 500-gal. and up, d/d in tankers, per gal., 5s 7½d; 100-499 gal. in drums, d/d per gal., 6s 0½d-6s 2½d. Pyridinised 66° o.p.: 500 gal. and up, in tankers, d/d, per gal., 5s 11d; 100-499 gal. in drums, d/d, per gal., 6s 4d-6s 6d.

Methyl Ethyl Ketone. All d/d. in 40/45-gal. drums, under 1 ton, £143 10s; 1-5 tons, £138 10s; 5-10 tons, £136 10s; 10 tons and up, £143; in 400-gal. tank wagons, £134 10s.

Methyl *iso*Butyl Carbinol. All d/d. In 5-gal. drums, £203; in 10-gal. drums, £193; 40-45 gal. drums, less than 1 ton, £168; 1-9 tons, £165; 10 tons and over, £163; in 400-gal. tank wagons, £160.

Methyl *iso*Butyl Ketone. All d/d. In 5-gal. drums, £209; in 10-gal. drums, £199; in 40/45-gal. drums, under 1 ton, £174; 1-5 tons, £171; 5-10 tons, £170; 10 tons and up, £169; in 400-gal. tank wagons, £166.

***so*Propyl Acetate.** 10 tons, d/d, 45-gal. drums £132.

***iso*Propyl Alcohol.** Small lots: 5-gal. drums. £118; 10-gal. drums, £108; 40/45-gal. drums: less than 1 ton, £83; 1-9 tons, £81; 10-50 tons, £80 10s; 50 tons and up, £80.

RUBBER CHEMICALS

Carbon Disulphide. According to quality, £61-£67.

Carbon Black. GPF: Ex-store, Swansea. Min. 3-ton lots, one delivery, 6¾d per lb.; min. 1-ton lots and up to 3-tons, one delivery, 7d per lb.; ex-store, Manchester, London and Glasgow, 7¾d per lb. HAF: ex-store, Swansea; Min. 3-ton lots, one delivery, 7¾d per lb.; min. 1-ton lots and up to 3-tons, one delivery, 8d per lb. Ex-store Manchester, London and Glasgow, 8¾d per lb ISAF: Ex-store Swansea, min. 3-ton lots in one delivery, 9¾d per lb., min. 1-ton lots and up to 3-tons in one delivery, 10d per lb. Ex-store Manchester, London and Glasgow, 10¾d per lb.

Carbon Tetrachloride. Ton lots, £83 15s.

India-Rubber Substitutes. White, per lb. 1s 4½d to 1s 7d; dark, d/d, per lb., 1s 0½d to 1s 4d.

Lithopone. 30%, about £57 10s for 5-ton lots.

Mineral Black. £7 10s-£10.

Sulphur Chloride. British, about £50.

Vegetable Lamp Black. 2-ton lots, £64 8s.

Vermilion. Pale or deep, 7-lb. lots, per lb., 15s 6d.

COAL TAR PRODUCTS

Benzole. Per gal., min. 200 gal., d/d in bulk, 90's, 5s 3d; pure, 5s 7d.

Carbolic Acid. Crystals, d/d bulk, per lb. 1s 3d; 40/50-gal. ret. drums extra, per lb., ½d.

Creosote. Home trade, per gal., according to quality, f.o.r. maker's works, 1s-1s 9d.
MANCHESTER: Per gal., 1s 3d-1s 8d.

Cresylic Acid. Pale 99/100%, per gal., 7s 9d D/d UK in bulk: Pale ADF, per imperial gallon f.o.b. UK, 8s; per US gallon, c.i.f. NY, 103.50 cents freight equalised.

Naphtha. Solvent, 90/160°, per gal., 5s 3d. heavy, 90/190°, for bulk 1,000-gal. lots, d/d, per gal., 4s 1d. Drums extra; higher prices for smaller lots.

Naphthalene. Crude, 4-ton lots, in buyers' bags, nominal, according to m.p.: £22-£30; hot pressed, bulk, ex-works, £40; refined crystals, d/d min. 4-ton lots, £65-£68.

Pitch. Medium soft, home trade, f.o.r. suppliers' works, £10 10s; export trade, f.o.b. suppliers' port, about £12.

Pyridine. 90/160, per gal., 20s about.

Toluol. Pure, per gal., 5s 2d; 90's 2,000 gal. in bulk, per gal., 5s 0d.
MANCHESTER: Pure, naked, per gal., 5s 6d.

Xylole. According to grade, in 1,000-gal. lots, d/d London area in bulk, per gal., 5s 5d-5s 7d.

INTERMEDIATES AND DYES
(Prices Normal)

***m*-Cresol** 98/100%. 10 cwt. lots d/d, per lb., 4s 9d.

***o*-Cresol** 30/31°C. D/d, per lb., 1s.

***p*-Cresol** 34/35°C. 10 cwt. lots d/d, per lb., 5s.

Dichloraniline. Per lb., 4s 6d.

Dinitrobenzene. 88/99°C., per lb., 2s 1d.

Dinitrotoluene. Drums extra. SP 15°C., per lb., 2s 1½d; SP 26°C., per lb., 1s 5d; SP 33°C., per lb., 1s 2½d; SP 66/68°C., per lb., 2s 1d.

***p*-Nitraniline.** Per lb., 5s 1d.

Nitrobenzene. Spot, 90 gal. drums (drums extra), 1-ton lots, d/d, per lb., 10d.

Nitronaphthalene. Per lb., 2s 5½d.

***o*-Toluidine.** 8-10 cwt. drums (drums extra), per lb., 1s 11d.

***p*-Toluidine.** In casks, per lb., 6s 1d.

Dimethylaniline. Drums extra, c.p., per lb. 3s 2d.

New Fast Curing Polyester Resin

Beck, Roller and Co. (England) Ltd., North Site, Speke, Liverpool 24, have introduced Filabond 8084, a new polyester resin that is said to cure very rapidly, allowing moulds to be cleared more frequently than when using conventional polyester resins. The resin was developed by the parent Reichhold Chemicals Group, U.S., and it is said that the rapid cure is associated with the use of ' booster ' systems which accelerate the process of polymerisation.

TRADE NOTES

Vinyl Plastic Resin

A new vinyl plastic resin, Pliovic M-70X, has been developed as a modifying material for plastisol moulding and coating compounds by the Chemical Division of the Goodyear Tyre organisation. The new resin is designed to lower the viscosity of liquid plastics moulding compounds within practical processing limits. Compounds made with the new resin are said to have better flow characteristics, improved stability and can be produced at lower cost. It is claimed that the resin's relatively small particle size allows excellent latitude in compounding without settling from the plastisol paste and increases adaptability of the resin in coating compounds which must pass through a fixed clearance in processing equipment.

Special Diisocyanates

Victor Blagden and Co. Ltd., Plantation House, Mincing Lane, London E.C.3, are now looking after the interests of the Carwin Co., North Haven, Connecticut, U.S., for their special diisocyanates used in the production of polyurethane rigid and flexible foams and polyurethane coatings. PAPI (polymethylene polyphenylisocyanate) and TODI (bitolylene diisocyanate) are particularly recommended for the manufacture of heat-resistant infusible polyurethane rigid and flexible foams which have good mechanical strength.

It is further stated that PAPI is also used as a ' back-bone ' for polyurethane foams and the polyurethane coatings produced with PAPI and TODI give harder and more solvent-resistant coatings than those obtained with toluene diisocyanate.

Nitrogen and Hydrogen Plants

Nitrogen plants designed to give either pure nitrogen or nitrogen with controlled amounts of additives, using town's gas, coke oven gas, L.P.G., blast furnace gas, light gas oil or kerosene as fuel, are described in a new pamphlet issued by the Incandescent Heat Co. Ltd., Cornwall Road, Smethwick, Birmingham. Also described is a hydrogen plant consisting of reformer, shift stages and CO_2 removal system.

Tower Packings

Hy-Contact tower packings, which include Intalox saddles, Pall rings, Lessing rings and Raschig rings in various materials, are the subject of an illustrated folder issued by Hydronyl Ltd., 14 Gloucester Road, London S.W.7. Tables show the range of sizes and materials available.

Titanium Pump

Carl Setterwall and Co. AB, Stockholm, have been appointed Swedish agents for the range of Gush pumps in titanium offered by Appleton and Howard Ltd., Salisbury, St. Helen's, Lancs (see C.A., 27 May, p. 850). In addition to titanium, the agreement covers the whole range of materials of construction in which the Gush pump is available and in demand.

NEW PATENTS

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

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

AMENDED SPECIFICATIONS

On Sale 12 July

Trichloromethane sulphenic acid derivatives. Geigy AG., J.R. **749 543**
Tetracycline antibiotic compositions. American Cyanamid Co. **822 422**

ACCEPTANCES

Open to public inspection 26 July

Process for the manufacture of titanium dioxide. Laporte Titanium Ltd. **873 611**
Diquaternary compounds. Wellcome Foundation Ltd. **873 691**
Production of substituted cyclohexanone peroxides. Laporte Chemicals Ltd. **873 614**
Process for the removal of hydrogen cyanide from coke-oven gases. Rheinpreussen Aktiengesellschaft Fuer Bergbau und Chemie. **873 609**
Process for the production of metallic niobium or tantalum by the electrolysis of melts. Ciba Ltd. **873 844**
Antibiotic compositions. American Home Products Corp. **873 692**
Apparatus and method for fractionation of gaseous mixtures. Air Products Inc. **873 427**
Dyeable polymeric products and their preparation. Montecatini Soc. Generale per l'Industria Mineraria E. Chimica. **873 830**
Preparing an aqueous oxidising solution containing alkali and alkaline earth chlorite. Grunaw, H., and Mellbin, B. **873 554**
Anthraquinone vat dyestuffs and process for their manufacture. Ciba Ltd. **873 617**
Process for the production of valuable gaseous hydrocarbons. Koppers GmbH, Heinrich. [Addition to 787 829.] **873 486**
Mycobacteriostatic compositions. Monsanto Chemicals Ltd. **873 602**
Process for preparing highly crystalline high molecular weight polymers of ethylene and catalysts therefor. Montecatini Soc. Generale per l'Industria Mineraria E Chimica. **873 831**
Moulding compositions. Du Pont de Nemours & Co., E. I. **873 353**
Cross-linked cellulosic fibrous products and methods of making them. Rohm & Haas Co. **873 492**
Production of alpha, beta-unsaturated carboxylic acid amides, acids and esters. Badische Anilin- & Soda-Fabrik AG. **873 603**
Trialiphatic hydrocarbyl phosphites. Hooker Chemical Corp. **873 495**
Process and intermediates for preparing steroid compounds. Smith Kline & French Laboratories. **873 633**
Catalytic polymerisation. Union Carbide Corp. **873 498**
Stability of polyether glycol urethane products. General Tire & Rubber Co. **873 697**
Separation of substantially pure phenol from reaction mixtures by distillation. Rütgerswerke-AG. **873 604**
Ion-exchange membranes. Imperial Chemical Industries Ltd. **873 520**
Steroids and the manufacture thereof. Upjohn Co. **873 605, 873 608**
Polysulphonamides compositions. Imperial Chemical Industries Ltd. **873 606**
Processes for production of low permeability carbon. General Electric Co. Ltd. **873 607**
Hardeners for aminoplast resins. Henkel & Cie. GmbH. **873 699**
Fluid compositions comprising (acetyl-salicyclic acid)-anhydride. Upjohn Co. **873 526**
Manufacture of resorcinol. Distillers Co. Ltd. [Addition to 739 907 and 775 813.] **873 676**
Rubber bonding agents Borg-Warner Corp. **873 358, 873 359**
Polymeric β-pinene emulsions. Lubrizol Corp. **873 452**
Conversion of ammonium thiocyanate to ammonium sulphate. Bergwerksverband GmbH. **873 453**
Method of and apparatus for making foamed polymeric structural materials. Koppers Co. Inc. **873 443**
Production of unsaturated aliphatic aldehydes. Distillers Co. Ltd. **873 712**
Process for the preparation of ϵ-ketonic carboxylic acids. Chemische Fabrik Naarden N.V. **873 455**
Methods of absorbing carbon dioxide. Vetrocoke S.p.A. **873 462**
Compositions for the control of soil dwelling nematodes. Dow Chemical Co. **873 463**
Testing feed for hydrocarbon conversion process. Esso Research & Engineering Co. **873 863**
Process for the preparation of olefin oxides. Dow Chemical Co. **873 864**
Hydrocarbyltin succinates and their use in the stabilisation of vinyl halide resins. Union Carbide Corp. **873 865**
Epoxy esters derived from cyclopentadienes. Esso Research & Engineering Co. **873 868**
N-methylpiperid-4-yl *o*-chloro-*p*-(*N*-butyl) aminobenzoate and acid addition salts thereof. S.I.M.E.S. S.p.A. **873 468**
Protective agents against termites. Farbenfabriken Bayer AG. **873 590**
Magnesium aluminium silicates and their preparation. Mallinchrodt Chemical Works. **873 506**
Catalytic polymerisation. Union Carbide Corp. [Divided out of 873 498.] **873 499**
Solutions of aromatic linear polyesters and shaped bodies produced therefrom. Farbenfabriken Bayer AG. **873 591**
Polyurethane plastics. Farbenfabriken Bayer AG. **873 665**
Process for obtaining organically substituted hydrazines. Farbenfabriken Bayer AG. **873 447**
Process for producing L-glutamic acid by bacterial fermentation. Ajinomoto Co. Inc., and Sanraku Distillers Co. Inc. **873 448**
Production of polyethylenes and catalyst therefor. Grace & Co., W. R. **873 596**
Process for the production of carboxylic acids. Shell Internationale Research Maatschappij N.V. **873 738**
Method of making polyurethane filamentary material. United States Rubber Co. **873 648**
5-Hydroxy-α-alkyltryptophans. Upjohn Co. **873 777**
Process for the production of anhydrous acetone isohydrazone. Farbenfabriken Bayer AG. **873 669**
Antibacterial agents. Beecham Research Laboratories Ltd. **873 533**
Secondary amines. Farbenfabriken Bayer AG. **873 780**
Method of combating slime-forming microorganisms in industrial water. Shell Internationale Research Maatschappij N.V. **873 800**
Sulphanilamide-pyrimidines and acid addition salts thereof and a process for the manufacture of same. Hoffmann-La Roche & Co. AG, F. **873 781**
Process for the production of high molecular weight polyoxymethylenes. Farbenfabriken Bayer AG. **873 673**
N - Methylpiperid-4-yl *o*-chloro-*p*-aminobenzoate and a process for its preparation. S.I.M.E.S. S.p.A. **873 469**

Market Reports

FERTILISER DEMAND REMAINS QUIET

LONDON The movement to the textile, plastics and the other main consuming industries against contracts has covered good volumes while the flow of new business has been fairly good for the period. Most of the routine soda products are in steady request and prices are maintained at recent levels, but copper sulphate has further declined to £79 5s/ton less 2% f.o.b. Liverpool.

Demand for fertilisers is quiet, being unaffected by the lower prices announced by the producers. Conditions in the coal tar products market are little changed with a steady outlet for available supplies of tar acids.

MANCHESTER There were few price changes of any consequence for heavy chemical products. A fair volume of new business on both home and overseas accounts has been evident, much of it being for prompt or relatively near delivery. Supplies of potash and soda compounds are finding a reasonably steady outlet, as are also refined glycerine, hydrogen peroxide, borax and boric acid, while a fair movement into consumption of the barium compounds, formaldehyde, arsenic and a wide range of general chemicals is reported. A steady demand continues for most of the light and heavy tar distillates.

SCOTLAND The trading position has remained fairly active during most of the past week in the heavy chemicals market, with the bulk of demands against immediate requirements. Quantities have again been well maintained, and in particular those pertaining to the textile industries. For the most part, prices have remained at a steady level.

Although generally speaking demands for agricultural chemicals was quieter, there has been some activity for end of season requirements. There was little change to report in regard to the export market which continues steady.

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PATENTS & TRADE MARKS

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Model No. 6 ROTO CUBE MIXER, stainless steel construction, 4 ft. cube, with bolted on cover, feed port and discharge connection. Mounted in ball bearing pedestals with vee belt drive from 7½ h.p. 400/440/3/50 cycles motor with starter.

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No. 7 SWEETLAND PRESSURE FILTER by **Dorr Oliver,** filter body cast iron construction, 2 ft. 1 in. dia. × 6 ft. 10 in. long internally, 20 mild steel woven wire leaves spaced at 4 in. with sight glass connections. Suitable 50 p.s.i. w.p.

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