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I.C.I. Cut Prices of Arcton, Solvents, Etc.

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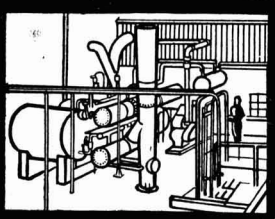

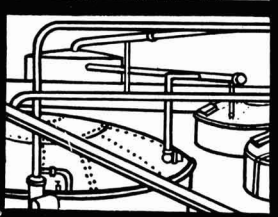

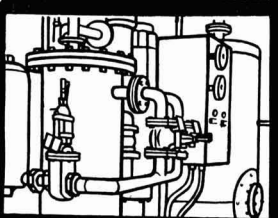

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INDEX TO ADVERTISERS

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

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CHEMICAL AGE

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BOOST FOR PHOSGENE

PHOSGENE, the deadly poison gas of World War I, is now a vital chemical intermediate. Output in the U.S. of 5 million lb. in 1957 is this year expected to rise to more than 57 million lb., and will, it is estimated, be around 230 million lb. by 1965. Actual phosgene capacity in the U.S., which totalled 56 million lb. in 1958, is likely to reach 122 million lb. this year and by 1962 may total 221 million lb.

In this country, Imperial Chemical Industries Ltd. are installing a phosgene plant at Fleetwood with a capacity of 10,000 tons/year. First news of this was given in CHEMICAL AGE, 24 September, p. 496. The plant is due to be completed by the middle of 1961 and will provide the phosgene required for their new isocyanate plant on the same site. Reason behind the sudden growth in phosgene capacity and production is the expansion in demand for toluene disocyanate, the starting material for polyurethane resins.

As stated in C.A., 27 August, p. 311, U.K. demand for polyurethane foams is currently about 20 million lb. a year, which could rise to 100 million lb. by 1965.

U.S. consumption of rigid and flexible urethane foams in 1960 is estimated at over 100 million lb.; by next year between 120 million and 185 million lb. will be consumed and by 1965 between 300 and 360 million lb. may be expected to be used.

Less well known but of considerable potential importance are urethane-based coatings. Present TDI use in coatings in America is about 500,000 lb. a year, but during the next few years, several million pounds could be used in coating applications.

There are, of course, other end-uses which will affect phosgene consumption. Polycarbonate resins, for instance, are expected to account for 1 million lb. of phosgene in the U.S. this year, rising to a possible 30 million lb. by 1965. Carbamates are also expected to take more phosgene during the next five years, rising from 6 million lb. in 1960 to 30 million lb. by 1965. Other established phosgene uses include the production of organic carbonates and chloroformates, i.e., tranquillisers, which this year are expected to amount to between 1.2 million and 1.3 million lb.—a 62% increase on 1958 production.

With the rise in phosgene consumption, capacity will also increase. Manufacture is relatively simple, carbon monoxide and chlorine being passed over activated carbon with an excess of carbon monoxide. There are two major considerations—safety and the availability of carbon monoxide and it is the latter which present the main economic problem in manufacture. Another important factor is that 70% by weight is chlorine and consumption of 230 million lb. of phosgene in the U.S. by 1965 will mean a usage of 161 million lb. of chlorine—so the chlor-alkali industry has a vital interest in projects to raise phosgene capacity.

As already stated, I.C.I. plan a major extension of their phosgene capacity (their General Chemicals Division is currently raising chlorine capacity at Runcorn and Fleetwood by 80,000 tons/year). In the U.S., the proposed expansions in TDI production by E. I. du Pont de Nemours

and Co., National Aniline Division of Allied Chemical Corporation, Mobay Chemical Co., and Nopco Chemical Co., will call for an estimated 175 million lb. of phosgene or more next year, or 57 million lb. of additional phosgene output.

Interested in phosgene production in the U.S. are Columbia-Southern, with a small unit capable of making 10 lb. to 200 lb. lots of phosgene chemicals. Hooker Chemical Corporation were former phosgene producers, but gave up production several years ago. With plenty of chlorine and carbon monoxide available, however, this company has a good incentive to get back into the running.

Stuaffer Chemical Corporation recently offered phosgene for sale from their Richmond, Calif., plant, while in 1959 Ethyl Corporation of America also produced and sold phosgene. Of 12 known U.S. producers, only three, Delmar Chemical, S. and W. Chemical Co., and Van De Mark Chemical Co., with total capacities of 16 million lb. sell on the open market and since Delmar consume half their production, only some 13 million lb. is available for external sale.

Phosgene producers generally set up their own plants in close association with their own production lines. This applies in the U.K. and in West Germany, where Bayer are the main producers, as well as in the U.S.

U. K. Consumption

Consumption pattern in the U.K. is different of course, there being no manufacture yet in this country of polycarbonates, or much in the way of carbamates or urethane surface coatings. I.C.I. are the only producers of phosgene and of TDI, which represents the only major tonnage outlet, reportedly taking just over 1 ton of phosgene for each ton of TDI produced. Several years ago the use of phosgene as an explosive stabiliser—reacting ethyl aniline with phosgene to produce a substituted urea derivative—called for about 200 tons/year of phosgene; this use has largely dropped away. An important use of phosgene in the U.K., which has been developed during the last decade or so, is in the production of urethane and urea derivatives for use as selective weedkillers.

Other uses, which like this and TDI, are based on amine reactions, produce carbamyl chlorides; further behind is the use of phosgene as an intermediate to produce ketones and the dyestuff methyl violet. The pharmaceutical industry finds use for derivatives of phosgene in the tranquilliser, meprobamate. It is thought that the future will lead to an expansion in the U.K. of phosgene end-uses, with the development of polycarbonates and a range of carbamates.

As previously stated the manufacture of phosgene involves a relatively simple reaction, but the TDI process calls for high pressures and high temperatures with a highly toxic and corrosive material—involving high capital expenditure. General Aniline and Film, however, have a solvent route to produce TDI by the phosgenation of amines at ordinary temperatures and pressures. G.A.F. are not themselves producers of TDI and as far as is known the process is not used currently.

Ministry Meeting Agrees to More Research on Seed Dressing Dangers

FURTHER experimental work is to be done on the dangers of seed dressings to wild life. This was decided at a meeting of all interested organisations held at the Ministry of Agriculture on 20 December. Aim of the meeting was to exchange views on the available evidence and to explore means of minimising undesirable effects.

Represented at the meeting were the Association of British Manufacturers of Agricultural Chemicals; National Association of Corn and Agricultural Merchants; Nature Conservancy; Council for Nature; National Farmers' Union; Country Landowners Association; Laboratory of the Government Chemists (D.S.I.R.); Department of Agriculture for Scotland and the Ministry.

The following points were agreed:

(a) Seed dressings play a very valuable part in agricultural production;
(b) Not all seed dressings present a hazard to wild life;
(c) There is evidence that seed dressings containing dieldrin, aldrin, and heptachlor, which in other respects are particularly valuable in present circumstances, can kill birds that eat dressed seed; and there is strong circumstantial evidence that deaths occur from this cause, particularly when sowing conditions are difficult;
(d) There is also some evidence that deaths of foxes and other predators may have occurred through eating birds that have died through ingesting these chemicals.

It was agreed that further experimental work will be done. Arrangements have already been made for collaborative experimental work by the Ministry of Agriculture, and the Laboratory of the Government Chemist, including examination of a limited number of bodies of birds and foxes that will be sent in by the Ministry's Pests Officer after an investigation of local circumstances. Collaborative research will continue between the manufacturing companies and the Ministry of Agriculture, Fisheries and Food.

Publicity will be arranged by the Ministry and all parties concerned so as to warn farmers about the risks to wild life; warning against illegal spreading of poisoned grain, referring to the Protection of Birds Act, will be included. This publicity will also draw attention to the care needed to dispose of any surplus treated seed and will warn against mixing it with untreated seeds or feeding it to livestock.

Advice issued by the manufacturers, with the dressings or dressing plants, will be modified so as to ensure that wheat bulb fly dressing is employed only where and when there is a real need to use it to control this pest. Seed merchants and manufacturers of dressings will continue to warn users of the risks from dieldrin, aldrin and heptachlor dressings and draw attention to the extra risk from the higher dosage of insecticide; this will enable landowners and others to use their judgment more critically when deciding on the choice of dressing.

The Departments will review the position after spring of 1961 when further information should be available.

I.C.I. Cut Prices of Arctons, Solvents, etc.

PRICE cuts, effective from 1 January, have been made by the General Chemicals Division of Imperial Chemical Industries Ltd, affecting the prices of a number of chemicals used in many different industries. These cuts follow recent I.C.I. reductions in the prices of polythene and propylene glycol.

Reductions of £1 and £5 a ton respectively are announced for the two solvents trichloroethylene (a metal degreasant) and perchloroethylene (dry-cleaning solvent) following increased capacity. Further cuts should be possible, say I.C.I., when the new £1 million solvents plant is completed by General Chemicals Division at Runcorn in the middle of 1961. Capacity of this new plant will be 20,000 tons/year, raising current capacity for the two solvents by 25%.

Prices of most of the Arcton fluorocarbon propellants and refrigerants are also being reduced as is the price of Alloprene chlorinated rubber (used in paints, adhesives and printing inks), which will be £10 a ton cheaper. I.C.I. claim the world's largest capacity for chlorinated rubber.

The prices of methylene chloride (the basis for most solvent-based paint strippers) and of technical chloroform have been reduced by £3 a ton and £20 respectively. These cuts stem from increased production capacity for higher chloromethanes.

Project News

THREE NATIONS LINK FOR £4 M. EIRE FERTILISER PROJECT

A CHEMICAL complex, costing £4 million, is to be set up by Irish, Belgian and Canadian interests at Kilmokea, Co. Wexford.

The plant will produce 115,000 tons of 100% sulphuric acid per year using pyrites from St. Patrick's copper mines. Superphosphates will be manufactured from the sulphuric acid and imported phosphate rock and compound fertiliser from ammonia from the projected £7 million nitrogenous fertiliser plant in the Midlands of Ireland.

The interests involved in this new venture are Shamrock Superphosphates, a joint Irish-Belgian company, St. Patrick's Copper Mines, the Canadian-owned company that owns the Avoca mine and other unspecified Canadian interests.

A company to be known as **Shamrock-Avoca Ltd.** has been formed by these interests to prepare for the establishment of the new industry. Production is expected to begin in 1963.

Upjohn Expansion Plans for Crawley Plant

● PLANT and offices of **Upjohn of England Ltd.,** pharmaceutical manufacturers, at Crawley, Sussex, are to be extended by a floor space of 50,000 sq. ft. because of an ever increasing amount of trade both in the home and export markets. Completion is scheduled by mid-1962. The new plant will produce all the existing Upjohn range, including novobicin, tetramycin, neomycin, corticosteroids and other pharmaceutical products. The open style of the interior architecture which is prevalent in their offices throughout the world will be retained and improved. The new offices will be built upon the existing office block and the fascia of the building will be redesigned to give a horizontal effect keeping the appearance of the building low. The manufacturing plant has been carefully designed and the new equipment, which is the most advanced in its field, will be employed at maximum efficiency in the manufacture of Upjohn preparations.

Part of the new office extension will be used to house the expanding European Division under the management of Upjohn of England's chairman Mr. J. A. Braun; there are now subsidiaries in Belgium, Italy and France, besides agents in every other European country.

S.A.I. Link with Steel Firm for Slag Production

● To meet the big rise in demand for all types of fertiliser, Scottish Agricultural Industries have authorised a £1,250,000 expansion programme. This will be spent on converting the Sandilands Works at Aberdeen from the production of compound fertilisers based upon superphosphate to the production of ammonium phosphate and the more concentrated compounds which can be made from it. Further small expenditure is being incurred to enable limited quantities of concentrated fertilisers to be made at the Ayr works.

This programme, already announced, is referred in the annual report. Sales of S.A.I. fertilisers for the year ended 30 September were a record.

New techniques now being adopted by some British steel companies are raising the strength of the raw slag they produce. S.A.I. have entered into an agreement with Richard Thomas and Baldwins at their Redbourn Works, Scunthorpe, to grind and market the high strength slag which will be made available shortly. Capital expenditure of about £500,000 has been authorised to provide the necessary facilities on site. The availability of this slag, according to the board, will materially improve the company's competitive position in the basic slag market.

Common Market Threatens I.C.I. Cyanide Exports

SEVERE competition from European producers in markets where much of the output of Cassell Works—cyanide and newer products—is sold was the subject of a recent warning by Mr. A. Speyer, commercial director of I.C.I. General Chemicals Division. Formation of the European Economic Community had helped their oldest and most formidable competitor—West Germany, as well as two new ones, France and Italy. It was not much compensation to be associated with the European Free Trade Association because it was in the countries of the Common Market that they had to look for their greatest expansion in exports.

It was in the C.M. that the greatest industrial expansion was taking place—the 'Six' were growing at a rate which was tremendous and before long the population of the countries would be more or less equal to that of the U.S. If Cassel Works were to retain their position in the export field, they would have to maintain efficiency and keep down the costs of production on the plants.

Mr. Speyer, who was presenting long-service awards, said that difficulties in the car and electrical appliance industries might also affect I.C.I. Again every effort had to be made to keep down costs, because a large slice of the products made at Cassel Works was incorporated in other I.C.I. products which also had to meet severe competition in world markets. That was why everything possible was being done to broaden the basis of sales by finding new uses for their products so that the works were not too dependent on any one branch of industry for sales.

During 1960, Cassel Works had a larger share of exports than any other works in the General Chemicals Division. It was expected that total 1960 deliveries of methyl methacrylate to Plastics Division for Perspex would be half as much again as they were in 1959. Three-quarters of cyanide output were exported, representing about a quarter of all the exports of the division. Competitors who made cyanide by more modern processes were now springing up in Canada, Japan and Italy and if I.C.I. was to go forward new ways of making cyanide more cheaply would have to be devised.

Mr. Speyer also spoke of record outputs for chlorine and of sales of chlorobenzine at the rate of several thousand tons a year, compared with a few hundred tons a few years ago.

Food Additives Committee Replaces Preservatives Sub-committee

THE Food Standards Committee has appointed a Food Additives and Contaminants Sub-committee to consider problems in relation to all substances added to food, whether deliberate or not.

The Committee consists of: Sir Charles Dodds, F.R.S. (chairman), Courtauld Prof. of Biochemistry of the University of London; C. A. Adams, F.R.I.C., Barrister-at-Law, at one time Director of Food Standards Division of Ministry of Food; A. Glover, F.R.I.C.; W. A. Godby, F.R.I.C.; E. B. Hughes, F.R.C.I. chief chemist of J. Lyons and Co. laboratories; Dr. J. M. Johnston, medical officer of Department of Health for Scotland; Prof. A. Kekwick, of the Department of Medicine of Middlesex Hospital, London; Dr. H. E. Magee, medical officer of the Ministry of Health; P. McGregor, F.R.I.C., of the Government Chemist Department; J. R. Nicholls, F.R.I.C.; Prof. B. S. Platt, Director of Human Nutrition Department of the Medical Research Council.

The Food Additives and Contaminants Sub-committee replaces the Preservatives Sub-committee set up in 1951 and which has now completed work.

★ I.C.I., who ended 1959 by cutting the prices of trichloroethylene and perchloroethylene, end 1960 the same way with cuts of £1 and £5 respectively for these two solvents, along with lower prices for Arctons, Alloprene, methylene chloride, technical chloroform and methyl methacrylate. From 1 January, the company cut the price of propylene glycol, along with Shell Chemical, and recently slashed titanium and polythene prices.

Throughout the whole of 1960, I.C.I. have in fact made regular price cuts—affecting the cost of chemicals to practically every other industry. The same can, of course, be said of the company's competitors and 1960 can well go on record as a year in which the chemical industry more than did its share to peg the cost of living.

★ QUITE apart from the influence of seasonal festivities, the task of designing a piping system which has 10 anchor points, two re-entrant loops and 23 branches is enough to make any engineer stagger a bit. However, such a problem was recently solved in about four hours by the English Electric Co.'s postal computing service. This, apparently, is not a means of computing how much revenue was raised by the Post Office on parcels, greetings cards, etc., this year, but a service whereby tricky pipeline problems encountered in chemical plants, oil refineries, etc., can be dealt with by large digital computers.

I learn that the English Electric computing bureau at Kidsgrove, Staffs, and Kingsway, London, has recently supplied the answer to its 1,000th problem on the design of pipe systems. The repetition involved in flexibility calculations, first for individual pipe sections, and at a later stage for whole branches, makes this work ideally suited to the digital computer. More rigorous methods of analysis are possible, and stressing of complicated multi-anchor systems can be worked out in double quick time.

★ THE season of goodwill heralded agreement on the controversial subject of seed dressings and wild life—an agreement which a year or two ago seemed impossible. But over recent months, nature organisations have been coming round to the view that the chemical manufacturers have been doing their utmost through research and technical service to minimise the dangers to wild life with the use of certain dressings.

It was agreed (p. 1072) at a meeting of all interested organisations, that seed dressings are of great value, that not all present a danger, but that some—notably dieldrin, aldrin and heptachlor—can present a danger. That the Council for Nature and the Nature Conservancy should agree with chemical makers, seed merchants and farmers along these lines is a great step forward.

Research to minimise undesirable effects will continue both in official laboratories and by manufacturers; a Ministry-sponsored publicity campaign will warn farmers about risks to wild life and chemical makers will modify their technical advice to farmers.

★ SVENSKA Esso's plans for a steam cracker at Stenungsund, north of Gothenburg—due on stream by mid-1963—appear to have put an end to studies by Kooperativa Förbundet for a Helsingborg project which would have included both cracker and refinery. The reason is not hard to find—Swedish needs are not enough to warrant two crackers.

Svenska Esso start building in 1961 aiming at an input exceeding 250,000 tons. An associated refinery cannot be discounted, but Esso may draw supplies from their Oslo and other refineries. The steam cracker will produce 75,000 tons of ethylene for supply to a 15,000 tons-a-year polythene plant (equally owned by Union Carbide and Stockholm Superfosfat Fabriks A.B.) and to a 10,000 tons-a-year ethylene oxide plant built by Mo and Domsjö A.B. for anti-freeze and detergents. Polythene production is mainly designed for film use.

The Helsingborg scheme had official favour because more Swedish capital would have been involved. The project was led by Kooperativa Förbundet and Standard Oil of Indiana and backed by Reymersholms Gamla Industri A.B., Skanska Ättikfabriken A.B. and Uddeholms A.B.

★ DID you know that, in Spanish, *el respqebrajamiento* means the cracking of soap? Or that, in French '*turbidity point*' *is rendered as le point de trouble?* Do you lie awake at night wondering what the Rumanian is for 'centrifugal disc atomiser'? I have been poring over a little book which gives, in 19 languages, a glossary of terms used in the detergents industry. As a result, I shall never be able to shave again without reflecting that shaving soap is *parranajosaippua* in Finland; shall never help to wash the dishes without thinking wistfully of Portugal, where a dishwashing agent goes by the exotic name of *produto para lavar louça.*

The book comes to me from Unilever Ltd., from whom I learn that the author, Dr. G. Carriere, who a few years ago was chief chemist at Lever's Zeep Maatschappij, Vlaardingen, got the idea of the glossary through attending international conferences, where there was often a bit of a mix-up over technical terms. He started compiling a glossary for his own use, but found it was useful to others, with the result that it has now been published as a 150-page book by the Elsevier Publishing Co., Amsterdam, price £1 1s.

★ IF the public needed any reminder that phosgene is a poison gas, it came when after use of a fire extinguisher on a fish pan blaze had put 76 citizens of Leeds in hospital on 21 December. Fortunately none of them was detained for long.

But as Leeds City Fire Brigade said the decomposition of carbon tetrachloride by contact with hot metal produced a number of gases, including phosgene, carbon monoxide and carbon dioxide.

Phosgene, a chemical warfare weapon of World War I, is now playing a valuable role as an intermediate in the production of a wide range of products unknown in 1914-18, such as polyurethane foams and urethane coatings, carbamates and polycarbonates. Production and uses of phosgene are discussed in the leader, p. 1071.

★ SINCERE thanks from my C.A. colleagues and myself are due to the countless members of the industry who sent us Christmas cards, diaries and calendars.

One of the most striking cards of 1960 was that of Lord Hailsham, which contained a "Song for a Minister of Science."

Sing a song of *particles*
Infinitely small,
Tissue-cultured specimens
From off your stomach wall.

Eight and forty chromosomes,
Dividing into two,
Hordes of hungry phagocytes
Like Tigers in the zoo;

Endomicine secretion
From a ductless gland,
Amino nucleic acid chains
Dancing hand in hand;

Take mesons from a synchroton
To fix the hellish brew,
For proton and electron,
That's me,—and you.

But tell me, dear Professor,
Explain it if you can,
If microscopic entities
Are all that's left of man.

Yes, tell me, dear Professor,
Explain it if you please,
Why men through countless ages
Have believed they're more than these.

If our love is but a hormone,
And our eye an optic lens,
And *beauty* but an enzyme,
Why is homo sapiens?

If our mind is just a magnet,
And our will a chemist's shop,
And if death of our life sentence
But the last full stop,

Why then, my friend, is consciousness
A thing you cannot hope
To see upon the side of your
Electronmicroscope?

For if Descartes was a donkey,-
And I'm sure you'd have him so,
You'll have to rub out not just 'sum'
But also 'cogito.'

Alembic

DORR-OLIVER PROCESS RECOVERS SULPHURIC ACID AND IRON FROM EFFLUENTS

A PROCESS for the recovery of iron and acid from ferrous sulphate bearing effluents that will eventually yield sulphuric acid at a cost of approximately £7 per ton, including amortisation and fuel, has been developed by the Dorr-Oliver Co. Ltd., Croydon, Surrey.

The process uses monohydrate cake containing some 7% surface moisture and 1½ to 2½% free acid obtained by the treatment of spent steel pickle liquor by the Nordac submerged combustion system. In this system the concentration of the spent liquor is raised from 5-12 to 50% at which point the ferrous sulphate settles out as the monohydrate. The monohydrate sludge obtained is dewatered by filtration or centrifugation giving a cake with a water content of between 7 and 3%.

The Dorr-Oliver process involves a two-compartment fluidised bed roaster using the top compartment, and the hot gases from the compartment below, to dry the monohydrate cake, which is converted to a free flowing powder.

Decomposition

Decomposition is carried out at 700°C in the lower compartment where the fuel is blown into a fluid bed together with monohydrate feed, now in powder form. The sulphur dioxide bearing products of combustion pass through an intermediate cyclone where the dust carried over by the other gases is collected and is fed to a products conveyor as is also product discharge from the bed. The hot, clean gases pass upwards to the compartment above where they are used to fluidise another bed and to drive off the surface water in the wet feed. Gases, leaving the system at 300°C, will contain over 14% sulphur dioxide measured on a dry basis.

Apart from the 50% acid recovery from the pickle liquor obtained by Nordacs, the process can be expected to yield 0.465 tons of acid and 0.4275 tons of iron oxide per ton of monohydrate feed.

The economics of the system are attractive. The composition of the waste liquor greatly affects the costs of the Nordac process making it difficult to arrive at a definite cost figure, but, based on a market value of £2 per ton for the monohydrate filter cake, the total cost of the acid production would be in the region of about £7 per ton, when oil is used as the fuel. This cost, which includes fuel, amortisation and labour, is off-set by the resale value of iron oxide which is between £2 and £3 per ton.

Using monohydrate cake with a composition of: $FeSO_4 . H_2O$, 91%; H_2SO_4, 1.5%; H_2O, 7.5% and with Shell KG heavy fuel for combustion the following yields could be expected, per ton of monohydrate feed: % SO_2 gas strength, dry basis, 14.525; S.c.f. air, 24,300; Blower abs. power Kwh, 15.175; Oil, lb. 153.75; Oil. gall., 16.2.

Coal, coke breeze or pyrites can be used as fuel, in the place of oil, but coal can give rise to stack problems, and all three would entail rise in capital and power costs for their preparation as ground feed.

Designs are so far available to handle 1, 1½, 2 and 2½ tons per hour of the filter cake; larger capacities in single units are possible but, for flexibility, it is preferable to operate multiple units in parallel.

The liquor obtained from steel plate pickling is the ideal, as the monohydrate is easily obtained. Such a monohydrate was used by the Dorr-Oliver Co. in their test runs at Dorking. It came from Port Talbot, and is the Lurgi source of monohydrate supply.

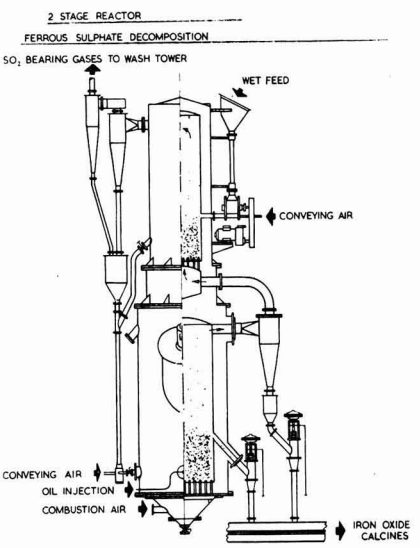
It is not quite so easy to obtain a monohydrate of suitable crystal size from titanium liquors because of the way the septahydrate settles out at a very early stage. However, Nordac's have succeeded in producing a cake which Dorr-Oliver have been able to decompose in their Dorking laboratories. Also British Titan Products have patented a process whereby the septahydrate may be converted to free flowing monohydrate powder.

Dorr-Oliver 16 ft. diameter fluid bed roasters have been in operation for a year at the Pyewipe Works of British Titan Products Ltd. In this instance the monohydrate is obtained from Kestner spray dryers, which are fed with the slurry from the by-product liquor of titanium dioxide preparation from ilmenite. Acid production of up to 70 tons per day per reactor is being achieved and the oxide, containing an average of 1% sulphur, is being sold as blast furnace feed. Chemical Construction (G.B.) Ltd., were the main contractors.

Other Processes

There are several other systems for the recovery of the monohydrate, such as the autoxidation, the Ruthner and the Zahn process, which all employ evaporation of the pickle liquor in the first stage to obtain the monohydrate. Iron oxide recovered by the Ruthner process is re-saleable to steel mills and, according to U.S. figures given in an article 'Evaluation of waste pickle liquor treatment' by T. F. Barnhart, the process cost per of acid, offset by the sale of oxide at $8 per ton, is in the region of $35.40 to $31.80 per ton according to plant size.

Other methods include the Belle Fons process, which operates under a vacuum, but which has so far only reached the pilot plant stage, and an electrodialysis process.



A Dorr-Oliver dryer/roaster. Such units are supplied with a blower capable of passing, for example, 900 s.c.f.m. against a back pressure of 5.5 p.s.i.g., all instrumentation which would make operation virtually automatic, supporting steel work with platforms and ladders and necessary refractory and lagging

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Unilever Oil and Ice-Cream Research in Surrey

A new laboratory which will carry out oil and ice-cream research is being transferred from Port Sunlight to the Downside Estate, Leatherhead. Mr. D. J. F. Hudson, of the Unilever research department, who now resides at Neston, Cheshire, is to be head of this new establishment. At Port Sunlight, research into detergents and chemicals will be expanded.

'The Wind of Change'

U.K. Chemical Plant Industry Thrives

by 'Contractus'

JUST a year ago (see 2 Jan. 1959, p. 13) CHEMICAL AGE published an article by the author entitled "Is there room for them all?" At the time, with so many new firms coming into the contracting field, it seemed doubtful whether there would be enough to go round. Since then we have had the credit squeeze imposed. The motor industry is working a four day week and many other industries are in difficulties. One would surely have thought that the chemical plant industry would also be badly affected.

In actual fact, the opposite obtains. In spite of the larger number of firms now in the field and the severe restrictions on credit, the British chemical plant industry has never been busier and there is every expectation of the situation continuing.

It is interesting to note, however, that much of the work the industry is engaged upon is for other countries and possibly there is in this a lesson that could be learnt by other industries.

Eastern Bloc

A growing market which, more than most, has been pursued with great vigour, is the Eastern Bloc. British firms have been successful in obtaining orders in Russia, Yugoslavia, Rumania and other Eastern States. Following the example of Courtaulds Engineering Division, referred to in previous articles, other contracts have been obtained, including a large contract which Constructors John Brown, in conjunction with Marchon Products, have obtained for a synthetic detergent plant; a contract for synthetic rubber plant which Vickers Armstrong have in Russia; sugar plant which Booker Brothers have for Russia, etc. Many firms in the food processing equipment field have been successful in Yugoslavia and Rumania. The East German Democratic Republic now has an office in London and is very interested in buying chemical plant of all descriptions from the U.K. It has a process licensing agreement with Humphreys and Glasgow.

A number of the firms that have entered the contracting field in the U.K. during the past year or so have been highly successful. Fluor have a contract for a butadiene plant for British Hydrocarbon Chemicals, many contracts for Petroleos Mexicanos, a synthetic rubber plant in Australia; a refinery in El Salvadore, a platformer unit at Abadan for Iranian Oil Services. Blaw Knox have a synthetic rubber plant for an unnamed client, a soap plant for Prices at Bromborough, etc.

E. B. Badger have a contract in connection with the B.P./California consortium venture at the Isle of Grain. They also have an Edeleanu unit for C.E.P.S.A. in Spain. Bechtal are building the Shell Philippines refinery and the Continental Oil Co. (ConoCo) refinery in Panama. They also have a contract for part of the B.P./California work at the Isle of Grain. McKee-Head Wrightson continue to be occupied with Pemex contracts for Petroleos Mexicanos and also have an Edeleanu plant for Lobitos Oil at Ellesmere Port.

As will be seen from the above, all the newcomers to the London scene are well occupied, considering their comparatively short establishment here.

What of the 'older hands'? They, too, are mostly very busy.

Foster-Wheeler having completed the refinery at Milford Haven for Esso are building a refinery in Turkey for a consortium of oil companies. Their Paris office have a refinery contract with S.I.B.P. at Antwerp; their London office have a refinery in Denmark for the Tidewater Oil Company. They are building a second ethylene plant at Fawley for Esso in order to supply feedstock for Imperial Chemical Industries, Severnside. They have an extension to the Kirkuk refinery for the Iraq Petroleum Co.

Varied Orders for Lummus

Lummus are building a synthetic rubber plant in India. Following on their pilot plant for the National Coal Board at Birch Coppice, they are now engaged on a contract for a full-scale commercial plant. They are building an acetic acid plant for Distillers at Hull, a urea plant in Mexico, and have a contract for extensions to the B.P. refinery at Llandarcy. They are also doing work for British Hydrocarbon Chemicals at Grangemouth on an ethylene dichloride plant.

Chemico have a contract with Abbot Laboratories in connection with modernisation schemes. They are building a methanol plant for British Hydrocarbon Chemicals at Grangemouth, a detoxification plant for the West Midlands Gas Board, and sulphuric acid plants in Mexico, Greece and Holland.

Matthew Hall are building yet another synthetic rubber plant after their successful completion of plants for the International Synthetic Rubber Company at Hythe, B.P.M. at Pernis in Holland, and supervision of the building of the plant at Shell Berre. This contract is for Witco in England. They can rightly claim to be one of the most experienced companies in the world in this field, being now on their fourth contract of this type in three years. They have also recently been engaged on a jet fuel blending installation for Esso at Fawley and are still erecting the Shell polyolefins plant at Carrington. They also, it is believed, have recently been awarded a contract in connection with the Shell/Montecatini polypropylene plant in Holland, which work is to be started on soon. They also have a soap factory for Joseph Crosfields at Warrington.

Constructors John Brown, as mentioned earlier in this article, have been awarded a large Soviet contract. They have a contract with British Celanese at Spondon, further extensions to the Dow Agrochemicals plant at King's Lynn, a tanker terminal for Gulf Oil, and a vegetable oil plant in India.

Humphreys and Glasgow are becoming much more successful in the chemical plant field; their entry into which was rather slow for some time. They also now have some Pemex jobs for Petroleos Mexicanos, including a bromine plant, and are also doing work for Boots Pure Drug Co. at Nottingham.

Simon-Carves are to build a 150 tons/day contact sulphuric acid plant in Egypt and another at Vlaardingen in Holland. W. J. Fraser, among other contracts, have one for two U.K. phosphoric acid plants.

The above are only a selection of some of the major contracts that have recently been awarded to some of the larger contracting firms during the last few months. There are no signs of any slackening in the pace; new contracts continue to be announced every week and many more are known to be under negotiation.

Common Market Tariff Cuts on 1 January

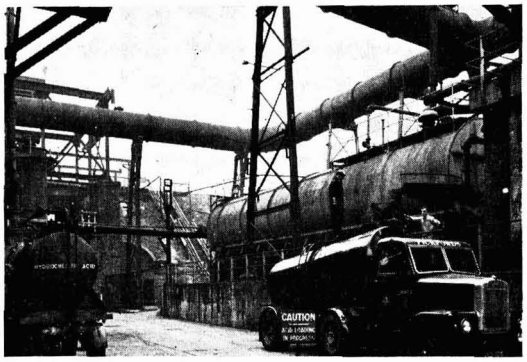
FROM 1 January the six Common Market countries will make their third reduction of 10% on internal tariffs for industrial products. At the same time, the first official move will be made towards aligning the individual national tariffs of the Six. Where individual duties are higher or lower than the C.M. rate by not more than 15%, then the C.M. rate will be introduced; in other cases, individual rates are to be increased or decreased towards the C.M. tariff level by 30% of the difference between the C.M. rate and the individual rate.

As a result over the tariff as a whole, the rates of West Germany and Benelux should generally be rising, while French and Italian rates should be somewhat lower.

These contracts, worth several £ million will keep the U.K. chemical plant industry busy for a number of years.

Bulk Storage of Corrosive Liquors

Practical Aspects of Design, Construction and Installation



Rubber-lined stock tank and piping for handling hydrochloric acid at *Magnesium* Elektron Ltd., Swinton, Manchester

By a Special Correspondent of the Plant Lining Group of the Federation of British Rubber and Allied Manufacturers*

INCREASING industrial use of acids and other corrosive liquors and the need for economical transporting, storing and handling has led to the gradual building up by acid manufacturers of fleets of road and rail tankers to deliver their products in bulk. The co-operation of the rubber manufacturers in this development has resulted in the production of a wide range of rubber compounds which are completely resistant to most industrial corrosive liquors and which can be used for lining transport tankers, storage tanks and pipelines with complete safety. The result is an acid distribution service which is safe and efficient.

Siting. Most manufacturers of corrosive liquors maintain fleets of road and rail tankers to deliver the liquor to the user's works. When considering the installation of a bulk storage unit, therefore, it is advisable to seek the assistance of the suppliers to ensure that the proposed tank will accept the full load of a road or rail tanker plus a reserve of liquor which will last seven to ten days. With road transport it is essential to make sure also that free access to the delivery point is available, and that no hazards such as limited headroom, sharp corners or restricted bridges deny easy movement to the road vehicles.

Specialised Problems

Design. Having decided that the amount of acid consumed warrants the installation of a bulk storage unit, the question of design must be considered, and at this stage it is advisable to call upon the services of the rubber manufacturer, as it is of primary importance that the rubber or ebonite lining which is applied will be completely resistant to attack by the liquor to be handled. It is also extremely important that the steel tank and pipework should be fabricated in such a manner that the lining operation itself can be carried out without difficulty. Most rubber manufacturers, after many years' experience of the difficulties involved, prefer to design these storage installations themselves and supply the complete unit.

Storage Tanks normally have a capacity of 10 tons and upwards. They should be of the cylindrical type, either vertical or horizontal, with dished ends and capable of withstanding a working pressure of 30 p.s.i. The shell of the vessel should be of welded construction throughout, and all welds should be continuous and ground smooth on the internal surfaces, as pitting and crevices can easily cause air trapping during the lining operation.

Seven openings are required in the tank: one each for acid inlet, manhole, sampling branch, vent, and level indicator, and two for the outlet. All these openings should be in the form of flanged branches.

The inlet branch should invariably be a branch of nominal 2-in. bore to which the pipework from the road tanker can be connected. The manhole should be at least 18 in. in diameter and the cover plate should incorporate the 6-in. sampling branch, this opening normally being closed by means of a blanking flange. In some designs the manhole cover also carries the branch which accepts a level indicator of the float type, but to reduce the work entailed in removing the manhole cover, it is sometimes advantageous to fit the level gauge into an independent branch in the tank shell.

To eliminate the possibility of pressure build-up, it is essential to vent the tank, and for this purpose a branch of nominal 2-in. bore should be provided. Provision must be made for feeding the contents of the tank to process vessels, and since it is normal practice to incorporate at the outlet point an internal plug valve, two branches must be provided to accommodate this device. Finally, suitable lugs or saddles must be provided for mounting the tank on a stillage or on piers.

After the rubber or ebonite lining has been applied to the metal, it is not possible to carry out any alterations to the tank, as the heat involved in welding or cutting the metal will destroy the rubber-to-metal bond and char the rubber itself. It is therefore vitally important that during the design stages all aspects of the installation are given very careful consideration and all possible contingencies catered for.

The last stage in the construction of the tank is the application of the lining. The lining can be either of rubber or of ebonite according to the nature of the liquor to be stored. It is normally 1/8 or 3/16 in. thick and it must cover the whole of the internal surface, including the necks and flange faces of the various branches.

Filling. To feed liquor into the storage tank from the delivery vehicle it is necessary to use mild steel pipework lined with rubber or ebonite and rubber-lined valves. The pipeline normally consists of a nominal 2-in. bore pipe lined with 1/8 in. or 3/16 in. rubber or ebonite. It should be kept as short as possible to reduce friction losses, etc., to a minimum. Some tankers are provided with a range of flange sizes for connecting to customers' intake points, but the most commonly used size, which is accepted by most of the acid suppliers, is 2-in. B.S.T.D.

To safeguard operatives from accidents due to residual acid collecting in the pipes, it is good practice to provide a tee at the terminal point. The tee should be mounted vertically with the branch parallel to the ground. The branch should be fitted with a 2-in. rubber-lined valve, which provides the tanker connection point. The bottom leg should also be fitted with a smaller valve carrying a short spigot which can be used to drain away residual acid after filling has been completed and the tanker hose has been disconnected. When not in use the open end of the terminal valve should be sealed with a rubber-covered blanking flange.

The complete assembly of the terminal point comprising tee-piece and two valves should be mounted about 3 ft. above ground level and securely fastened to supporting steelwork or other permanent fixture.

Venting. To safeguard against the possibility of pressure build-up, a branch with a bore not less than that of the intake pipe should be provided in the top of the vessel. It should be sited as

* Members of the Group are: B.T.R. Industries Ltd., P. B. Cow and Co. Ltd., Dexine Rubber Co. Ltd., Dunlop Rubber Co. Ltd., Nordac Ltd., Redferns (Bredbury) Ltd.

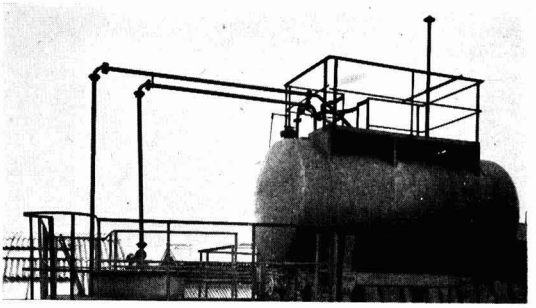
far from the inlet point as possible to minimise the chance of spray being carried over during the filling operation, and a rubber-lined steel pipe should be connected to it to conduct fumes, etc., to ground level. This will prevent any fumes or spray which may escape during filling from corroding the outside of the storage vessel. The pipe can terminate with an open bore, preferably near an open surface drain, and as an added precaution against any carry-over of spray, it should rise vertically for approximately 3 ft. before turning through 180° and returning to ground level.

Contents Gauge. Three kinds of gauge are available for measuring contents—the float type, the ebonite gauge glass, and the hydrostatic gauge. Of these the first consists of a glass float and stem running freely inside an ebonite guide tube. It is fitted inside the tank and held in position on the flanged neck of a branch built into the top of the shell. Superimposed on this flange is a gland carrying a glass tube which guides the float stem externally and is protected from accidental damage by means of a steel tubular sheath with vertical slots through which the level of the top of the float stem can be seen. A graduated board can be secured to the back of the metal sheath and calibrated to suit individual requirements.

Special Provisions

Ebonite gauge glasses on the other hand are similar in design to conventional boiler gauge glass fittings. They thus necessitate the provision in the steel tank of suitable flanged necks, one of which will be below the level of the liquor. Hydrostatic gauges also require a special branch, fitting into the bottom of the tank below liquor level. Their chief advantage is that the dial can be placed some distance away, which may be a great convenience if the tank has been mounted on a high stillage or is otherwise difficult of access.

Generally speaking it is advisable to keep the number of branches below the liquor level to a minimum. Any gauge fitted in such a branch should be capable of being isolated by a suitable valve, which however cannot be repaired or checked until the tank is empty. With multi-unit installations no great difficulty arises, as the contents of one tank can usually be transferred to another; but with single units the problem can be serious. For this reason the float type of contents gauge which is mounted on the top of the shell above the level of the liquor is strongly recommended.



Ebonite-lined storage tank with ebonite-lined piping

Discharge. To discharge acid from the storage tank to process, an outlet branch should be provided in the bottom of the tank to which is connected the mild steel rubber-lined pipework leading to the process department. The flow of liquor can be regulated or isolated by means of a rubber or ebonite lined valve sited at a convenient point. To enable this valve to be maintained without emptying the tank, an internal plug valve should be fitted. This operates in an ebonite seating between the flange of the bottom outlet and a special tee, and consists of a mild steel plug and rod covered all over with rubber. The rod is extended through a gland mounted on top of the tank, and can be operated quite simply by means of a screw or lever. The plug valve is primarily precautionary and is normally left open. The tee normally consists of a 2-in. tee piece provided with a 6-in. flange on one extremity of the through leg which mates with the flange on the tank. The liquor is fed to process via the horizontal branch of the tee piece; the remaining leg faces downwards and should carry a valve and blanking plate. This arrangement provides a means of cleaning and washing out the tank without having to discharge the sludge, etc., through the feed line to process.

Shell Protection. To prevent any spillage which may occur when taking samples of the liquor from attacking and corroding the outside surface of the tank shell, it is usual to bond a rubber apron to the area surrounding the manhole. The apron is designed to guide the spillage down the side of the tank to a point below the centre line where the liquor is allowed to drip harmlessly to the ground. The outside shell of the tank must also be protected from normal weather corrosion, and for this purpose it is advisable to use a special corrosion-resisting paint. For preference the colour should be white in order to protect the rubber or ebonite linings as much as possible from gradual deterioration due to the heat of the sun in summer.

General. To guard against any possible escape of acid from the storage tank, the ground area in the immediate vicinity of the installation should be concreted and surrounded by a low boundary wall, and adequate provision should be made for washing down any minor spillage or for neutralising a major spillage.

Adequate lighting fixtures should also be provided both at the intake terminal and at the control points so that off-loading operations can be carried out during the dark winter evenings. Throughout, safety is a primary consideration when designing and installing a bulk acid storage unit. It follows therefore that a suitably equipped first aid box must be provided.

Finally, emphasis must be placed on the vital importance of careful design in the early stages, full attention being given to future requirements as well as to current working, safety, etc. This is particularly important with rubber and ebonite lined installations, because once the lining is applied it is not possible to make any alterations to the metal of tanks or pipes without damaging the protective lining.

Part of a battery of rubber-lined stock tanks for storage of sodium hypochlorite liquor and hydrochloric acid at Murgatroyd's Salt and Chemical Co. Ltd., Sandbach, Cheshire. Each tank is 30 ft. long and 7 ft. 6 in. in diameter

Edible Oil Tank Farm at Birkenhead

ANOTHER stage in the development of the new tank farm for the storage of edible oils and liquid chemicals at Lewis's Quay, West Float, Birkenhead, was reached recently with the arrival of motor tanker *Komsomolets Ukraini.*

The vessel brought 1,000 tons of fish oil from Vladivostock for discharge into the new installation, the first section of which was started in April. Work is still in progress on the site, but 12 storage tanks are already in use, and it is hoped that the whole of the first section of the tank farm, comprising 21 tanks, will be completed by January.

Overseas News

SOVIET WORKERS DEVELOP OXYGEN ROUTE TO ETHYLENE AND PROPYLENE

WRITING in the Russian periodical 'Gazovaya Promishlennosti' ('Gas Industry') **5**, 33, 1960, the two Soviet scientists S. F. Vasilyev and N. V. Lavrov describe oxidative pyrolysis of ethane and propane as what they call a "new, promising method for the production of ethylene and propylene."

Pyrolysis takes place at some 850°C and at atmospheric pressure in the presence of oxygen, resulting in conversion of 73% of the ethane and 91% of the propane, as compared with a conversion rate of only 49% for thermal pyrolysis undertaken under the same conditions. Exothermal oxidation reaction taking place in the mixing zone of the heated gases provides heat energy for the fission reaction $C_2H_6 \rightarrow C_2H_4 + H_2$.

In the presence of oxygen, pyrolysis may be carried out at considerably lower temperatures than are possible with thermal pyrolysis, with a high yield of ethylene and propylene as well as the improved conversion rate. Low operating costs are possibly due to the simplicity of the reaction and the heating system.

The method permits the yield from ethane of ethylene at a level of 70% and in the case of propane a 43.2% ethylene and 14.5% propylene yield. H_2 and CO are also produced. The authors see the possibility of erecting works with an annual throughput of 175,000 tonnes of propane.

Hungary to Build Third Chlorine Plant

Hungary's third chlorine plant is to go up at the Balatonfüzfö premises of the Nitrokémia Company, near Lake Balaton. It will cost several million pounds to build. Larger equipment will be delivered by the Soviet Union. The design of the plant is based on Soviet plans.

Spain to Free Chemical and Fertiliser Imports

Chemicals and synthetic fertilisers are among items on a liberalisation list issued by the Spanish Government. Import of the products concerned will be liberalised as from 1 January.

Growth in U.S. Styrene Copolymers

Until their new styrene copolymer plant is on stream at Addyston, Ohio, late in 1961 with 50 million lb./year capacity for acrylonitrile - butadiene - styrene (ABS) polymers, Monsanto Chemical Co. will make both ABS and styrene-acrylonitrile at a 6 million lb./year plant in Springfield, Mass.

There are three other producers in this field. The oldest established are the Naugatuck Division of U.S. Rubber and the Marbon Division of Borg Warner, both of whom have capacities of around 25 million lb./year. B. F. Goodrich Chemical make ABS at Akron, Ohio, with a capacity estimated at about 15 million lb./year.

Total production in 1960 is estimated at about 40 million lb., an increase of 25% on 1959, rising to an expected 51 million lb. in 1961 and an estimated 90 million lb. by 1965.

New Italian Company Produce Chemical Equipment

Breda and Nuovo Pignone (E.N.I. Group) have set up in Bari a new company, Nuovo Pignone Sud who will manufacture measuring and control equipment for chemical and petroleum industries.

French-U.S. Link for Basic Acid Production

The American Potash and Chemical Corporation and Société L'Electrochimie d'Electrometallurgie et des Aciéries Electriques d'Ugine have decided to form a new company, Seurobor (Société Europeenne du Bore) which will construct a new facility at Pierre Benité, near Lyons, France, to produce boric acid from imported mineral borates. This plant, which will be located adjacent to the Pierre Benité plant of Ugine, will be put into service during 1961 and will require an investment of $2 million.

Ugine have been interested in the production of boron derivatives for several years and American Potash consider it necessary to have a source of production in Europe to meet the rapidly growing demand for boric acid and other boron products in the Common Market and elsewhere in Europe.

The boric acid produced by Seurobor will be distributed throughout Europe by Borax and Chemicals Ltd., who have been for many years the sole European and U.K. selling agents for the range of Three Elephants brand products manufactured by the parent company, American Potash.

Eight Oil Companies Plan Algerian Refinery

A group of eight oil companies has signed an agreement to build a 2.5 million tonnes/year refinery at a cost of N.Fr.150 million to 200 million at Maison-Carre, near Algiers. Compagnie Française des Pétroles (20%) and their subsidiary, Compagnie Française de Raffinage (12%) are largest shareholders; other participants are: B.P., Esso, Shell, Repal, Mobil and Beryl.

Producing Carbon Black from Anthracite

What is said to be a promising commercial process for the production of carbon black from anthracite has been devised by Pennsylvania State University. The proposed route calls for the treatment of anthracite with steam, freeing hydrogen and carbon monoxide, followed by high-temperature reaction with chlorine gas. Chlorine treatment reduces anthracite impurities. Under optimum conditions, a gramme of activated carbon made from anthracite would adsorb 0.7 g. of carbon tetrachloride gas.

Swedish Oxygen Expansion

The Swedish chemical producers, A/B Svenska Salpeterverken, of Köping, plan to invest some Kr.4 million in a new oxygen plant at their main works. The plant will be completed within two years. Research is being carried out by Salpeterverken into methods to obtain oxygen from air and by compression and distillation processes.

Two new carbonic acid tanks with a total volume of 240 cubic metres, are to be installed to replace three former tanks, with a total volume of 200 cu. m., which were destroyed by fire.

U.S. Takeover Bid in Holland

The Harshaw Chemical Co., of Cleveland, have taken up negotiations with the Dutch chemical concern L. van der Hoorn Chemische-Technische Industrie N.V., of Utrecht, with a view to taking over the majority of the Dutch firm's capital. The Utrecht concern would then change its name to Harshaw van der Hoorn N.V.

Chemical Trade Between Hungary and E. Germany

Chemical products are to be exported in either direction under a Hungarian-East German trade agreement signed for 1961.

Parathion Expansion for Monsanto in U.S.

A 50% expansion which will raise parathion and methyl parathion production capacity to 18 million lb./year has been completed by Monsanto Chemical Co., U.S., at their Anniston, Ala., plant.

A 50% expansion in phenolsulphonic acid capacity is also planned, with a new plant at Avon, Calif., scheduled to be in operation in March 1961.

Foam Plant for Egypt

The Tractor Engineering Co., of Cairo, are to open a foam rubber plant in the United Arab Republic next year. Equipment for the plant will be supplied by the N.V. Euromatic concern of Weesp, Holland.

Aerojet Cut Cost of Nuclear Route to Hydrazine

Hydrazine can be produced directly from ammonia by nuclear fission under the Aerojet-General Nucleonics process for 25 cents/lb., instead of the orginal estimate of 50 cents, state the company. Aerojet have completed tests with a capsule in a Livermore pool type reactor. The next step is the development of a continuous process. Preliminary work indicates that such a process would be based on the use of uranium dioxide to provide a fissio-chemical reaction in liquid phase which would be run at pressures high enough to keep anhydrous ammonia liquefied.

Bookshelf

SHORT CUT TO RUSSIAN FOR SCIENTISTS

TRANSLATION FROM RUSSIAN FOR SCIENTISTS. By *C. R. Buxton* and *H. S. Jackson*. Blackie, London and Glasgow, 1960. Pp. xx + 299. 30s.

The growing volume of Russian literature available and neccessary to Western scientists makes the timely appearance of this volume, specifically designed to give scientists a reading knowledge of the Russian language as quickly as possible, particularly welcome. After familiarity with the alphabet has been gained through Russian words which are mostly recognisable to the English eye, a brief but adequate summary of the essential grammar is given. Frequent comparison is made with other European languages which may be expected to be more familiar to the reader, especially German in which the principles of word building are very similar. A series of graded exercises and annotated texts completes the teaching half of the book (138 pages). The second half (110 pages) consists of passages for practice in translation taken from Russian technical writing. As these texts are reproduced entirely without comment their inclusion cannot be said to be indispensable and must add considerably to the cost of publication. Presumably most scientists who wish to learn Russian will have access to the Russian literature and would prefer to acquire the vocabulary of their own field from the beginning. A useful list of abbreviations and a vocabulary complete the book.

If the reader is prepared to pay for a certain amount of redundant material, the book will be found to give an excellent introduction to all, especially scientists, who wish to gain an understanding of written Russian. Those C.A. readers who read our recent series 'Scientific Russian Without Tears' will find this book most useful.

Biochemistry

LEHRBÜCH DER PHYSIOLOGISCHEN CHEMIE. By *F. Leuthardt* (14. Auflage). Walter de Gruyter and Co., Berlin, 1959. Pp. 917. DM42.

This book is really a combination of concise textbooks on: the chemistry of the chief food materials and components of cells, the physical chemistry needed by a biochemistry student, general metabolism, composition and metabolism of individual organs and tissues, the chemical control of physiological functions, and nutrition. It contains a six-page supplement helpfully classified by the page number in the main text, 31 pages of references classified by the numbers of the chapters and a 25-page subject index.

Specialists are bound to find parts of this book a little too light in the treatment of some topics but it does cover the field extremely well for the student; introducing advance concepts. The chapter on physical chemistry should be especially useful to the student and possibly other readers, while the chapters on metabolism serve the student's needs without long descriptions of physiological topics. The diagrams and illustrations are well set out.

Unfortunately many British undergraduates cannot command sufficient German to read the book, but it could be a valuable reference book for research students which, in fact, is easy to use.

Air Pollution

PROCEEDINGS OF THE INTERNATIONAL CLEAN AIR CONFERENCE. Edited by *A. Marsh*. National Society for Clean Air, London, 1960. Pp. 290. 30s.

This book gives the texts of the original papers read at the conference, grouped according to the different sessions: National Air Pollution Problems, Legislation, Education, etc.; Technical; Observations, Investigations and Measurements of Air Pollution; Research and International Co-operation; followed by valuable reviews of each session contributed by an expert who attended it, and an account of the resulting discussion. Representatives from 17 countries took part so the information now made available does not suffer from parochial attitudes and the true size and shape of the problems emerge. It thus provides a source of information that could be used profitably by those who pollute air, by those who have to enforce existing regulations and by those who hope to improve the regulations. Much of the material will be of interest to people such as meteorologists, applied mathematicians, physicists and chemists, who are not directly concerned with air pollution.

The production is excellent; paper that is nice to handle, clear print and illustrations, and the small print has enabled the weight and price to be kept to a reasonable level, though the stated price cannot be an economic one. The subject index is rather terse.

B. P. Addendum

BRITISH PHARMACOPOEIA, 1958—ADDENDUM, 1960. Pharmaceutical Press, London.

This addendum contains 71 pages of alterations and additions. The additions cover:

(a) Immunological products; mixed diptheria and tetanus vaccine, poliomyelitis vaccine, mixed typhoid-paratyphoid A and B and cholera vaccine, and an extension to the previous monograph on bacillus calmette-guerin (BCG).

(b) Antibiotics; calcium and potassium salts of phenoxymethylpenicillin and capsules of the free antibiotic and its potassium salt, calcium or sodium salts of novobiocin.

(c) Hormone preparations; long acting corticotrophin, and hydrocortisone succinate, an active principle of thyroid gland (liothyronine) and the antithyroid compound potassium perchlorate.

(d) Recent synthetic drugs; preparations of amylobarbitone, bemegride, busulphan, chlorhexidine, chlorthiazide, halothane, hydroxychloroquine, mercaptopurine, naphthazoline, phytomenadione, piperazine citrate, probenecid, pyridostigmine, soluble compound codein tablets, tolubutamide, tripelennamine.

(e) Additions to tables on diameter of tablets, uniformity of powders and sieves, and quantitative test for lead.

The alterations include: Rephrasing of the monograph on smallpox vaccine, and amendments to those on corticotrophin; alterations to a few assay procedures and other aspects of various monographs and changes in the requirements for a variety of tablets (42 monographs affected). The table of standard preparations and units of activity is brought up to date, and the appendix (XIIA) on the assay of Vitamin A is revised.

Biography

THE LIFE AND WORK OF WILLIAM HIGGINS, CHEMIST (1763-1825) by *J. R. Partington* and *T. S. Wheeler*, Pergamon Press, Oxford, 1960. 60s.

This volume consists of three books. The first (pp. viii + 173) is written by Partington and Wheeler. The second and third are photographic reprints of books by Higgins: 'A Comparative View of the Phlogistic and Antiphlogistic Theories', 2nd Ed., Murray, London, 1791, pp. xxi + 316; and 'Experiments and Observations on the Atomic Theory and Electrical Phenomena, 1814, pp. vi + 180. Higgins was an Irish chemist who would now be forgotten except that he wrote his 'Comparative View' at the age of 26. In that book he applied a rudimentary atomic theory to chemical phenomena. He also made a number of suggestions, particularly about reaction mechanisms, which now seem prophetic but which have played little part in the development of chemistry. His second book was written largely to claim priority for his ideas. As is clearly stated, Higgins did not develop the quantitative side of atomic theory and modern chemistry stems from Dalton.

Higgins has been very well served by his biographers. The lives of very few British scientists have been described with such scholarly attention to detail. Though it must be remarked that the available detail can only be examined at such length because very little is known about Higgins' life. A detailed commentary on the 'Comparative View' is also supplied with an elaborate index of cross references. The book is fully indexed.

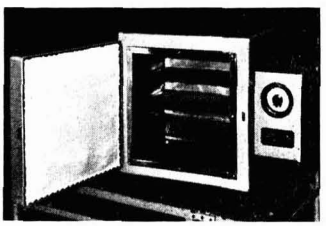
EQUIPMENT NEWS

Chemical Plant : Laboratory Equipment : Control and Indicating Apparatus

HIGH-TEMPERATURE OVEN In a high-temperature laboratory size oven designed and constructed by **Isopad Ltd.**, Boreham Wood, Herts., to meet special requirements three stainless steel trays are fitted and the oven temperature is automatically controlled by a mercury-in-steel contact thermometer calibrated 0-800°C. Thanks to the high thermal efficiency, a loading of 1,800 watts is sufficient for the operating temperature of up to 500°C (930°F) required in this instance.

The inner stainless steel casing measures approximately 15¾ by 15¾ by 11¾ in., and is backed by 3 in. of thermal lagging. The outer casing is stove enamelled mild steel.

Ovens of this nature are also made in larger dimensions as well as in the special design suitable for use in flameproof areas Group II and Group III: in that case, the heating elements are metal sheathed and mineral insulated: they terminate in flameproof glands and flameproof terminal boxes. The element temperatures must, of course, be kept below the spontaneous ignition temperature of explosive gases or liquids present, for which purpose a range of controls in flameproof housings or automatic intrinsically safe controls is available.



Stainless steel oven with mercury-in-steel thermometer, made for Union Chimique Belge S.A.

RECORDING SPECTRO-PHOTOMETER The Unicam SP.700 double beam ratio-recording spectrophotometer is now available with an increased range of scales that give facilities for scale expansion, the recording of differential spectra and (with the absorbance accessory fitted) the recording of absorbance. The scales can be selected by a single eight-position switch.

The expanded scales 0-20% and 0-10% enable more accurate measurements to be made of highly absorbing samples, making use of the low noise characteristics of a photomultiplier at low transmission valves. The linear absorbance scales are provided by an accessory built into the recorder of the instrument.

Three scales are provided for different spectroscopy, where the ratio of the transmittances of two samples is required and the relative transmittance may be greater than 100%. These scales are 90-110%, 0-200% and −0.3 to +1.7 absorbance.

An extended range of cells for the SP.700 is now available, including standard cells, microcells, 10 cm. cells, variable path-length cells, demountable stoppered cells and flow-through cells.

Makers of the instrument are **Unicam Instruments Ltd.**, Arbury Works, Cambridge.

PLASTICS NEEDLE VALVE A needle valve constructed from styrene/butadiene/acrylonitrile blend is available for use with plastic tubes of ¼ in. o.d., 5/32 in. i.d.; 5/16 in. o.d. ¼ in. i.d.; and ⅜ in. o.d., ¼ in. i.d.

It is being manufactured by **Barflo Ltd.**, 56 Cavendish Place, Eastbourne, primarily for use with Wade Couplings, and is obtainable from Wade Couplings Ltd. It is recommended for use with fluids at 0-300 p.s.i. and gases at 0-100 p.s.i. Each valve is designed with the 'P' type joint of all plastics construction, with spigot support for the tubing, and knurled coupling nuts for hand tightening.

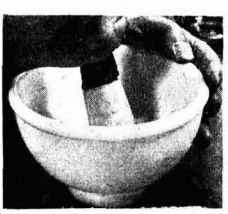
A feature of its design is its finger tip control, no undue pressure being required to obtain a firm seating. Further details are available from Barflo Ltd. at the above address.

PORTABLE MICRO-WEIGHING INSTRUMENT Introduced by the **Shandon Scientific Co. Ltd.**, 6 Cromwell Place, London S.W.7, a portable micro-weighing instrument known as the Cahn Electrobalance weighs only 12 lb. and requires no special bench. It is claimed to be unaffected by vibration, temperature and draughts and to require no levelling, while it is fast in operation and calls for no special skill. The weighing chamber, 6 in. by 6 in. by 3 in., is removable and may be operated by remote control through four electrical connections. Disposable sample-pans, simply cut from foil, may be used in place of the standard pans if required.

There are six readily selected ranges, from 0-1 up to 0-100 mg. It is claimed that in the 0-1 mg. range both reproducibility and accuracy are within 1 microgramme. In the 0-100 mg. range, reproducibility is stated to be within 25 microgrammes and accuracy within 100 microgrammes. Comparable figures apply to the intervening ranges.

A special feature of the instrument is the ultra-rapid calibrating facilities which enable it to be kept at the highest pitch of accuracy.

RIGIDEX MIXING BOWL



Heavy duty mixing bowls for laboratory use are now being manufactured by Goodburn Engineering Co. Ltd., Arundel Road, Trading Estate, Uxbridge, Middlesex. The bowls are moulded in Rigidex high density polythene supplied by British Resin Products Ltd. They are of 6 in dia. and have a substantial wall thickness which is claimed to make them extremely tough and rigid, and to give them stability in use. Chemical resistant, inert and non-toxic, these bowls can be sterilised at 100°C and stored *under deep-freeze conditions* without deterioration of their mechanical properties

NEW SERIES OF MASS SPECTROMETERS A new series of mass spectrometers manufactured by the Compagnie Francaise Thomson-Houston for the determination of the exact proportions of the constituents of a gaseous mixture within the 2 to 150 mass range is now available in the United Kingdom through **Leland Instruments Ltd.**, 145 Grosvenor Road, London S.W.1. Employing interchangeable permanent magnets, the series includes three models: the TH.N.202D, which is specifically designed for the separation of a pair of molecules of similar mass and is based on 'double collection'; the TH.N.202SD which features, in addition, an electrostatic scanning device allowing single collection spectrum recording and may be switched instantaneously to either single or double collection'; and the TH.N.202SD which features purely single collection and spectrum recording by electrostatics scanning. At any time the models 202S and 202D may be converted into the TH.N.202SD by the addition of elements in spaces provided.

This specification of instruments is claimed to result in very precise measurement of a gas present in only small quantities, excellent reproduction of measurements and the absence of a memory effect. The interchangeable permanent magnets with fields of 835, 1560 and 3150 Gauss cover the mass ranges 2 to 8, 8 to 32 and 30 to 100 respectively, and any other combination of magnets to cover mass ranges up to 150 can be supplied on request. Using double collection, the 202 spectrometer may be used for precise measurements of isotopic ratios of gaseous or solid elements, for gas concentration measurements in

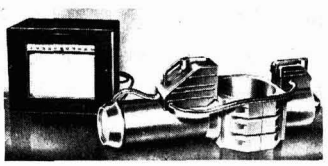
binary mixtures, for deuterium measurements in H_2, DH or HD,D_2 and for tritium in HT,T_2 mixtures, etc.

Employing single collection the appropriate model may be used for automatic continuous analysis of the spectrum of one of the three mass ranges 2 to 8, 8 to 32, and 30 to 100 (and up to mass 150 on request), for automatic analysis of predetermination masses by high voltage switching and, if required, for the continuous and automatic recording of the concentrations of specified gases.

Housed in a monobloc unit, the spectromoters include two assemblies: the separator assembly comprising ion source, analyser tube, magnet, two target collectors, pumping system, power supplies and safety devices; and the electronic measurement assembly comprising two linear amplifier chains, HT power supply and (in the S and SD models) a spectrum recorder, automatic spectrum scanner and, on request, automatic HT and sensitivity switching for measuring predetermined masses.

INDUSTRIAL DENSITY GAUGE

CONTINUOUS recorder indication of density changes in liquids, solids, slurries, etc., in industrial processes is provided by density gauge type 336 recently introduced by **Saunders-Roe and Nuclear Enterprises Ltd.**, 45 Parliament Street, London S.W.1. Basically the system consists of a Caesium 137 source 'looking through' the inspection volume (normally a pipe of between 4 in. and 10 in. dia.) at a 5 in. dia. by 2 in. thick, plastic



Density gauge and recorder

phosphor mounted on a 5 in. photomultiplier. The amount of radiation which reaches the detector is dependent on the density of the material in the process. It is stated that the 'stopping power' of this system is of the order of 30 times greater than that of an ionisation chamber and hence with similar sources the sensitivity is much better.

The photomultiplier is arranged to give a signal which is monitored by a Honeywell Brown recorder. This is arranged to have a suppressed zero, so that the required variations in denstiy are covered by the recorder scale. Density value and scale sensitivity are controlled by varying the Honeywell Brown zero suppression and span.

A complete automatic standardisation system is incorporated. The measuring source is 'switched off' and a calibrating source 'switched on' for one minute at 10 min. intervals. This calibration source, which is mounted in a known and constant relationship to the scintillation counter, produces a fixed dose rate at the counter which automatically compensates for decay in the measuring source. The signal produced by this dose rate is then fed into the recorder and the overall Wheatstone bridge sensitivity (i.e. both zero suppression and span) adjusted automatically so that this dose rate corresponds to a fixed position on the scale and the span represents a fixed fraction of the dose rate.

Overall calibration of the system is in terms of a standard dose rate and is independent of E.H.T. and temperature variation. In the standard model the interval between calibrations is 10 min., the time of calibration 1 min. and the response time 10 sec.

LEVEL INDICATOR AND CONTROLLER

PRODUCED by **Thomas Industrial Automation Ltd.**, Station Buildings, Altrincham, Cheshire, the Levelrator not only gives continuous indication of the contents of silos, tanks, hoppers, etc., but it will also operate visual and/or audible alarms. The equipment uses one electrode only for both continuous measurement and control. Alarm points can be set to operate over the full length of the electrode to suit the particular application.

The electrode system can be of the rigid variety for a small vessel and the flexible type when the depth of the container exceeds 6 ft. The limitation of length of electrode is really dependent upon the particular application, but electrodes are available up to 60 ft. in length. The high or low level control the indicating instrument, and the relays are operated by a specially designed electronic circuit.

The control unit, consisting of a stabilised power supply, alarm relay circuits and built-in calibrating instruments, is housed in a cast iron or sheet steel weatherproof case in first-grade industrial finish, and can be situated up to 150 ft. from electrode head unit. The built-in calibrating instrument has a scale length of 2½ in. and this is graded in 2% divisions and can, if necessary, be used as a local indicator.

The price for a Levelrator fitted with both high and low level alarms is approximately £100.

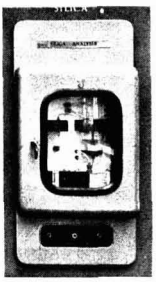
BOILER FEED SILICA ANALYSER

CONTINUOUS analysis of the silica content of boiler feed water is provided by an automatic instrument manufactured under licence by **Electronic Instruments Ltd.**, Richmond, Surrey. It eliminates the tedium and uncertainty of manual determinations.

The silica analyser is essentially a colorimeter in which the colour of a solution to which reagents have been added is a measure of the concentration of silica in that solution. A measured sample of water is taken automatically, a fixed volume of molybdate solution is added and then the reducing agent. The stirred mixture eventually develops a blue colour and is then delivered to an optical comparator and the blue shade photo-electrically compared with a perspex blank or, if the water is discoloured with the original water. The instrument is available in three ranges: 0-0.2 parts of silica per million of water, 0-2.5 p.p.m., and 0-30 p.p.m.

The complete cycle of operations takes 12 min. Stirring and reducing process in the mixing vessel occupies 9 min.; additions of the sample and the reagent to the reaction vessel together occupy the other 3 min.

The differential output of the photo-



E.I.L. silica analyser, model 58A

cells in the colorimeter feeds a transistor amplifier, which gives an output of 1 mA. into a resistance of 1,500 ohms for full scale deflection. The output drives a suitable recorder. The whole sequence, being entirely automatic, is controlled by a mechanical programme timer.

Calibration is simple. The output of the optical system is adjusted to zero. A glass calibration filter representing a known silica concentration in the upper part of the instrument's range, is inserted and the scale length then set correctly. The zero and scale length adjustments are made by pre-set controls at the front of the instrument.

GRIFFIN DUORIDER BALANCE

IN the new Griffin Duorider balance, all the agate bearings are relieved, instead of only the central bearing, when the beam is lowered. When not in use the balance beam is supported in the two central slots of the arrestment and maintained level by two locked screws. A further feature of this balance is that the metal rider bar carries two captive riders of 1.0 gramme and 0.1 gramme respectively. They move over nine notched divisions from left-hand zero to centre and over 50 divisions from centre zero to right. This Duorider system is claimed to increase the speed of operation since it eliminates the use of fractions of a gramme.

Manufactured by **Griffin and George Ltd.**, Ealing Road, Alperton, Wembley, Middx., the Duorider balance has a shortened beam for easier weighing, combined with a single limb bow eliminating impedance, an inclined pointer scale rising with pointer to facilitate reading and reduce parallax, an easily positioned pillar and stainless-steel pans.

Capacity is 250 g., the pointer is white against black engraved plastic scale, the beam is of solid-type, 8 in. long brass, the sensitivity is to 2 mg., the finish is plating or hammer-finish for all metal parts except pans and rider bar, and the base is of moulded plastic.

Price, ex works in the U.K.: £8 17s 6d.

PEOPLE in the news

● **Mr. Ronald G. Mason, B.Sc., A.R.I.C.,** director and general works manager of A. Boake Roberts and Co. Ltd., Stratford, London E.15, has been appointed to the board of the parent company, A. Boake Roberts and Co. (Holding) Ltd., from 1 January.

● **Mr. J. H. Sellars,** at present work study officer of United Coke and Chemicals Co., a subsidiary of the United Steel Companies Ltd., of Sheffield will become works manager (services) from 1 January. **Mr. R. C. Limb,** who rejoined the company some months ago as assistant works study officer, will become works study manager.

● **Mr. H. Hall** and **Mr. W. J. Stimpson** have been appointed directors of Wm. Butler and Co. (Bristol) Ltd., Silverthorne Lane, Bristol 2. Mr. Hall, who has been with the Butler Organisation since 1916, was appointed a director of Bristol and West Tar Distillers Ltd., a subsidiary, in 1952, and became managing director of that comany earlier this year. Mr. Stimpson joined the parent company as assistant secretary in 1951, secretary in 1955 and general manager in 1959. Mr. Hall will continue as managing director of Bristol and West Tar Distillers Ltd., and Mr. Stimpson as general manager of the parent company.

● **Dr. G. A. Collins** has been appointed commercial manager of Schenectady-Midland Ltd., whose plans to erect manufacturing plant at Four Ashes, near Wolverhampton, were reported last week, p. 1047. **Mr. J. S. W. Smith** has been appointed production manager and he will spend some time in specialised training at the Schenectady works in the U.S. Production management of the plant will be part of the existing management organisation of Midland Tar Distillers Ltd., under the general works manager.

● **Professor V. F. Weisskopf,** of Austria, has been elected director general of the European Nuclear Research Centre (C.E.R.N.) as successor to **Mr. J. B. Adams,** of the U.K., who in 1961 will take over the leadership of the Laboratory for Plasma-Physical Research at Culham. **M. Jean Willems,** of Belgium, will succeed **M. de Rose,** of France, as C.E.R.N. president.

● The Council of the Institute of Metals has elected **Prof. W. Hume-Rothery, O.B.E., F.R.S.,** Isaac Wolfson Professor of Metallurgy in the University of Oxford, as an honorary member of the Institute. **Maj. C. J. P. Ball, D.S.O., M.C., Dr. Maurice Cook, C.B.E.** (chairman of I.C.I. Metals Division), and **Lieut.-Colonel S. C. Guillan, T.D.** (secretary, Institute of Metals), have been elected fellows, in recognition of the services that they have rendered to the Institute.

● **Mr. R. A. G. Fowler,** Northern divisional manager of the Esso Petroleum Co., announces that three major branches have now been formed within his division. These comprise the north-western branch in Leeds, and the northern branch in Newcastle. **Mr. J. G. Benson** has been appointed manager of the north-western branch, and **Mr. A. G. Currie** manager of the north-eastern branch. The northern branch will be managed by **Mr. F. W. Ellis.**

● **Mr. Ward L. Morden** has been appointed deputy managing director of Jenson and Nicholson Ltd., London E., a subsidiary of Berger, Jenson and Nicholson Ltd.

● **Mr. B. P. R. Parsons,** managing director of Bound Brook Bearings Ltd., Lichfield, has been appointed chairman and has joined the board of the parent company, Birfield Ltd. The previous chairman of Bound Brook, **Mr. H. E. Hill,** who is also chairman of Birfield Ltd., will remain as vice-chairman. **Mr. T. L. Martin,** formerly administration director, becomes director and joint manager (commercial) of Bound Brook, and **Mr. W. Harris,** previously works director, is now director and joint general manager (works).

● **Sir John Wrightson,** chairman and managing director of Head Wrightson and Co., has accepted an invitation to join the board of A. Reyrolle and Co. Ltd.

● **Dr. J. D. Thornton** has been appointed reader in chemical engineering at King's College, Newcastle upon Tyne, Durham University.

● On 26 November 1960, **Mr. A. M. H. Davies, O.B.E.,** of Fibreglass Ltd., was elected chairman of the Institution of Works Managers for the Institution's thirtieth year, 1960-1961.

● The appointment of **Dr. I. W. Wark** to the executive of the Commonwealth Scientific and Industrial Research Organisation has been announced. He fills the vacancy created by the resignation of Prof. L. G. H. Huxley. Dr. Wark is a physical chemist who was entrusted with the formation of a Division of Industrial Chemistry on joining the C.S.I.R.O. For the time being he will continue to act as chief of this division.

● **Brigadier H. E. Hopthrow, C.B.E., M.I.Mech.E.,** has been elected secretary of the Royal Institution in succession to the late Sir Harold Spencer Jones. Brigadier Hopthrow was formerly assistant secretary to Imperial Chemical Industries Ltd.

● **Mr. L. Gosland** has been appointed deputy director of the British Electrical and Allied Industries Research Association. He will continue as research manager. **Mr. C. G. Garton** and **Mr. E. W. Golding** have been appointed assistant directors. Mr. Garton will continue as head of the materials department.

● **Mr. S. Chapman,** secretary of the Association of Chemical and Allied Employers, has been appointed director. **Mr. J. T. Collins,** assistant secretary, has been appointed secretary. Both appointments take effect on 1 January.

Hinshelwood Gets First Award of New R.S. Medal

A GOLD medal which will be accompanied by a monetary award of £500, donated by the trustees of the Leverhulme Trust Fund, to mark the Royal Society's tercentenary, has been accepted by the council of the society. Under the terms of the offer the medal will be awarded by the Royal Society every three years, to the individual who in the opinion of the council has made the most significant contribution in the field of pure or applied chemistry or engineering, including chemical engineering.

First award has been made to Sir Cyril Hinshelwood, O.M., F.R.S., who retired as president of the society on 30 November, for "his outstanding contributions to physical chemistry".

Geon P.V.C. Coats Lead in New Atomic Sub

ABOUT 20,000 lead bars of various sizes have in recent months been p.v.c.-coated by Plastic Coatings Ltd., Guildford. Designed for use as ballast in the new atomic submarine H.M.S. *Dreadnought*, the bars will lie adjacent to the hull. It was necessary to give them a protective anti-corrosive coating which would act as an insulation, and thus prevent electrolytic decomposition of the submarine's metal parts.

Besides insulating the bars, this tough, highly adhesive, resilient coating ensures that they will resist knocks and damage when being placed in position.

The lead bars were designed and made by British Lead Mills Ltd., using a pressure moulding method to ensure accurate weight and density. They were coated by immersion in a trough of paste based on Geon 121 p.v.c. resin, made by British Geon Ltd.

I.C.I. to Launch Ad. Campaign in 50 European Newspapers

An 'institutional' advertising campaign is to be launched in the European Economic Community and the European Free Trade Association areas by Imperial Chemical Industries Ltd. starting in January. About 50 newspapers will be used.

Commercial News

- Bowmans Chemicals' 122% Profit Increase
- British Oxygen Declare 10% Dividend
- Lawes Rights Issue Over-subscribed
- Bayer's Exports Now 45% of Sales

Bowmans Chemicals

A big increase—122%—on profits for the year ended 31 October, is reported by Bowmans Chemicals Ltd. with a rise from £39,756 to £88,102. After tax of £33,519 (£12,157) depreciation of £18,607 (£15,301) and provision for deferred repairs £10,000 (nil), net balance was £25,976 (£12,298). The dividend is raised from an equivalent of 7.69% to 11.35% with a final of 7½% against a payment of 6% that was forecast on capital increased in July by a three-four-ten scrip issue. Chairman of the company is Mr. J. A. E. Howard, who is managing director of Howards of Ilford Ltd.

British Oxygen

Profit of the British Oxygen Co. Ltd. for the year ended 30 September after tax of £4,439,111 (£4,065,754) and depreciation of £4,747,023 (£4,339,723) was £4,426,993 (£3,935,579). The increase in profits is attributed almost entirely to sales expansion on the part of overseas companies. Greater turnover at home was offset by higher wages, and other costs, particularly in the last few months, with a consequent narrowing of margins. A final dividend of 10%, as forecast, is declared, making 16% (against an effective 14%).

Cross Bone Fertilisers

Acceptances by 95.7% of Cross Bone Fertilisers have now been received following the offer by the parent company, Hargreaves (Leeds) Ltd. Parent company's holding is now 98.1% of ordinary and 91.8% preference.

Hardman and Holden

Offer of Borax (Holdings) Ltd. for all the issued ordinary shares of Hardman and Holden Ltd. has been accepted by holders of about 95% of the stock and has become unconditional, subject to quotation for the new deferred ordinary shares of Borax being granted by the Stock Exchange council.

I.C.I. and Rochdale Wallpaper

The consideration for last month's purchase by Imperial Chemical Industries of the entire £30,000 issued ordinary capital in £1 shares of Rochdale Wallpaper Printing Co. is now revealed to be the issue on 2 January 1961, of 99,994 £1 ordinary shares in I.C.I.

Murex Ltd.

An interim dividend of 5% on capital increased by a three-for-four scrip issue is announced by Murex Ltd. for the year ending 30 April 1960. Total distribution last year was 22½%. Demand for metallurgical products has been maintained at the high level of the latter half of 1959-60 and indications are that the group trading results for the year will compare favourably with those of previous years.

Capital spending at Rainham and Waltham Cross during the half-year totalled £237,000 and was financed from current resources. New plant shop and offices at Waltham Cross are complete and work has started on a new analytical laboratory at Rainham. Activity at both works continues at a satisfactory level.

Lawes Chemicals

The one-for-four rights issue by Lawes Chemical Co. Ltd. at £1 a 10s. share has been over-subscribed. Excess share applications will be allotted as follows: holders of under four shares, nil; other applications will be allotted on a scaled-down basis up to a maximum of 410 shares.

Powell Duffryn

Powell Duffryn are repeating the interim dividend on their ordinary shares at 6% payable on February 28. The final for 1959-60 was 10%.

Wellcome Foundation

Satisfactory advances in sales and profits of the Wellcome Foundation Ltd., both at home and overseas, were made during the year, reported Mr. Michael Perrin, chairman of the board, at the annual meeting held on 21 December. This improvement in sales was common to both human and veterinary fields. While the Foundation could be proud of its record achievements during 1959-60, Mr. Perrin warned of increasing competition being met both at home and abroad.

Farbenfabriken Bayer

Farbenfabriken Bayer AG, Leverkusen, state that in the 1960 financial year they will have invested a total of some DM2,750 million (about £230 million). This compares with a total for the previous year of DM2,460 million (some £205 million). About DM250 million (£21 million) of the 1960 investment figure was made up of foreign investments. Some 45% of all Bayer's sales are now made up of exports.

Stockholms Superfosfat

The Swedish chemical and fertiliser producers Stockholms Superfosfat Fabriks A/B plan to raise their capital from Kr.45 million to Kr.67.5 million. The company is connected with plans to start melamine production at the Stockviks plant near Sundsvall and build a 6,000-tonne sodium chlorate unit at the same plant, as well as in a joint scheme with the Union Carbide Corporation, of the U.S. to produce polythene at the Stenungsund petrochemical complex.

Industri A/B Viking

The Örebro, Sweden, concern Industri A/B Viking has passed into the ownership of B.B. Chemical Co. A/B, a subsidiary of the United Shoe Machinery Co., Boston. Both the Viking company, all of whose 550,000 crowns' worth of shares have been taken over by B.B., and the new parent company are interested in shoe-polish and shoe-cream production.

Switch to Live Polio Vaccine by Wellcome

BECAUSE the combined outputs of the three U.K. producers of the 'killed', or Salk, variety of poliomyletis vaccine were much in excess of probable needs of the Ministry of Health, the Wellcome Foundation stopped production of their vaccine Polimylex in the summer for a time in favour of large-scale development of the alternative, attenuated living virus vaccine. This was stated by Mr. Michael Perrin, chairman of the board of the Foundation at the annual meeting on 21 December.

There was evidence, he said, for the successful use of this on a very large scale in the U.S.S.R. and in other countries. Its advantages and disadvantages were now under active consideration in the U.K. as well as in the U.S. where there was also excess overcapacity for the killed vaccine.

On the scientific evidence available to them, the directors of the Foundation are satisfied in their own mind that the future is more likely to lie with the alternative type of living vaccine, once it can be proved with conviction to be safe. It was in the Foundation's tradition that it should try to take a leading position in any such development and, by using the excellent facilities and scientific experience now available, large batches of all three types (Sabin strains) of the attenuated living vaccine have already been prepared. Tests are nearly complete so that if and when a Government decision is taken to allow its use in the U.K., the Wellcome Foundation will be in a position to produce it.

Mr. Perrin also spoke of increasing competition from firms whose main interest and experience had been in consumer goods and who might feel free to use promotion methods more usually associated with such products. The Wellcome Foundation had always prided itself on its efforts to maintain the highest ethical levels.

NEW PATENTS

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

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

ACCEPTANCES

Open to public inspection 8 February

Separation of gaseous and vaporous media. Peierls, R. E., Simon, F. E., and Arms, H. S. **860 752**

Separation of silver halide from aqueous dispersions. Kodak Ltd. **860 542**

Shaped linear copolymers. Farbwerke Hoechst AG. **860 436**

Catalytic version of alkyl thiophenes. British Petroleum Co. Ltd., Birch, S. F., and Holmes, P. D. **860 673**

Polymerisation of ethylenically unsaturated hydrocarbons and catalysts therefor. Du Pont de Nemours & Co., E. I. **860 641**

Purification of sulphur. Elliott, H. J. **860 674**

Lubricating compositions. Castrol Ltd. **860 675**

Emulsions of vinyl ester copolymers and methods of preparing same. Revertex Ltd. **860 677**

Apparatus for polymerisation process. Imperial Chemical Industries Ltd. **860 643**

Process for the manufacture of substituted formamides. Leuna-Werke W. Ulbricht Veb. **860 805**

Refining of acrylonitriles. Union Carbide Corp. **860 686**

Process for preparing metal carbonyls. Ethyl Corp. **860 645**

Production of potassium permanganate. Carus Chemical Co. **860 548**

Electrolytic production of potassium permanganate. Carus Chemical Co. **860 549**

Styrenated alkyd resin and process of preparing same. American Cyanamid Co. **860 639**

Method of making cubic boron nitride. General Electric Co. **860 499**

Production of irradiated polymer-coated electric cable. T.I. (Group Services) Ltd. **860 811**

Process for the manufacture of synthetic waxes. Commonwealth Color & Chemical Co. **860 688**

Method for preparing titanium trichloride containing polymerisation catalyst and polymerisation process. Esso Research & Engineering Co. **860 647**

Apparatus for dispensing liquefied gases. Union Carbide Corp. **860 663**

Process for the preparation of aliphatic N-chloro-N-alkylamides. Montecatini Soc. **860 650**

Ion-exchange processes. Permutit Co. Ltd. **860 695**

Apparatus for bringing a gas into contact with a liquid. Bahco AB. **860 652**

Bleaching compositions. Newlands Bros. & Mumford Ltd. **860 651**

Silicone compositions. Midland Silicones Ltd. **860 522**

Phenphosphazine derivatives, and their preparation. Imperial Chemical Industries Ltd. **860 629**

Diazocyanine dyestuff cations. Badische Anilin- & Soda-Fabrik AG. **860 584**

Production of penicillin. Abbott Laboratories. **860 633**

Water-soluble monoazo heterocyclic basic dyestuffs and their preparation. Badische Anilin- & Soda-Fabrik AG. **860 634**

Production of alkyl aryl compounds. British Petroleum Co. Ltd., Hale, J. G., White, P. T., and Porter, F. W. B. **860 839**

2-4-10-12-Tetramethyl 6-8-di-isobutyl 7-aza 6-tridecene and its method of manufacture. Commissariat a l'Energie Atomique. **860 636, 860 637**

Process for the production of cross-linked plastics of high molecular weight. Farbenfabriken Bayer AG. **860 857**

Catalyst for the copolymerisation of unsaturated polyester resins. Koninklijke Industrieele Maatschappij Vorheen Noury & Van der Lande NV. **860 701**

Separation of carbon dioxide from gaseous mixtures. Texaco Development Corp. **860 702**

Resin solutions for preparing paper of wet strength. Cassella Farbwerke Mainkur AG. **860 703**

Herbicidal compositions. Amchem Products Inc. **860 859**

Substituted terpenes. Farbenfabriken Bayer AG. **860 860**

Hardening of polymers. Gevaert Photo-Producten NV. **860 632**

Dialysis apparatus. Technicon Instruments Corp. **860 653**

Acyl-mercapto-amides and their use in the permanent waving of hair. Soc. Monsavon-L'Oreal. **860 705**

Alkoxytrioxanes, processes for their production, their use in froth flotation and materials treated therewith. National Chemical Products Ltd. **860 498**

Nickel-silicon-boron alloys. Coast Metals Inc. **860 733**

Amides of animoalkyl pyrrolidones. Fairweather, H. G. C. (General Aniline & Film Corp.). **860 655**

Synthesis of carbazole. American-Marietta Co. **860 554**

Apparatus for separating liquid particles from a gas stream. Chemical Construction Corp. **860 610**

Method and apparatus for the polymerisation of olefins. Bergwerksgesellschaft Hibernia AG. **860 454**

Production of compounds of the pyrimidine series. Badische Aniline- & Soda-Fabrik AG. **860 423**

Process for producing benzene. Universal Oil Products Co. **860 424**

Recovery or separation of aromatic hydrocarbons. Standard Oil Co. **860 842**

Pyridyl-methyl-dibenzyl amines and acid addition salts thereof and process for the manufacture of same. Hoffmann-La Roche & Co. AG., F. **860 844**

TRADE NOTES

Fibre Lubricants

Specially designed for the processing of all types of fibres on the woollen system, Shell Chemical Co. Ltd. have recently introduced a series of new textile fibre lubricants under the name of Oxitex. It is claimed that their main advantage over the traditional oleines or mineral oil blends is that they are immediately and completely removed by water alone. Where wool grease or excessive mill dirt is present on yarns or pieces scouring can be effectively accomplished in neutral mild detergent baths.

L.P.G. Fittings

A range of fittings for handling liquefied petroleum gas (L.P.G.) is described in a catalogue from Whessoe Ltd., Darlington, Co. Durham. This consists of a series of data sheets on various hydraulically operated safety valves, hydraulic operators and line type housings. Schematic suggestions for the use and application of L.P.G. safety valves are also included.

Contraves Products

Short and Mason Ltd., 280 Wood Street, Walthamstow, London E.17, sole selling agents in the U.K., for Contraves products, i.e., viscometers, multi-test tensile strength testing machines, announce that Dr. P. R. Masek, technical sales representative, has now returned from a visit to Zurich, and is available for consultation and service in respect of these instruments.

Turbros Price Reductions

Following the price reduction for glass rove in October, Turner Brothers Asbestos has announced further reductions of between 2d and 6d a lb. in glass fibre materials. The new reductions affect chemically and mechanically bound glass mats chopped rove, and glass rove.

Valve Catalogue

It was recently announced that Elliott-Automation has entered into agreements with The General Kinetics Corporation of New Jersey. A new catalogue, GV102, describes the range of P-K Paul and Ludeman Rotoflo valves, the subject of one of the agreements, which James Gordon Valves Ltd., a company of the Elliott-Automation Group, is manufacturing and marketing in the Eastern Hemisphere. The catalogue is available from Elliott-Automation Ltd., 34 Portland Place, London W.1.

G. A. Harvey

An illustrated brochure entitled 'The Harvey Team' discusses the activities, products and personnel of G. A. Harvey and Co. (London) Ltd., Woolwich Road, London S.E.7. The company's activities include heavy fabrication such as fractionating columns and other vessels for the chemical and petroleum industries; light fabrication; sheet metalwork; steel furniture; perforated metals and plastics; wirework and weaving; and galvanising.

Pipework Services

A service for the design, fabrication and erection of pipework systems is the subject of a pamphlet issued by Shaw-Petrie Ltd., North Hillington, Glasgow S.W.2. The company's operations include chrome molybdenum alloy piping for boiler plants and carbon, alloy and stainless steels for high temperature process work or for corrosion resistance, and many other examples.

Stretford Process

A new brochure on the Stretford process for the efficient and economic removal of hydrogen sulphide from refinery gas, natural gas, coal gas and air, is available from W. C. Holmes and Co. Ltd., Turnbridge, Huddersfield, who have built a plant to exploit the process at the Whitchurch Works of the North Western Gas Board. The process was developed by the N.W.G.B. in association with the Clayton Aniline Co. Ltd. and uses a washing medium of an aqueous alkaline solution of a commercial intermediate containing salts of one or more of anthraquinone disulphonic acids.

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 6d d/d to 6s; golden, 3s 9d d/d per lb. to 5s 2d 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, £59 10s; gran., £47; crystal, £50 10s; powder, £51 10s; extra fine powder, £52 10s; BP, gran., £56; crystal, £59 10s; powder, £60 10s; extra fine powder, £61 10s. In 6-ply paper bags, per ton £58 10s.

Boric Acid. Ton lots, in hessian sacks, c.p. Comm., gran., £78; crystal, £87; powder, £84 10s; extra fine powder, £86 10s; BP gran., £91; crystal, £99; powder, £96 10s; extra fine powder, £98 10s. Most grades in 6-ply paper bags, £1 less.

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. Less 2½%, d/d UK, in 1-ton lots, per lb., 2s 2½d.

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

Citric Acid—Granular. In kegs, 1-4 cwt. lots, per cwt., £11; 5-19 cwt. lots, per cwt., £10 16s; 1-ton lots, per cwt., £10 15s; packed in paper bags, 1-4 cwt. lots, per cwt., £10 12s; 5-19 cwt. lots, per cwt., £10 8s; 1-ton lots, per cwt., £10 7s.

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

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

Copper Sulphate. £77 10s 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, £12 1s 6d. 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. C.P., d/d, 44% by wt., per lb., 13d; 50% by wt., 14½d; 80% by wt., 23d; dark tech., ex-works, 44% by wt., per lb., 9d; 1-ton lots, ex-works, usual container terms.

Lead Acetate. White, about £154.

Lead Nitrate. 1-ton lots, about £135.

Lead, Red. Basic prices: 15-cwt. drum lots, Genuine dry red, £102 5s per ton; orange lead, £114 5s per ton; Ground in oil: red, £123 5s, orange, £135 5s.

Lead, White, Basic prices: in 5-cwt. drums, per ton for 2 ton lots, Dry English £115 5s; Ground in oil, £134 5s.

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), £17 10s.

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

Magnesium Sulphate. Crystals, £10 7s 6d.

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

Mercury Sulphide, Red. 5-cwt. lots in 28-lb. parcels, per lb., £1 10s 6d; 1-cwt. lots, £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., 1s 11¾d; 3-cwt. lots, per lb., 1s 11½d; 5-cwt. lots, per lb., 1s 10¾d; 1-ton lots, per lb., 1s 10½d; 5-ton lots, per lb., 1s 10d. Tech., 1-ton lots in 1-cwt. drums, per cwt., £9 18s; 5-cwt. in 1-cwt. drums, per cwt., £10; 1-cwt. lots, £10 9s.

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. drums, c.p. station, in 4-ton lots, about £76 10s. 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 Metaphosphate [Calgon]. 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. Solid, 60/62%, spot, d/d, in drums in 1-ton lots, £38 2s 6d; broken, d/d, in drums in 1-ton lots, £39 2s 6d.

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, £9 15s.—£11 7s 6d per ton; 140° Tw., arsenic free, £8 2s 6d; 140° Tw., arsenious, £7 17s 6d.

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, £105. green seal, £103; red seal, £100

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.
***iso*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, 8¼d per lb. ISAF: 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 Swansea, 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, min. price, d/d bulk, per lb., 1s 4¼d; 40/50-gal. ret. drums extra, per lb., ⅛d.
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., 16s 6d about.
Toluol. Pure, per gal., 5s 2d; 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 7½d-5s 8½d.

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.
Nitroanphthalene. 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.

Kestner Training Scheme

Kestner Evaporator and Engineering Co. Ltd., 5 Grosvenor Gardens, London S.W.1, have recently revised the scale of remuneration for members of their training scheme, which is aimed at giving practical training to young men who are not entering university after leaving school but who are keen to take up chemical engineering as a career. The course comprises ten sessions, taking five years to complete.

Iridon Add ABS to Their Thermoplastic Sheeting Range

MOST interesting of a new range of thermoplastic sheeting introduced by Iridon Ltd., 75 Grosvenor Street, London W.1, one of the Commercial Plastics Group, are a styrene copolymer material ABS (acrylonitrile-butadiene-styrene), rigid unplasticised p.v.c. and polypropylene. All these materials have properties of interest in chemical plant fabrication.

ABS has exceptional mechanical strength and resists attack by most dilute inorganic acids and alkalis, dilute organic acids and vegetable and mineral oils. Iridon ABS is an extruded material with an exceptionally high-impact strength and is extruded from imported resins. Particularly suitable for low-temperature applications, it retains its strength down to −45°F. Standard sheet sizes are 72 in. by 36 in. and 36 in. square. Iridon import the raw material.

Iridon ABS can be bonded or cemented to itself by wetting the surface to be joined with methyl-ethyl-ketone or methyl-iso-butyl-ketone.

In the U.S., ABS polymers are an engineering plastics coupled with other thermoplastics, such as nylon moulding resins, polyformaldehyde and polycarbonates. The polymer comprises roughly 25-30% acrylonitrile, 25-30% butadiene and the balance styrene. ABS polymer production in the U.S. is expected to total 40 million lb. for 1960 rising to 51 million lb. in 1961; sales gains are expected in the high-impact polystyrene field.

Iridon's M.200 is a p.v.c homopolymer of high physical strength and with a high degree of resistance to chemicals. It is available in thicknesses up to ½ in., in graduations of 0.10 in. and is supplied in a range of colours with filler rod to match. Easily formed and joined, it can be machined with conventional equipment.

Iridon polypropylene has the advantage of a high softening point enabling fabricated articles to be sterilised. It retains useful physical and chemical properties up to 75°C and can be taken above 100°C for short periods.

DIARY DATES

MONDAY 2 JANUARY
Plastics Inst. with I.R.I.—Leicester: Grand Hotel, 6.45 p.m. 'Recent developments in plastics & rubber for cable insulation', by J. A. Rhys.
Plastics Inst.—London: I.C.E., Savoy Pl., W.C.2., 2.30 p.m. Young People's Lecture: 'Plastics & textiles', by Dr. H. A. Thomas.

WEDNESDAY 4 JANUARY
S.C.I.—London: 14 Belgrave Sq., S.W.1., 6 p.m. Cathodic protection panel meeting on: 'Galvanic anodes'.

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