THE Chemical Age

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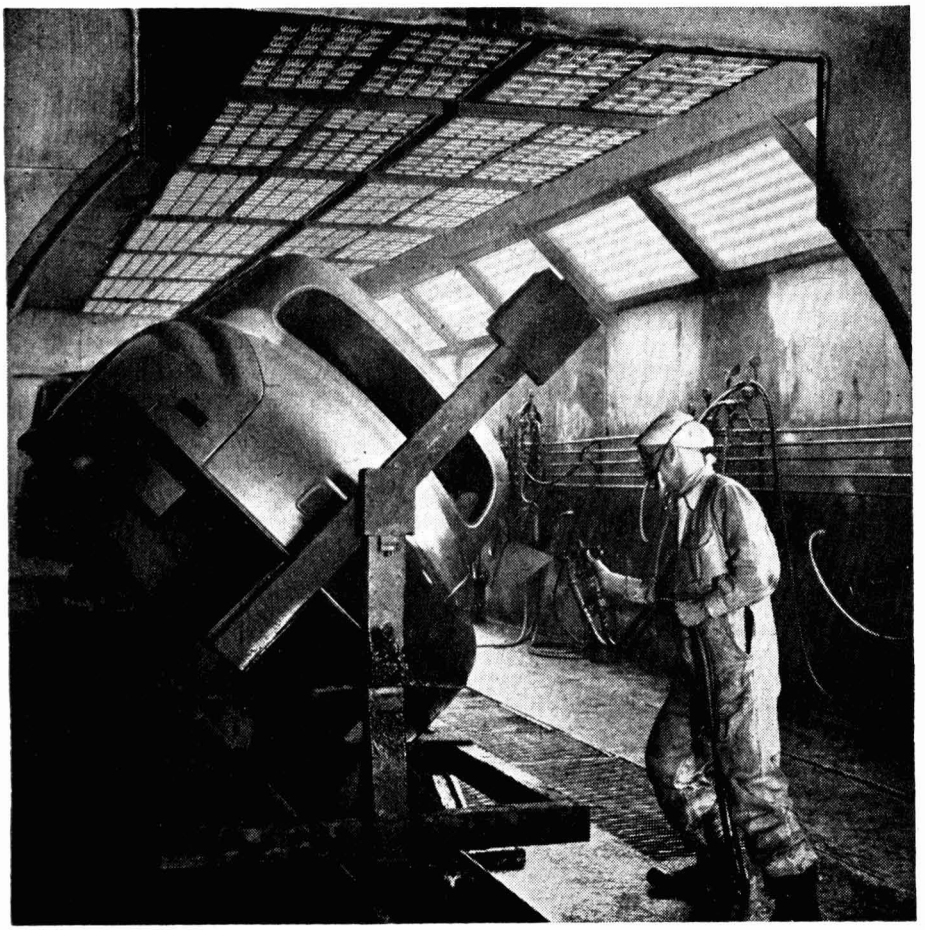

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Fertiliser Prospects

WHEN almost the entire countryside has so recently been encrusted with ice and snow and lashed by biting winds, the spring must still seem something too distant and fragile for immediate reckoning. But the agricultural spring begins before the spring of week-end motorists and feminine fashion displays. The huge peak of activity that annually pleases and perplexes the fertiliser industry lurches into existence any time from about the middle of February. It is not at all premature now, therefore, to scan the prospects of the industry, no longer an odd and Cinderella-like branch of the chemical industry but today one of its largest sections.

At about this time last year (THE CHEMICAL AGE, 1953, **68,** 299) we noted hopeful signs that the sharp fall in demand of 1951/52, an artificial recession caused by the removal of subsidies, was being arrested. These signs did not prove illusory. It is impossible to estimate with any certainty the precise extent of recovery. With characteristic shrewdness the farmers had bought heavily before the date-line of subsidy removal; the tonnage of fertilisers ordered in 1951/52 gives a poor indication to the tonnage actually used. To it must be added the unknown tonnage that farmers held in stock. Probably the best summing-up is a relatively rough one—in 1951/52 the sales of the fertiliser industry dropped in volume by between 33 and 40 per cent, and in 1952/53 they recovered by about 25 per cent. In terms of usage, however, the fall for 1951/52 was not as severe as these figures suggest, and allowing for old stock that was also used it was probably only about 15 per cent. What must be emphasied, however, is that steadily from 1940, and despite the raw material problems of the war years, British consumption of fertilisers expanded and by 1950 roughly three tons were being applied for every ton before the war. That year-by-year rate of expansion has disappeared, and real recovery cannot be claimed until the curve of national consumption again displays the same angle of ascent.

It is both technically and economically wrong for British fertiliser consumption to be passing through a flat portion on the curve of annual tonnages. It is an implication that the optimum rate of consumption, either for home food production or for farming profitability (or for both), has been attained. Such an implication is very far from truth; despite all the progress made, we are still little more than halfway to any target based upon optimum returns from use. By contrast, consumption in the United States is still rising steadily each year and there each successive spring for many years has brought its record-breaking tonnage.

It may be thought that the somewhat less certain economic situation of British farming reasonably explains the set-back to expansion in fertiliser use. Trade of any kind undoubtedly depends upon the customer's sense of prosperity and security, and this kind of influence is undeniably a part of the current fertiliser picture. Ironically, a more intensive use of fertilisers can do more than any other single and simple farming operation to improve agricultural balance-sheets. Fertilisers reduce the costs of crop production. Evidence from innumerable farm tests and general economic surveys of groups of farms

shows that the reasonably expectable rate of return for financial investment in fertilisers is between 100 and 250 per cent. Even when the farmer has to wait some time after the harvest to dispose of his produce this attractively high rate of return is obtained in a period of not more than 15 months. It is obvious that this is not widely appreciated; if it were, there would have been no halt to the expansion in fertiliser usage, and even the jolt of price rises when subsidies were removed would have had a very small and quite temporary effect. Equally obviously, the agricultural community as a whole is far from adequately informed about the virtues of fertilisers.

During the 1940-50 period of expansion the entire emphasis was laid upon food production. The maximum quantity of food that our soils could raise was required and there was no serious consideration of costs. Where the market price would not encourage investment of private resources in food production, subsidies of various kinds compensated for budgetary deficiencies. In the circumstances of war the subsidies were essential and inevitable for it was better for national morale for food prices to be kept down by balancing rising production costs with Treasury injections. Nevertheless, the impression made was that fertilisers, though excellent means for raising crop output per acre, needed a little help to be economic. All the propaganda, both official and from the industry, was based upon the single theme that fertilisers produce more food, and none of it emphasised the equally important theme that fertilisers also reduce the costs of producing that food. The re-introduction of subsidies for nitrogen and phosphate, welcome enough for short-term effect, is in the long run a dangerous perpetuation of the idea that in using fertilisers a farmer cannot stand upon his own economic feet. It might have been preferable to introduce a scheme through which fertiliser purchases by smaller-scale farmers could be financed at specially low interest rates.

What, then, are the prospects for 1954? Will the spring bring a greater or smaller demand than was presented in 1953? The pattern of demand has been slightly changed by a new system of early delivery rebates; most manufacturers offered maximum rebates during the generally more difficult months of November and December. As a result some farmers, though probably not a high proportion, took delivery of spring requirements in those months. It seems doubtful whether this will significantly reduce the spring tonnage, for one consequence has been a smaller intake by farmers during January and early February. Stocks held already on the farms are not appreciably greater than normal, and (very regrettably because of all the distribution problems that are involved) it seems that once again the main shape of the year's tonnage will be settled in the 8 or 10 weeks of the farming spring. If there is no sign that demand will be less, there is also no sign as yet that it will be any greater. To those who are mainly concerned with avoiding recession, this is reasonably satisfactory; but to those who believe that it is nationally essential for the 1940-50 rate of expansion to be revived, it is far less encouraging. One of the most potent offerings of applied science is still marking time. Agriculture, a great British industry, is not even approaching the full employment of technical advantages that have been known and available for many years.

If in fact it proves that fertiliser consumption in Britain for the farming year of 1953-4 is not appreciably greater than the consumption of 1952-53, the situation should be urgently examined at the highest national level. A relatively non-expansive utilisation curve should not be allowed to drift on year by year. We have too little soil, too big a population; and the reliance we can place upon food from overseas is limited both in quantity and in time. The neglect of food productive capacity at home is a past error that we cannot repeat without even greater risk of disaster. The argument that food produced in this country is too dear should be more closely examined; if, as a fact, it is true or partially true, then the reasons for under-using the most effective known means for lowering food production costs should be ascertained.

Notes & Comments

Effluents & the Budget

AT this period of the year the Chancellor of the Exchequer is showered with at least one commodity—advice. If budgets could be balanced with it, he would have the easiest of all Ministerial tasks. The publication by the FBI of their representations ('The Budget 1954' 10 pp. 1s. 3d.) might be looked upon as an attempt to seek popular pre-judgment for industry's claims, but the actual document or booklet is so obviously a sober and responsible contribution to national economic thought that apprehensions such as these vanish at once. Apart from the more general recommendations —taxation relief to provide more incentive, removal of death duty injustices to private companies, and a re-shaping of profits tax to mitigate its several anomalies, all worthy enough suggestions that Mr. Butler must balance against his need for fiscal revenue—a detailed representation made to the Chancellor's permanent advisers is of direct interest to the chemical industry. This draws attention to the defective system of assessing depreciation on effluent treatment installations. At present the allowance is given on only that portion of an installation that ranks as plant, but by far the heaviest costs incurred are those for settling tanks, underground pipelines, and associated excavation. And it is usually these parts of an installation that need the most frequent replacement.

Particularly Unsuitable

THE Tucker Committee recommended that a retrospective or balancing allowance should be given when it had been clearly shown that expenditure of this kind had become valueless, i.e., depreciation should be recognised at the stage when it had become complete. The FBI view is that deferred recognition is particularly unsuitable for effluent treatment plants, whose increasing installation is nationally desirable and should therefore receive special encouragement. It is difficult to see how any logically-minded person can dissent from this opinion. The FBI plea for realistic allowances on the costs of these installations should be speedily and fully granted; it should certainly not become one of those legitimate grievances of detail that require several years of Treasury reflection before their rectification. The loss of revenue involved would be triflingly insignificant set against the total sum paid by industry in taxes, but effluent treatment projects would have costs-budgets appreciably more attractive to boards of directors and accountants.

Manganese

AN important dollar export of the Commonwealth is threatened by a new American process for utilising low-grade manganese ore. The export of manganese ore from British West Africa, principally from the Gold Coast, has doubled in volume and quadrupled in money value since 1939; America's manganese supply has been heavily based upon Africa throughout the post-war period. The new process developed by the Western Electrochemical Co. is claimed to produce battery-active, high-grade manganese dioxide from ores averaging a 20 per cent content of manganese, ores abundant enough in the United States for virtual self-sufficiency. The new process is based upon electro-deposition. Low-grade ore is first pulverised to a fine particle size; it is then roasted with oil to convert the element to the divalent state. Sulphuric acid treatment next dissolves the metallic metals present. The solution is subsequently treated with barium sulphide to separate the heavy metals. After settling, the clear solution is aerated, and iron, colloidal sulphur, and arsenic are removed by precipitation. What remains is a sufficiently pure solution of manganese sulphate for passing to electrolytic cells where pure manganese dioxide is deposited on graphite rod anodes. The separation of the dioxide from the

graphite is easily accomplished; the final product is washed and dried at a fairly low temperature, and is said to be high-grade battery-active MnO_2.

Economic Retrogression

FOUR years ago the total production of battery-active dioxide in America was 1,100 tons and all of this was based upon high-grade ore imported from Africa. It is now estimated that a new plant based upon the low-grade ore process would cost between $7,000,000 and $8,000,000 for a capacity of 25 tons per day of product. This would meet the maximum US demand that can at present be foreseen. Year by year from 1949 to 1952 the tonnage of manganese ore exports from the Colonial Territories has been maintained at between 700,000 and 800,000; the sterling value of exports from Africa is about £4,000,000 per annum, and this forms 3 per cent of the value of all exports from British West Africa. Gold exports are worth only 2 per cent more. Once again technological advances threaten established lines of world trade. When the £ was the world's leading currency the flexibility of world trade was maintained because Britain's own industry was based upon an extraordinary self-insufficiency of raw materials. The US dollar is posed against a similar background and chemical progress that plugs the few gaps is a form of economic retrogression.

OEEC Chemical Committee

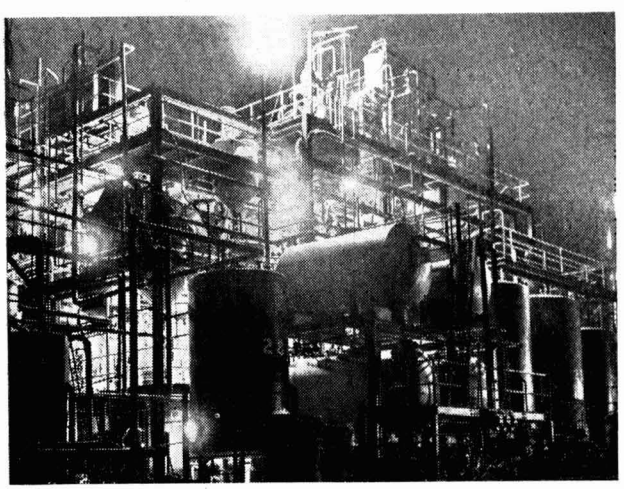
THE Organisation for European Economic Co-operation has set up a number of technical committees, whose work falls into two broad divisions. Statistical studies are prepared of the current position and future prospects of those sections of European industry covered by the committee concerned; and the committees are available to undertake special investigations as required.

Each technical committee meets as a rule six times a year for a session of three or four days. The intervals between meetings provide an opportunity for the secretariat and such working parties as the committees may appoint to prepare material for the plenary sessions of the committees.

The Chemical Products Committee, at its December meeting, discussed its programme of work for 1954. It is proposed to establish permanent working parties to exchange information in the field of petroleum chemicals and dyestuffs and to set up an *ad hoc* working party on statistics.

Analytical Chemists

The annual general meeting of the Society for Analytical Chemistry will be held on 3 March in the meeting room of the Royal Society at Burlington House, Piccadilly, London, at 4.30 p.m. Afterwards Dr. E. B. Hughes will deliver the Bernard Dyer Memorial Lecture, entitled 'The Contribution of Public Analysts and Other Analytical Chemists to Public Welfare.'



Believed to be the largest of its kind in the world, this phenoxylene plus plant recently went into production and is now yielding in excess of all expectations. Located at Cambridge and owned by Pest Control Ltd., it will enable Britain to meet both European and American competition in overseas markets for MCPA with an exceptionally high content of the active isomer. It will also allow the company to meet the growing demand from UK farmers for hormone weedkillers

Disposal of Industrial Wastes

Papers Read at American Conference

THE latest methods of waste disposal were reviewed at the 8th Industrial Waste Conference held at Purdue University, Indiana, in May last year, reports of which have recently appeared.

Fume disposal by catalytic combustion was the subject of a paper by R. J. Ruff (Catalytic Combustion Corporation). Many fumes, odours and poisonous gases are destroyed by passage over platinum-palladium catalysts when admixed with air at a temperature above the approximate ignition temperature (usually 150-300°). The catalyst is mounted on nickel strip arranged in the form of a panel and held in a box in the ductwork. Its life may be as long as three or four years before regeneration (at a relatively low cost) is required.

There were stated to be about 300 installations in the US. Many of these dispose of vapours from the varnishing of copper wires for electrical installation and of those from printing inks. Other applications include fat rendering, fish and vegetable processing, meat and food cooking, paint and varnish manufacturing, organic chemical manufacture including plastics, asphalt blowing, hydrogen sulphide, hydrogen cyanide, etc. The heat of combustion may be recovered.

Submerged Combustion

Submerged combustion in industrial waste treatment was discussed by William Weisman (Ozark-Mahoning Company). It was held that this process offered possibilities for the recovery of sulphuric acid for re-use from waste solutions. Mention was made of two existing applications in which Ozark-Mahoning equipment has been used: the concentration of a 1½-2 per cent solution of zinc chloride which could not otherwise be disposed of and which thus yielded a valuable by-product, and the conversion to a molasses product of a citrus peel waste liquor containing 6 per cent sugar, which caused severe scaling in more conventional equipment. Pointing out that carbon dioxide was one of the cheapest acids available for the neutralisation of alkaline waters before discharge, the author claimed that submerged combustion was one of the cheapest and simplest ways of neutralising alkaline wastes while bringing about any desired degree of concentration.

The National Council for Stream Improvement has conducted experiments on the oxidation of waste sludge obtained from aeration treatment of kraft mill waste. The results were discussed by the Council's Technical Adviser, H. W. Gehm. The material has a five-day BOD of 1,220 ppm. at a solids content of 0.77 per cent. The oxygen uptake of this sludge on aeration proceeds in linear fashion for five days, after which the rate decreases appreciably, indicating that the oxygen demand of the waste sludge is substantially destroyed by autogenous respiration. Data from the tests reveal that the oxygen demand of 1 per cent sludge drops from 1,560 to 230 ppm. on five days aeration, a decrease of 82 per cent. These results imply that long period aeration may be applicable to the oxidation of flocculent seed sludges to condition them for direct discharge to receiving waters.

Long Period Aeration

In order to determine what would be involved in the application of long period aeration to an amenable waste, an evaluation was made for a board mill effluent of unusual characteristics. This waste consisted of 75,000 gallons daily, having a five-day BOD of 1,200 ppm., the bulk of which was in the dissolved or finely dispersed state. Respirometer tests, which represent ideal oxidising conditions, revealed that when supplemented with ammonia and phosphate in the presence of a flocculent seed concentration of 4,000 ppm., BOD reduction in excess of 90 per cent could be consistently obtained for waste waters of this type in eight hours of aeration. Tests also indicated that one pound of volatile sludge solids would be produced for every two pounds of BOD introduced in the process. A proposed flow diagram for a plant for the application of the process was presented. It was pointed out, however, that before the process could be applied, more knowledge must be gained through pilot plant studies, particularly as to aeration requirements.

E. J. Mills and Vernon T. Slack (Process Development Laboratory, Carbide & Carbon

Chemicals Company) presented data obtained in an attempt to find answers to problems regarding the biological oxidation of synthetic organic materials. The bacterial growths employed in obtaining BOD reduction data were acclimatised to a replica of the process effluents at the company's South Charleston plant, and sewage seed was used in the BOD determinations. This replica was employed as a control in studying the effect of synthetic organic materials on biological oxidation. These conditions necessarily limit the application of the data, but certain generalisations seem possible.

Aerobic Biological Oxidation

From the observed data it appears that many organic materials are relatively stable to aerobic biological oxidation and show no toxicity to micro-organisms over an organic material concentration range of zero to 1,000 ppm. Biological oxidation of polyethylene glycol and its derivatives is related to the chain structure, molecular size and functional groups present. Neither polyethylene glycols nor their diethoxy derivatives are readily oxidised by aerobic biological oxidation. On the other hand, monoethoxy derivatives are biologically oxidisable and more significant oxidation was observed for the shorter chain materials. The acetate derivatives of the lower molecular weight polyethylene glycols were significantly oxidised by aerobic biological oxidation. It seems logical to assume that similar results would be obtained with other polyoxyalkylene materials.

Biological oxidation of aliphatic ketones is controlled by the molecular size. Concentrations of benzaldehyde greater than approximately 400 ppm. show a toxicity to biological oxidation organisms. Atoms other than carbon atoms in the chain of an organic molecule may interfere with carbonaceous aerobic biological oxidation. Acetaldol is toxic to biological oxidation when present in concentrations greater than approximately 600 ppm.

The BOD exerted by the individual components of an aqueous organic mixture may not apply to the mixture, particularly if chemical reactions occur between any of the components. Ethyl formate, calcium formate and acrylonitrile are not toxic to aerobic biological oxidation over the concentration range of zero to 1,000 ppm. of material.

Waste disposal at the Bristol plant of the Rohm & Haas Company was reviewed by Frank M. Majewski. This plant, which is located on the Delaware River, covers an area of about 50 acres and employs about 2,500 men. The wastes which have to be handled are dilute sulphuric acid, phosphoric acid sludge, hydrochloric acid wastes from insecticide and weedkiller manufacture, often containing dichlorophenol, neutral aqueous waste containing dichlorophenol, various other aqueous wastes, and various potential air-polluting wastes.

The sulphuric acid wastes contain some acid ammonium sulphate and cannot, therefore, be concentrated and re-used. From 350,000 to 400,000 lb. of 30 to 35 per cent sulphuric acid waste is collected per day in a copper pipe line from various plant buildings. It is neutralised with ammonia, when gummy organic matter separates and is skimmed off and later burnt. The ammonium sulphate (99 per cent or better) is crystallised out after concentration and sold to fertiliser manufacturers.

The phosphoric acid sludge is a thick viscous product containing much organic matter. It is reacted with phosphate rock to produce a triple superphosphate of about 46 per cent available P_2O_5. The organic matter present was found to be non-injurious to plant life, and fertiliser manufacturers purchase the triple superphosphate. The original material has also found other outlets; e.g., for the production of trisodium phosphate washing powders.

Reducing Dichlorophenol Content

Hydrochloric acid wastes are produced as a result of various organic chlorination reactions in the production of insecticides and weedkillers, and small quantities of dichlorophenol—which has a high taste threshold—are present in them. The gaseous HCl is first scrubbed with a hydrocarbon solvent (later burned) to reduce the dichlorophenol content as far as possible, before being absorbed in water. The aqueous acid so produced is passed through beds of high calcium limestone with the production of a harmless calcium chloride solution of *p*H 4-6. Dolomitic limestone was unsatisfactory because of its tendency to crumble and clog the bed. At this stage the dichlorophenol content of the calcium chloride is about 250 ppm. It is reduced by chlorination to less than 0.2 ppm. the residual chlorine content being over 400 ppm.

The aqueous wastes now containing dichlorophenol and residual chlorine in these quantities are combined and diluted approximately 80-fold with other contaminated waters, including those from tank-car washings, most floor washings, and aqueous wastes from the manufacture of acrylate, Plexiglas, moulding powder, etc. These waters are fed into a trickle filter of 225 ft. diameter at the base and containing about 10,000 tons of three to four inch crushed trap rock. Emergency and operating basins are used, the hold-up time in each being about twelve hours. Normal operation at normal temperatures shows 92 to 96 per cent BOD reduction. One pound of nitrogen and one half pound of phosphorus are added per 27 lb. of BOD in the feed. The effluent from the trickle filter is impounded in a 34-acre basin at the far end of which the BOD falls to 25 ppm., the retention time being about three to four months. The effluent from the basin percolates slowly to the Delaware River.

First 'Breeder' Pile

ZEPHYR Goes Into Operation

'ZEPHYR,' the zero energy fast reactor at Harwell, and the first fast reactor to be built in the United Kingdom, became critical for the first time on 5 February. The objects of ZEPHYR are to obtain operating experience with a fast reactor and to gain information (for example about control systems, nuclear constants and materials and methods of reactor construction) which can be obtained only by the actual operation of a reactor. This information will be of major importance to the design work on an experimental power-producing fast breeder reactor which is being undertaken jointly by Harwell and Risley.

The fast reactor has characteristics which make it likely that most of the uranium atoms in natural uranium can be consumed by the process known as breeding. Consequently, if this type of system can be developed, a nuclear energy electricity generating system should operate with a much smaller supply of fuel than in the case of natural uranium or slightly enriched uranium thermal fission reactors.

Reactors previously built and now in use in Britain—two at Harwell and two at Sellafield—use uranium rods enclosed in graphite which acts as a moderator to slow down neutrons produced by fission. Plutonium is created by such piles and those at Sellafield were built for this purpose, but the principle of breeding is to create more fissile material than is consumed.

The construction of a fast reactor requires pure, or nearly pure, fissile material, so the construction of ZEPHYR could not be undertaken until this material was available. The fuel used is, in fact, plutonium enclosed in a metal can. The core of a fast reactor, i.e., the central portion containing the fuel elements, is very small and in the case of ZEPHYR only about the size of a top hat. The core is surrounded by a more massive envelope or blanket of uranium which either reflects back any neutrons escaping from the core or absorbs them so as to produce fresh plutonium. In this way very few neutrons are wasted.

The designation zero energy means that the reactor is to be operated at a very low power level so that it will not get highly radioactive and will not require cooling. As a result it should be possible to make modifications to the reactor from time to time in the light of experience.

The design of ZEPHYR, in which special attention has been given to safety, has been the responsibility of the Reactor Physics Division at Harwell. They have had assistance with components from nearly every other Division and especially from the Metallurgy and Electronics Division. The detailed design and construction of the reactor was undertaken by the Reactor Engineering Division and the main workshops at Harwell.

IN THE EDITOR'S POST

Silicone Rubber Tubing

SIR,—My attention has been drawn to a trade note on page 239 of your issue of 16 January, stating that the British Standards Institution has accepted silicone rubber tubing for blood transfusion equipment.

I would like to point out that the draft British Standard for transfusion equipment shortly to be issued requires that natural rubber shall be used for the rubber tubing.
—Yours faithfully,

G. WESTON.

Technical Director,
British Standards Institution.

UK Sulphuric Acid Returns

Production & Consumption in 1953

PRODUCTION of sulphuric acid and oleum (chamber, tower and contact) in the United Kingdom during 1953 totalled 1,875,177 tons of 100 per cent H_2SO_4, which was 369,704 tons more than in 1952 and 269,099 tons more than in 1951.

Consumption also increased during 1953, the total of 1,901,826 tons being 349,803 tons higher than that for 1952. Stocks at 31 December, 1953, totalled 63,138 tons, this being 7,032 tons less than the figure at the end of 1952.

SULPHURIC ACID AND OLEUM
(*Tons of* 100% H_2SO_4)

Data referring only to Acid Makers' Returns	Chamber and Tower only	Contact only	Chamber Tower and Contact
Stock 1 Jan. 1953 ..	30,844	39,326	70,170
Production	658,525	1,216,652	1,875,177
Receipts	130,169	97,725	227,894
Oleum feed	—	5,256	5,256
Adjustments ..	−453	−394	−847
Use	399,498	472,658	872,156
Despatches	389,411	852,945	1,242,356
Stock 31 Dec. 1953 ..	30,176	32,962	63,138
Total capacity represented	794,130	1,472,690	2,266,820
Percentage production	82.9%	82.6%	82.7%

RAW MATERIALS
(*Tons*)

Data referring only to Acid Makers' Returns	Pyrites	Spent Oxide	Sulphur and H_2S	Zinc Concentrates	Anhydrite
Stock 1 Jan. 1953	127,958	238,049	62,185	78,670	515
Receipts	403,094	280,865	236,090	162,261	183,078
Adjustments	+1,434	+3,879	+2,475	+85	—
Use	378,124	285,973	252,893	174,036	182,803
Despatches*	1,880	58,993	769	—	—
Stock 31 Dec. 1953	152,482	177,827	47,088	66,980	790

* Including uses for purposes other than sulphuric acid manufacture.

CONSUMPTION OF SULPHURIC ACID AND OLEUM,
(INCLUDING ALL IMPORTED ACID)
(UNITED KINGDOM, 1953)

Trade Uses	Tons 100% H_2SO_4
Accumulators	10,042
Agricultural purposes	9,522
Bichromate and chromic acid	9,465
Bromine	15,941
Clays (Fuller's Earth, etc.)	9,196
Copper pickling	3,659
Dealers	12,064
Drugs and fine chemicals	14,108
Dyestuffs and intermediates	68,237
Explosives	31,757
Export	2,631
Glue, gelatine and size	459
Hydrochloric acid	54,268
Hydrofluoric acid	11,859
Iron pickling (including tin plate)	96,524
Leather	4,231
Lithopone	11,897
Metal extraction	4,003
Oil refining and petroleum products	64,182
Oils (vegetable)	11,218
Paper, etc.	5,338
Phosphates (industrial)	1,389
Plastics, not otherwise classified	21,096
Rayon and transparent paper	232,553
Sewage	11,224
Soap and glycerine	30,671
Sugar refining	585
Sulphate of ammonia	287,328
Sulphates of copper, nickel, etc.	20,450
Sulphate of magnesium	5,131
Superphosphates	482,393
Tar and benzole	22,843
Textile uses	21,549
Titanium oxide	169,164
Unclassified	144,849
Total	1,901,826

Figures for the year 1953, reproduced in the tables above, are from the summary of returns issued by the National Sulphuric Acid Association Ltd.

'Great Palace of Chemistry'

DESCRIBED by the public orator of Sheffield University (Professor Browne) as 'a great palace of chemistry,' the university's new chemistry building, which was opened last week by Lord Scarborough, Lord-Lieutenant of the West Riding of Yorkshire, has laboratories on an extensive flat roof 'for the recovery of volatile solvents and for conducting dangerous operations.'

To record the university's appreciation of a gift of £50,000 from the Staveley Coal and Iron Co. and the Staveley Iron and Chemical Co., the research laboratories have been named the Staveley Laboratories. The Wynne Library has been so named in honour of Professor W. P. Wynne, professor of chemistry at the university from 1904 in 1931. The library has been equipped to cope with chemical literature for at least ten years, but is due for expansion in the department's plans, like the rest of the building.

Sulphurous Raw Materials

Committee Report on First Six Months of 1953

THIS report is the second of a series dealing with developments in the sulphurous raw materials position to be issued at regular intervals by the Chemical Products Committee of the Organisation for European Economic Cooperation. The first report, which dealt with the situation in 1952, was published in September (THE CHEMICAL AGE, 1953, **69**, 555) and the present report deals with the position in the first six months of 1953.

Sulphurous Raw Materials

Developments in production of sulphur (as such) are given in the following table (in 1,000 metric tons):—

	July-Dec. 1952	Jan.-June 1953	Increase or decrease (per cent)
Native sulphur	139.2	117.0	−16
Recovered sulphur ..	107.9	115.6	+ 7
Total	247.1	232.6	− 6

The output of native sulphur in Italy has declined considerably. The doubling of production of recovered sulphur in the Netherlands should also be noted.

The level of consumption of sulphur as such is given in the following table (in 1,000 metric tons):—

		Increase or decrease over 1st half 1952 (per cent)	Increase or decrease over 2nd half 1952 (per cent)
1st half 1952	439.0	—	—
2nd half 1952	296.0	−32.6	—
1st half 1953	410.4	− 6.5	38.6

The decline compared with the first half of 1952 is due to the decrease in consumption of sulphur for agricultural use resulting from the more favourable season in 1953.

The gross deficit in member countries in the first six months of 1953 amounted to 410,400 − 232,000 = 177,800 tons. If exports to non-member countries are deducted (14,700 tons) it will be seen that the net deficit was about 192,500 tons.

Imports from the United States during the first half of 1953 (206,600 tons) show a decline of nearly 15 per cent compared with the second half of 1952 and were 38 per cent lower than in the first half of last year. Imports from other countries have fallen to an even greater extent (by 45 per cent compared with the second half and 72 per cent compared with the first half of 1952).

Exports by member countries to non-member countries remained stable in the period January-June 1953 compared with the second half of 1952 though exports to the OEEC area declined. The situation appears to be singularly difficult in Italy where less than 30 per cent of total exports between July-December 1952 were exported in the first half of 1953. In Norway, however, exports only amounted to 80 per cent of those of the previous six-monthly period.

The following table shows the trend in the pyrites situation (per 1,000 metric tons of sulphur content):—

	Production	Increase or decrease (per cent)	Consumption	Increase or decrease (per cent)
July-Dec. 1952	818.3	—	1,048.1	—
Jan.-June 1953	809.1	−0.5	1,149.5	+10

Production was thus stable, but consumption has risen, again reaching the level of the first half of 1952. This development should be seen in the light of the fact that the use of pyrites for the manufacture of sulphuric acid for the fertiliser industry is normally higher in the first half of the year than in the second.

Imports and exports have both fallen by about 33 per cent, the decrease in trade with non-member countries being greater than with member countries.

The trend in the blendes situation is shown in the following table (in 1,000 metric tons of sulphur content):—

	Production	Increase or decrease over 2nd half of 1952 (per cent)	Consumption	Increase or decrease over 2nd half of 1952 (per cent)
July-Dec. 1952	66.9	—	179.2	—
Jan.-June 1953	58.6	−12	184.0	+2.7

Imports have decreased by 17 per cent and exports by 2 per cent compared with the second half of 1952.

The following table shows the situation for sulphur in all other forms (in 1,000 metric tons of sulphur content).

	Production			Consumption		
	July-Dec. 1952	Jan.-June 1953	Increase or decrease (per cent)	July-Dec. 1952	Jan.-June 1953	Increase or decrease (per cent)
Anhydrite*	130.7	140.7	+ 8	135.7	137.9	+ 1
Spent oxide	84.2	96.7	+15	107.1	117.5	+10
Mining wastes	18.1	16.3	−10			

* Production of anhydrite for the manufacture of ammonium sulphate and sulphuric acid only.

Except for mining wastes the production and consumption, but particularly the production, have increased compared with the second half of 1952.

The large increase in exports of spent oxide by the United Kingdom (18,000 tons compared with 4,000 tons during the whole of 1952) should be noted.

During the first half of 1953 production of sulphurous materials as a whole remained about on the same level as the second half of 1952. Consumption increased by 13 per cent over that of the period July/December 1952, though compared with the first half of that year (the period with which a more valid comparison can be made owing to the seasonal nature of use in certain sectors) consumption decreased by about 2 per cent.

Sulphuric Acid

The position is as follows:—

	Production	Increase or decrease (per cent)	Consumption	Increase or decrease (per cent)
July-Dec. 1952	4,057.7	—	3,977.3	—
Jan.-June 1953	4,329.1	+6.7	4,380.1	+10

Production and consumption are normally higher in the first half of the year than in the second. A comparison with the first half of 1952, when production amounted to 4,310,600 tons and consumption to 4,343,700 tons, shows that the situation is relatively stable.

End Uses

The percentages of sulphur used for certain important purposes are shown in the following table:—

	Jan.-June 1952 (per cent)	July-Dec. 1952 (per cent)	Jan.-June 1953 (per cent)
Sulphuric acid	35	41	39
SO_2	15	16	15
CS_2	20	23	26
Agricultural uses	21	7	13
Other uses	9	13	7

It will be seen that there has been little change on the whole, though, for climatic reasons, the quantity of sulphur used in agriculture was lower in 1953 than in the corresponding period of 1952, and that used in the manufacture of carbon bisulphide is increasing, reflecting the more favourable situation in the artificial textile industry.

The following percentages illustrate the distribution of sulphuric acid:—

	Jan.-June 1952 (per cent)	July-Dec. 1952 (per cent)	Jan.-June 1953 (per cent)
Fertilisers	57	61	57
Textiles	10	10	10
Metallurgy	4	4	4
Others	29	25	29

and reveal that the distribution in the first half of 1953 was identical with that of the first six months of the previous year, with an increase in the total consumed of less than 1 per cent.

The figures of consumption of sulphuric acid in the fertiliser industry show a continuous decline in the B.L.E.U., the Netherlands, and to a lesser extent in France and Germany. On the other hand the tonnage used by this industry in Italy and the United Kingdom has increased considerably (in the latter country by nearly 30 per cent).

It should also be noted that despite a general increase in consumption of sulphuric acid in the textile industry, certain countries (Austria, France, Italy, Switzerland) have not yet regained the level current in the first half of 1952.

Information Services

An advanced course in information work, under the general title of 'Organisation and Development of Information Services,' is to be held by Aslib from 25-28 February. The course will be mainly a series of lectures and is planned to be of maximum benefit to information workers with from three to five years' experience in the field. Further details may be obtained from Aslib, 4 Palace Gate, London, W.8.

Meeting the Nation's Fuel Requirements

Atomic Energy as a Competitor to Coal

THE relative importance of coal and atomic energy in meeting the nation's future fuel requirements was the theme of more than one speech by prominent personalities at the recent annual dinner of the Institution of Incorporated Plant Engineers in London. The guests included Sir Hubert Houldsworth, chairman of the National Coal Board; Sir Charles Ellis, president of the British Coal Utilisation Research Association; Sir John Cockcroft, director of the Atomic Energy Research Establishment, Harwell; Dr. H. J. Hough, engineer-in-chief, Unilever Ltd.; and representatives of the senior institutions and the Board of Trade.

Proposing the toast of 'The Institution,' Sir Hubert Houldsworth said the need for efficiency in every aspect of engineering was well illustrated by the struggle to promote improvement in the utilisation of fuel. The ever-increasing demand for power would throw too big a strain on the nation's fuel resources unless success crowned the endeavour to increase the availability of fuel —of which coal was the most important— coupled with ever-increasing efficiency in its use.

Efficient plant, properly maintained and used—and not only fuel-using plant—was necessary for real success in the fight for the efficient use of fuel. Much improvement was frequently possible with a different plant, but that plant must be properly maintained and used, and in that respect the plant engineer was therefore a key figure in the country's economy.

Growth of Atomic Energy

Referring to the growing importance of atomic energy as fuel in the days to come, Sir Hubert added: 'But we have to think of the present—of today as well as tomorrow—and I think that today and for many morrows your help in developing the right use of the existing fuel available will be of great importance to this country.'

Sir Charles Ellis, replying to the toast of 'The Guests,' also alluded to atomic energy. He asked: 'How many of you would like us to stop mining and trust in atomic energy? How many would like us to stop mining coal in 20 years, or even 40 years? Believe me, the burden of B.T.U.'s is going to be taken for the next 100 or so years by coal, and rightly so; but what will atomic energy do? It will raise the whole standard of what I might call 'B.T.U.ism' because it will mean that everything in the form of utilisation has to measure itself against standards which will be supported by the most modern advances in research, the most modern applications of technology, and the expenditure of resources. I wonder whether that setting of the standard is not going to be one of the biggest contributions from atomic energy; and we in the coal industry realise that it is going to be a whip, or an encouragement, to us.'

Sir John Cockcroft's Reply

Sir John Cockcroft also replied to the toast. After mentioning that his first contact with plant engineering came in Canada in 1944, he went on: 'We heard then that the Americans had the building of a $500,000,000 plant to produce atomic power, to extract plutonium by a very complicated chemical extraction process which they wouldn't tell us anything at all about. So we had to get to work to study how to build a plant of a similar sort in England. At that time we had only a little speck of material corresponding to the smallest speck of cigarette ash and our chemists had to go to work with their test tubes and shake up that ash with solvents and so on. Then two chemical engineers came over from England and they built a pilot plant. As a result of their work we see the enormous chemical extraction plant which has been built in Cumberland. As you have probably read in the recent book on atomic energy factories, it is working very well indeed. This, I think, shows what science and technology really can do, although at the time our engineering friends were very pessimistic.

'We are now engaged upon more venturesome experiment—the building of a nuclear power station in Cumberland. Now I should say at once that we are not trying to put Sir Hubert and Sir Charles out of business. In fact I say that anybody who tries to build power stations if they have lots of coal would be just crazy. However, we are

told by the people who write reports—the Ridley Report, and even by the National Plan for Coal—that they are going to be in serious difficulties in 20 years' time, and are going to be 20,000,000 tons short. As you go about the world you find the same story. In Canada I used to think that they had all the hydro power they would ever need, but Ontario hydro is already running out, and now they are interested in atomic energy. In Sweden, too, I thought they had all the hydro they could ever want, but in 20 years they are going to run out. Therefore I think it is time we made a start and we are going to build one of these experimental power stations to produce quite a sizeable amount of electrical energy.

'What will it be like? It will have a different kind of boiler, looking much like an ordinary boiler except that there won't be any ash, or coal handling; it will all be very clean, with polished floors. Once every year or two we shall have to change the fuel and people will put on their white coats for the occasion, and perhaps there will be a little radiation about. I can assure you that a little bit of radiation doesn't do anybody any harm and I think that a lot of these dangers associated with it are very much exaggerated; provided you know what you are doing, you won't come to any serious trouble.

'On this business of our fuel supplies, coal may run out in 200 or 300 years—the figure varies from time to time—but there is plenty of nuclear fuel in the world. For instance, in the gold ores, in the phosphate rocks, and in the ocean there is lots of it if we could only learn to take it out, and this is the real problem. We must encourage our young technologists to develop their ideas and provide them with the facilities and finance to get on with it. I have a great faith in the younger generation if they are properly encouraged and I am sure that when Sir Hubert gets into difficulties with his coal supply we shall be able to come along to help him out.'

Potassium From Sea-Water

A METHOD of producing potassium from sea-water has been discovered by Norsk Hydro, the Norwegian chemical concern. To exploit the method Norsk Hydro, together with the Dutch chemical concern Mekog, have built an experimental factory near Amsterdam with an annual capacity of about 1,500 tons of potassium. If production at this factory proves successful, factories for the production of potassium from sea-water on a major scale will be built in Norway and Holland.

Norway at present imports about 45,000 tons of potassium a year at a cost of £1,600,000 and Holland imports 160,000 tons, costing about £8,000,000. Norsk Hydro and Mekog have formed a special company, Norduco, to run the experimental plant and to make patenting arrangements, but subsequent commercial production in Norway and Holland will be the separate responsibility of the two parent companies.

The method has been worked out by the head of Norsk Hydro's research laboratory, superintendent engineer Jakob Kielland. Bjarne Eriksen, Norsk Hydro's director-general, said at a Press conference that the potassium salt which will be primarily extracted from sea-water by the Norduco process is potassium nitrate. As sea-water contains only on the average 450 grammes of potassium per cubic metre, tremendous quantities of water are required. To produce a ton of potassium, 2,000 to 3,000 cubic metres of water are needed.

Import & Export Licensing

THE Board of Trade announces the introduction of a consolidated Notice to Importers, bringing up to date the summary of import licensing arrangements. It is Notice to Importers No. 635, and can be obtained from Import Licensing Branch, 43 Marsham Street, London, S.W.1.

The Board also announces the introduction of a consolidated Order governing export licensing arrangements. It is the Export of Goods (Control) (Consolidation) Order, 1954, which came into operation on 8 February. Copies of the Order, S.I. 1954 No. 118, are obtainable from H.M. Stationery Office, price 1s. 9d. No charges are made in the existing regulations for imports and exports by these documents. They set out the existing licensing arrangements in a convenient form.

Shortage of Science Teachers

'Revolutionary' Suggestion Made in the House of Commons

DURING a speech in the House of Commons last week on the shortage of science teachers, Mr. M. Follick, M.P., made what he described as the 'revolutionary' suggestion that Loughborough College be taken over and become an ancillary of British industry.

Mr. Follick began by declaring that the shortage of teachers could undermine our very existence as a nation unless something was done to solve the problem. 'If we have not got the teachers in the schools,' he said, 'we cannot have the pupils; if we have not got the pupils, we cannot have the students; if we have not got the students, we cannot have the graduates, and without the graduates we cannot have the scientists.'

This country was far behind both Germany and the United States in the scientific development of industry—the Massachusetts Institute of Technology was founded in 1860 and the Charlottenburgh High School of Technology was founded in 1880. Although British industry had developed very rapidly on a basis of scientific development since the First World War, unless the flow of scientists was continued industry could not go ahead and compete with the other scientifically developed industries in the world.

'For us,' continued Mr. Follick, 'this is much more important than for any other nation, because we are more vulnerable in this respect than any other people on earth.' This country had no natural exportable resources. True, there was coal, but if industry was to be expanded sufficiently for us to live there would not be any coal to export. We had to import nearly half the food we required and nearly all the resources needed for industry. For all this we depended on the export of manufactures, and to do this in competition with the most highly developed nations in the world we must have the scientists. Unless there were teachers in the schools, industry could not have scientists.

Industry Cooks Own Goose

The difficulty was being increased by industry itself, which could and did offer a much higher level of remuneration, better conditions and easier existence to the scientists than they had by teaching in the schools. As industry expanded, it absorbed more scientists and unless something was done to level out the distribution of scientists, industry itself would have killed the goose that laid the golden eggs.

Mr. Follick continued: 'I have had a lengthy correspondence with the chairmen of four of our giant industries, I.C.I., de Havillands, Unilever and Shell. The chairmen of these four great branches of industry put their experts at my disposal in order to furnish me with as much information as possible. From the educational side, I have taken four people from outstanding establishments of education—the director of Nottingham University, the headmaster of Uppingham, the president of Loughborough College, and the headmaster of Loughborough Grammar School. They have all helped me in bringing forward the proposals I have to make in this debate tonight. In their letters to me, each one of them recognises that this is not a problem, but a danger.'

Grants from Shell

Later in his speech, Mr. Follick said: 'Some of our great firms, such as Shell, have pressed our universities to adopt courses and to promote departments in their establishments for the development of scientific industrial expansion. Shell gave about £500,000 to Cambridge University to found a chair of chemical engineering and also promoted the teaching of geophysics in our universities. Other firms have also given large sums of money to our teaching establishments to help us in this difficult problem.'

Mr. Follick went on to speak of the shortage of women teachers and continued: 'Now, what am I going to propose as my first revolutionary suggestion? It is that Loughborough College be taken over and become an ancillary of British industry; that British industry goes in to a large extent, to finance Loughborough College and also gives guidance to that college in the kind of sciences, physics, or mathematics which British industry desires for its expansion and development. The one person whom I should have thought would have

objected to this idea is the president of the college. But no; on the contrary, he comes out wholeheartedly in favour of it.

'The result of this would be that Loughborough College would be an ancillary to British industry, producing the scientists, the physicists, and the mathematicians which British industry requires, leaving the universities and training colleges to provide the teachers in schools and colleges. Therefore, one would get a flow from the schools to the universities on the one hand, and the flow from Loughborough College to industry on the other. Hon. members may ask why I specify Loughborough College. I do so because this college is recognised as the principal engineering and technological college in the Commonwealth.'

Mr. Follick was going on to refer to the possibility of attracting teachers if they were exempt from National Service when, owing to the lateness of the hour, the Speaker adjourned the House without the question being put.

Metal Statistics 1938-52

ONCE again, after a lapse of 13 years, the the Metallgesellschaft AG at Frankfort-on-Main has begun to publish annual statistical compilations on the production, consumption, imports and exports, and prices of aluminium, lead, copper, zinc, tin, cadmium, nickel, mercury and silver. This very useful reference book (Pp. 238 + xix), will be welcomed by all those who knew it before the war.

Since this, the 41st annual issue, is the first since 1938, the introduction has been devoted to a general survey of the developments in the metal industry during the period 1938-52 and as far back as the beginning of the century. The close connection between the metal industry and industry in general, and the importance of technical progress for the development of the metal industry, have led to the inclusion of some brief details on industrial production and raw material requirements together with a short review of the progress of non-ferrous metallurgy during the last 25 years.

The German version of this publication appeared some weeks ago, and the English edition has just been released.

It is hoped that a survey of technical developments in the field of manufacturing will be included in the next annual issue.

Industrial Water

A PUBLIC inquiry opened on Monday into an application by the Metropolitan Water Board to increase charges for water supplied to industrial and commercial undertakings. The Board have applied for an increase of 55 per cent on present charges, which range from 1s. 4d. a 1,000 gal. for a quarterly consumption not exceeding 50,000 gal., to 11⅛d. for a quarterly consumption exceeding 5,000,000 gal. The increased charges would range from 2s. 0¾d. to 1s. 5¼d. The application is opposed by the British Transport Commission and the Federation of British Industries on behalf of the London Brewers' Society, the Institute of British Launderers, the Food Manufacturers' Association, the Association of British Chemical Manufacturers, the Society of Pharmaceutical Chemists, the Society of Master Bakers, and the London Mineral Water Manufacturers' Association.

Terylene Fur Coats

IN the House of Commons last week the President of the Board of Trade (Mr. Peter Thorneycroft) was asked by Mr. Dodds whether he would give further support to the industries concerned in the production of Terylene fur coats, so that mass production could be started, thus ensuring the export of such coats before next winter.

Mr. Thorneycroft replied that he was informed that the fabric for these coats was still in the technical development stage and that mass production would not be a practical proposition for some time. The industries concerned were receiving every assistance from the producers of the raw material and he was not aware that they required any special support from the Government.

Answering a further question, Mr. Thorneycroft promised that he would do all he could to encourage the development of Terylene.

Larger Ammonia Plant

The Dow Chemical (Canada) Co. has announced that the proposed expansion of its ammonia plant, at a cost of $3,000,000, will be started this month.

Methods for Entrainment Separation

by PETER W. SHERWOOD

ENTRAINMENT occurs wherever a gas is separated from a liquid. Depending on the physical properties of the system and the initial velocity of the gas stream, the amount of liquid particles carried by mechanical entrainment may range from negligible quantities to amounts which will interfere with adequate and economic operation of the process. The problem of liquid entrainment occurs throughout the chemical process industries and numerous devices are today on the market by which this phenomenon—or at least its adverse effects—may be minimised.

A Necessary Measure

Entrainment separation may be a necessary measure in petroleum refineries for any one or several of five reasons: (a) entrained liquid may interfere with the efficiency—or indeed the operability—of a subsequent process; (b) values contained in recovered liquid spray, may add materially to the economics of the operation; (c) elimination of liquid carry-over to a later process stage may lower maintenance requirements and minimise damage to machinery; (d) removal of entrained liquids from effluent gas streams very often contributes significantly to the reduction of air pollution problems; (e) where the entrained liquid is corrosive, its removal is essential before the process enters nonresistant materials of construction.

How seriously even minor amounts of liquid entrainment may interfere with the operation of refinery processes is illustrated by the recent experience of the Eastern States Petroleum Company in America. This problem was responsible for reducing Platformer operation from 5,100 barrels per day to 3,000 barrels per day in addition to frequent necessary shutdowns and high maintenance requirements.

The situation arose at the outlet of a diethanolamine contactor which was installed to remove hydrogen sulphide from the recycle hydrogen stream of a platforming unit. The possibility of entrainment at this point had been foreseen and a wire mesh blanket had therefore been installed atop the scrubbing tower and a knock-out drum was provided. Nevertheless, it was soon evident that small amounts of liquid continued to pass these disengagement provisions. The 'spray' consisted apparently in part of hydrocarbons which condensed from the vapour phase, and to a small extent of aqueous scrubber liquid which had been mechanically entrained. This liquid mixed with carbon particles in the hydrogen recycle compressors, to form a highly abrasive paste which necessitated high maintenance to the pistons and cylinders. Complete shutdowns were required every seven to ten days. At the same time, throughput in the platformer had to be cut drastically.

Eastern States has been able to overcome this problem satisfactorily by installation of a novel 'Petco' entrainment separator, at a point preceding the hydrogen compressors. This separator unit works on the principle of coalescing, rather than filtering the fine liquid spray particles. The separating element is a four-inch cylinder made of porous plastic and mounted inside a 12-in. steel shell. The gases enter the central section and permeate through the plastic to be withdrawn at the top of the steel shell. Coalesced liquid collects at the bottom of the shell from which it is periodically removed.

Since the installation of several such units Eastern States Petroleum Company has operated its hydrogen compressor for over five months without replacement of any parts. Furthermore, it has become possible to operate the Platformer at design rates without serious disturbance.

This illustration covers, of course, only one specific solution to an isolated problem. Each entrainment situation calls for special engineering consideration and the proper piece of equipment can only be selected after careful consideration of all the technical and economic factors involved.

In a recent study, Montross[1] offered a classification of the many available entrainment separators into six major categories. The present discussion will follow the same subdivision.

Centrifugal Collectors

This is the type of separator employed most commonly throughout the industry. It serves with good efficiency for the removal

of particles down to a lower size limit of 5-10 micron diameter. Because of their low first cost and favourable operating characteristics, centrifugal separators are frequently used in conjunction with other clean-up devices. Numerous designs in this category are on the market, but almost all follow the principle of the simple cyclone in which circular motion is imported to the fluid. The resulting centrifugal effect causes the heavier liquid particles to be thrown outward where they will drain downward after impingement on the side wall.

The most important factor determining separating efficiency in cyclones is the radius of curvature, the smaller this distance, the greater being the efficiency of removal. However, at the same time the pressure drop through the system is increased. To overcome this, multiple units must be employed. The selection of the system must be based on compromise between the factors of permissible efficiency, pressure drop, and investment cost. Other factors which contribute to separating efficiency in centrifugal collectors include high linear gas velocity (also with resulting increase in pressure drop) and increased vertical length of the cyclone.

Numerous aids to effective particle removal or low pressure drop are employed by different manufacturers. Special annular vanes may be provided to promote spiral motion of the gas. Buffing and guiding devices are employed to prevent re-entrainment of separated liquid, and internal rotors (usually driven by the gas stream itself) are offered by at least two manufacturers with the avowed aim of boosting the centrifugal effect.

Gravity Settlers

This category covers a large range of devices ranging from a simple knockout pot to a horizontally baffled chamber in which liquid particles can settle on multiple horizontal surfaces after only a short vertical travel through the gas stream.

Units of this type are quite commonly home-made (although special designs are offered commercially). Their simplicity permits operation with only low maintenance. Operation is characterised by low pressure drop, but relatively large settling areas are required for any given objective. Since units of this type rely entirely on gravity for their separating effect, their scope is limited to the removal of particles exceeding an effective diameter of 50-100 microns. In many cases this limitation does not interfere with the demands of the process. Quite commonly, however, gravity settlers are used as crude clean-up units, preceding other, more efficient devices.

Impingement Separators

This category, once again, covers a large variety of designs—both home-made and commercial—many of which find wide application in the petroleum industries. The primary removal effect depends on the impingement of particles on a surface. In several instances, this is supplemented by a centrifugal effect which is achieved by compelling the gas stream to pass around the impingement obstruction in a rotary path.

During the post-war years, knitted wire mesh entrainment separators have acquired increasing popularity in refineries. This material, which is available from several manufacturers, and in a large variety of materials, combines the effects of impingement with a scrubbing action by the coalesced liquid itself. Material of this type offers not only a large impingement surface per unit volume (approximately 125 sq. ft. per cu. ft.) but is also characterised by high free volume (approximately 98 per cent) which tends to result in relatively low pressure drop. Installation of this material into existing tanks and vessels is quite simple and no special equipment need be provided for this purpose. The usual practice is to install a wire-mesh separator at the top of a standard knock-out tank or process vessel to permit the collected liquid to flow back to its main body by simple gravity effect.

Units of this type can function effectively over a surprisingly wide range of flow velocities. The lower useful limit occurs when the gas velocity is no longer sufficient to force impingement on the metal surface, while an upper limit is set by eventual inability of the liquid to flow back against the high-velocity gas stream. For the system water-air, S. C. Reynolds[2] has reported 99 per cent liquid particle removal at velocities ranging from 2 to 12 ft. per second (at atmospheric pressure).

As in the case of centrifugal entrainment separators, the best efficiency is limited to liquid droplets exceeding 5 microns in diameter. Below 2 microns, wire-mesh screens are of only very limited effectiveness.

Typical refinery service of such units includes their use at the top of luboil towers

to reduce mechanical losses of lubricating oil, and in the flash zone of stills to minimise damage to catalyst in subsequent processing stages due to the introduction of non-permissible high-boiling liquids by mechanical entrainment.

Use of such protective devices permits the use of higher linear gas velocities in disengagement chambers, and therefore makes the use of smaller equipment possible. According to Reynolds, a 6-ft. diameter knock-out drum to handle 2,500,000 cu. ft. per day may be replaced by a 3-ft. drum with a knitted wire mesh entrainment separator, without resulting increase in liquid carry-over.

Most other types of impingement separators depend on the introduction of baffles into the gas stream. Different designs claim improved efficiency due to the particular flow pattern imparted to the fluid and to the method by which the coalesced liquid is removed from the collector in order to prevent re-entrainment. Improved operating efficiency is, however, quite commonly paid for by higher pressure drop and, sometimes, by greater investment costs.

An extension of the concept of separation by impingement is found in the use of scrubbers. Here, the presence of larger amounts of liquid adds to the coalescing action of simple impingement. In each design, the basis of design involves a method for obtaining fine distribution of the scrubbing medium (to permit intimate contact with the gas stream) provision of a contacting zone, and a suitable mode for separating the liquid from the gaseous stream.

The use of packed towers in this function is of long standing. Recent innovations in this field include the use of Venturi-type washers, followed by a settling chamber, wet cyclones (i.e. centrifugal separation supplemented by scrubbing action), wet filters, and scrubbers with rotating elements.

Units of this type frequently employ water as scrubbing medium. Quite often, however, the entrained material itself may serve in this function. Illustrative is the use of sulphur scrubbing for the removal of sulphur droplets from the carrier gas in Claus plants, which are acquiring much importance for the production of elemental sulphur from sour refinery gas streams.

Electrical Entrainment Separators

Devices in this category are highly efficient and they are the only widely usable type for the removal of very fine particles. However, electrostatic precipitators are bulky as well as costly—both in investment and operating expenditures. Almost universally, units of this type are preceded by other entrainment separators for the removal of the bulk of the liquid spray.

In separators of this type, the gas is passed through a strong electrical field. In the course of this passage, suspended particles are electrically charged. The path of fluid then approaches the oppositely charged electrode on which the charged particles will precipitate and coalesce. The liquid so accumulated is run off to a collector.

In the separation of entrained liquid particles, a single-stage precipitator is most commonly employed. In units of this design, the ionisation and collection functions are combined into a single chamber. A favoured design passes the gas stream through a multiplicity of vertical pipes which are electrically earthed and serve as collector elements for the liquid. Mounted in the centre of each pipe is an energising electrode which is held at high negative electrical potential. Depending on the number of stages employed, up to nearly 100 per cent removal efficiency may be obtained, even with particles of only 0.1 microns diameter.

Sonic Precipitators

Precipitators of this type cause the coalescence of very small particles (0.5 to 10 microns) into larger droplets which can then be effectively removed by one of the more standard types of collectors. A high-intensity sound field is generated inside the agglomerator by means of a siren. The resulting particle vibration causes collision and coalescence. A sound frequency is usually selected in the range of 1-5 kilocycles, the actual selection depending on particle size distribution. The chosen frequency influences agglomeration efficiency significantly.

It is desirable to operate in a range which will cause maximum vibration of the smaller particles while holding the movement of particles above 10-12 microns at a minimum. The required hold-up time is inversely related to the sound pressure. In recommended practice, however, sound intensity of about 150 decibels is employed, and hold-up time in the agglomerator varies from a

fraction of a second to two or three seconds.

Concentration of entrained particles should be of the order of one grain per cu. ft. At lower concentrations, there is insufficient opportunity for coalescence and it may actually become necessary to improve the situation by augmenting the quantity of entrained materials. At excessively high concentrations, however, energy consumption becomes too wasteful. Precipitators of this type have shown promise, particularly in the control of air pollution problems. The commercial use is, however, of quite recent origin and much developmental work remains to be done.

[1] *Chem. Eng.*, 1953, 60, (10) 213.
[2] Reynolds, S. C. *Petroleum Refiner* 1953, 32, 138.

SCI Visit to Austria

THE summer tour organised by the Food and Agriculture Groups of the Society of Chemical Industry will take place this year in Austria, the programme including visits to places of industrial, scientific and general interest, in and around Innsbruck.

A regular air service will operate between London and Innsbruck in May and arrangements will be made to offer this service as an alternative to the overnight sea and rail route. It is intended that the party travelling by air shall leave London on Saturday, 22 May, and return on 29 May, and that the party going by sea and rail shall leave London on Friday, 21 May, proceeding via Dover, Calais and Switzerland, and return on Sunday, 30 May.

Members who hope to take part in the tour are reminded that the completed application forms should be returned by next Monday, 15 February, to the hon. organising secretary, Mr. J. A. Beesley, Lyons Laboratories, 149 Hammersmith Road, London, W.14.

Rare Metals Contract

AN open contract with the USA Government for all ore produced during a period of three years has been secured by a newly-registered company in Melbourne, which will shortly begin mining operations for rare metals.

The company—Northwest Tantalum Ltd.—has a nominal capital of £A1,000,000 and has made an issue of 600,000 5s. shares, of which 253,200 are being offered to the public. The company proposes to develop uranium ore deposits, as well as tantalum, columbium, beryllium, caesium and other rare metals. Production will begin within six months.

Aden Refinery Half-Finished

SINCE work began in November, 1952, on the Anglo-Iranian Oil Company's 5,000,000 tons a year refinery at Aden, more than 135,000 tons of equipment and materials have been shipped to the site. Of this total 82,000 tons are for permanent work in the refinery and port.

The greater part of this tonnage has been shipped from the United Kingdom, 117,000 tons having arrived at Aden from this source and 17,000 tons from the USA. By the time the refinery and port are completed towards the end of this year some 186,000 tons of equipment and materials will have been shipped to Aden.

The refinery is now half-finished, construction work being well advanced on the SO_2 plant and the two distillation units. Several major oil storage tanks are complete and 15 more are being erected.

At the port 1,000,000 cu. yd. of rock have been quarried and tipped into position to form a breakwater and bund, which are nearing completion. About two-thirds of an estimated 5,700,00 cu. yd. of sand have been dredged from the approach channel and harbour and pumped ashore to reclaim 200 acres of the building site.

More Canadian Polythene

AT an estimated cost of £1,000,000, the new polythene plant of Canadian Industries Ltd., at Edmonton, is to be expanded to increase capacity by one-third.

When the installation of additional equipment has been completed by the end of this year, the plant will be capable of producing 16,000,000 lb. of polythene resin a year. The company plans to extend this capacity still further by improving operating efficiency and by installing additional equipment as it becomes necessary.

Until now, polythene has been totally imported into Canada. The plant at Edmonton is the first of its kind in Canada.

Emulsifying Agents

Talk by Manufacturing Company's Chief Chemist

ON Thursday, 21 January, the chief chemist of the Watford Chemical Co. Ltd., Mr. G. B. Frost, gave a lecture to the British Lubricating Oil & Grease Research Organisation on the use of emulsifying agents, and their interest to many industries.

He explained that fundamentally there are two possible functions of surface active agents in the preparation of emulsions; the lowering of inter-facial tension at the interfaces between the dispersed globules and the continuous phase, and the formation of protective inter-facial films.

The first effect makes the initial process of mechanical phase subdivision easier and reduces the thermodynamic instability of the system; the other produces a stabilising action, which tends to increase the action produced by lowered inter-facial tension by reducing coalescence. Highly hydrophilic substances tend to promote oil-in-water emulsions whereas lipophilic materials promote water-in-oil emulsions. The type of emulsion produced will depend not only upon the emulsifier used but on the method of emulsification. Generally, the most stable emulsions will be produced where the internal or dispersed phase occupies 40-60 per cent of the composition.

Two or More Used

It is very rare for one emulsifying agent to be a complete emulsifier in itself; two or more emulgents are normally used. The reason for this is that to achieve complete emulsification it is necessary to reduce inter-facial tension, form a protective inter-facial film and impart the optimum viscosity to the continuous phase. Normally, when using a combination of emulsifiers the primary emulsifier reduces surface tension, whereas the secondary emulsifier increases the viscosity of the continuous phase and assists in the production of a rigid inter-facial film.

Mr. Frost then went on to discuss emulsifying agents in greater detail, classifying these as follows:—

1. Anionic agents.
2. Cationic agents.
3. Nonionic agents.
4. Finely dispersed solids.

Mention was made of various materials available under each heading and the anionic agents discussed were alkali and alkaline earth soaps, polyvalent metallic soaps, bile salts and sulphated and sulphonated oils and alcohols.

Cationic Agents

The cationic agents reviewed were the quaternary ammonium compounds and amine salts. Only recently has interest been shown in these materials as emulsifying agents, as they have been used previously in textile processing, dyeing, and as germicidal agents. Cationic agents generally tend to be absorbed more strongly than anionic materials and the hydrophobic groupings are orientated in the majority of cases towards the aqueous medium, this effect having been used in such processes as water-proofing of textiles, pigments, etc., and in ore-flotation.

One particular product discussed under cationics was 'Estax 28,' a hydroxy amino ester, which is commercially available from the company. This product is an active water-in-oil emulsifier.

Under the heading of nonionics come a number of emulsifiers, included among which are most of the edible type. There are a number of advantages for these materials (several of which are available under the trade name 'Estax'):—

1. They are less affected by concentrations of electrolytes as they do not depend on ionisation for the production of a suitable hydrophilic/lipophilic balance.
2. They include most of the emulsifiers which can be classed as 'edible.'
3. The variation in hydrophilic/lipophilic balance can be achieved more readily and in smaller steps since the solubilising effect of each non-ionising polar group is smaller than with ionogenic groups.
4. They are normally compatible with anionic or cationic emulsifiers.

In addition, many are in approximately the same price range as the cheaper anionic and cationic agents.

Finally, Mr. Frost discussed the material under the heading of finely dispersed solids and particular reference was made to bentonites. The company hope to have available soon some organophilic bentonites.

Canadian Paint Progress

MR. D. A. Whittaker, president and managing director of Sherwin-Williams Co. of Canada, Limited, in a new year's review, declares that the Canadian protective coating industry marked an all-time high in sales for the first nine months of 1953, according to known figures. In effect, total sales of paint for the first three quarters of 1953 amounted to $87,175,321—a gain of $6,101,081, compared with the same period in 1952.

Raw materials were in good supply during 1953 and no shortages should be experienced in 1954, states Mr. Whittaker. While the principal sources of supply are still the United States and Britain, Canada is entering the raw material field and is now producing pentaerythritol and phthalic anhydride, used for the manufacture of synthetic resin, petroleum solvents, linseed oil, white lead and dry colours. Germany is making a strong bid for Canadian outlets and is now supplying a number of special chemicals for use principally in the processing of colorants.

This year will see the construction of several large paint manufacturing plants in Canada and most of the existing plants will have increased their productive capacity by installing up-to-date equipment facilities.

New Phosphorus Factory

THE new phosphorus factory at Portishead, near Bristol, belonging to Albright & Wilson, Ltd., started up last week. The factory will have a capacity of 40,000,000 pounds of phosphorus and is so designed that production can be greatly increased at short notice should additional capacity be required. The capacity of the plant will be greater than the current UK production and should be sufficient to meet the country's needs for many years to come.

Phosphorus produced at Portishead will be transported by rail in special 24 ton tankers to the company's new works at Kirkby, near Liverpool, where it will be converted into phosphoric acid and sodium tripolyphosphate. In the last five years there have been very large imports of sodium tripolyphosphate from the Continent. The output from these new plants will entirely replace these imports, which in 1953 amounted to over £2,000,000. Sodium tripolyphosphate is an important component of non-soapy detergents which are today so widely used in the home.

The resident works manager at Portishead is Mr. J. A. McArthur.

Analytical Chemists' Election

AT the recent annual general meeting of the Microchemistry Group of the Society for Analytical Chemistry, held at the Sir John Cass College, Aldgate, London, officers for the ensuing year were elected as follow:—*Chairman*, Dr. A. M. Ward; *vice-chairman*, Dr. G. F. Hodsman; *hon. secretary*, Mr. A. Bennett, Brewing Industry Research Foundation, Lyttel Hall, Nutfield, Redhill, Surrey; *hon. treasurer*, Mr. G. Ingram, Research Laboratories, Courtaulds Ltd., Lower Cookham Road, Maidenhead, Berks.

The meeting was followed by an ordinary meeting of the Society for Analytical Chemistry (organised by the Microchemistry Group), with the president, Dr. D. W. Kent-Jones, in the chair. A film entitled 'Old Masters of Microchemistry' was shown and two papers were presented and discussed—"Organic Ion Exchange," by Dr. L. Saunders, and 'Inorganic Ion Exchange,' by Mr. G. H. Osborn. An exhibition of microchemical apparatus was held in the college laboratories during the afternoon and evening.

New Tablet Coating

FOR the first time in the history of tablet coating a practical method of press coating has been evolved by workers in Evans Medical laboratories. The process, for which the trademark 'Prescoted' has been coined, consists of the application of a suitable coating by compressing it in the dry state on to a ready formed 'core tablet' of the active ingredients. The process is rapid and automatic.

A special device for the correct centring of the core tablet in the machine has been designed by the company. 'Prescoted' tablets can be made to disintegrate more readily than tablets prepared by the conventional pan-coating process, since they need not be compressed so hard, nor is a protective coating required for hygroscopic ingredients.

Germany's Successful Year

Larger Sales & Lower Prices

FINAL figures reveal that the increase in West Germany's chemical production was even greater than provisionally estimated. The total sales of the chemical industry in the German Federal Republic are now put at DM. 10,900,000,000 compared with DM. 9,700,000,000 in 1952 and DM. 9,900,000,000 in 1951. Ex-factory prices averaged 186 per cent of the 1938 level, against 195 in 1952 and 201 in 1951; they thus continued to decline last year but the price movement appears to have come to a halt since last summer, further cuts in the prices of organic chemicals and chemical manufactures being offset by slight advances among inorganic basic chemicals.

The chemical production index (1938 = 100) advanced from 127 in 1951 and 128 in 1952 to 151 in the average of 1953; it reached its peak at 168 in November and receded to 158 in December, largely owing to seasonal influences. In assuming these figures, it must be borne in mind that the chemical industry, according to the German classification, covers a somewhat wide field, including rayon, plastics, essential oils and ferro-alloys.

Potash Sales Rising

The West German potash production amounted to 1,321,000 metric tons (as K_2O) last year, an increase by no more than one per cent compared with 1952, while total sales rose from 1,149,000 to 1,402,000 tons, i.e., by 22 per cent. Home sales increased by 13.6 per cent and exports by 37 per cent. As these figures show, part of the additional demand had to be met out of stocks which consequently declined. The favourable trend of potash sales last year was due to two factors neither of which is likely to recur this year. Early in 1953 German potash producers were able to dispose in the home market of some of the stocks accumulated because of unfavourable weather towards the end of 1952, and later West German potash exports benefited from a strike in the French mines and transport difficulties in East Germany.

West German potash producers anticipate more competitive conditions in the world market this year. The East German authorities do their utmost to increase the foreign trade of the Soviet zone and regard potash salts as one of the few surplus commodities which they can offer in return for the essential materials they wish to buy abroad. Larger supplies are also expected to be forthcoming from smaller producing countries.

Characteristic of the measures taken by the West German potash industry to bring down producing costs is the policy of Burbach-Kaliwerke AG, one of the leading producers, who intend to introduce novel mining methods using US machinery at the Königshall and Hindenburg works. When the new machinery has been installed, probably in the second half of this year, substantial economies in the use of labour and explosives are expected to lower producing costs. The large sales and withdrawals from stocks have been of special benefit for the financial position of the leading potash companies.

Coal Derivatives

The production of coal derivatives increased in West Germany last year in line with the rising coke and gas output, and producers experienced no difficulty in selling their output of most products. Among new plants which came into operation last year in this section of the chemical industry are a continuous coal-tar distillation unit for Gesellschaft für Teerverwertung at Duisburg-Meiderich, a phenol distillation plant for Braunschweigische Kohlenbergwerke at Offleben and a benzol pressure refining unit for Harpener Bergbau AG at Bochum. Ruhröl AG opened a plant for the production of maleic anhydride from benzol at Bottrop, and Hibernia AG at Herne started the production of cyclohexanol, adipic acid and dichlorobenzene in the course of last year.

Although official West German export figures for the past year are not yet available, it is clear from earlier information that the great success of German chemical manufacturers in the export field has been maintained. Fertiliser exporters fared especially well in North America and the Far East. Europe and the Mediterranean

area in 1952 absorbed 63 per cent of all West German chemical exports; in January-September, 1953, this region accounted for 56 per cent alone. The British market took seven per cent of Germany's chemical exports in both years. The share of the non-European market advanced from 30 per cent in 1952 to 37 per cent in January-September, 1953.

The West German import trade in chemical products does not show any great change in total value. There has been however a heavy fall in the volume of imports of raw and basic materials, especially phosphates and basic slag, while imports of semi-finished and finished chemical products, in particular plastics and dyes and paints, increased. The contraction in the West German import trade in raw and basic materials is of course largely due to the declining trend of world market prices of basic commodities.

Practice School Planned

AS a contribution to the training of chemical engineers in Britain, a practice school in chemical engineering is to be set up this summer at the Royal Ordnance Factory at Bridgwater, Somerset, according to a Ministry of Supply announcement.

The school will be open to honours students in their final university year and applicants for the 12 available places will be selected by competitive interview. Entry will be limited to British subjects.

Successful candidates will be given a four-week intensive course during which they will study problems relating to chemical plant under the guidance of Mr. E. S. Sellers, of the department of Chemical Engineering, Cambridge University. No fee will be charged for the course and students will receive an allowance of £4 2s. 6d. per week while the course lasts, with free travel to and from their homes. They will be accommodated in a hostel near the factory at a cost of about £2 15s. per week.

Provisional dates for the course are from 16 August to 13 September, and the Ministry state that if the school is successful this year it may be continued as an annual event.

Application forms are obtainable from the Director of Ordnance Factories (Administration and Finance), Room 88, Ministry of Supply, Leysdown Road, Mottingham, London, S.E.9.

Benelux Customs Changes

Several Import Duties Raised

THE *Moniteur Belge* recently published a decree, effective from 1 January, amending the Benelux import duty tariff for certain chemicals, etc., as follows:—

In Section 13 para. (1) (Exemptions from Import duty) of Preliminary Provisions of the import duty tariff, letters 'k' and 'l' are replaced by the following:—

(k) Samples of negligible value imported for the purpose of seeking orders for foreign goods.

(l) Samples other than those specified in 'k' belonging to individual or corporate bodies established abroad and which will be re-exported after having served the purpose for the purchase or attaining orders of foreign goods.

(l *bis*) Catalogues, price lists and trade literature in the name of a foreign firm and imported in very small quantities by the consignee.

Tariff No.	Description	Old Duty	New Duty
210	Resins and pitch of mineral origin (obtained from coal-tar, lignite, petroleum, etc.), including petroleum coke, coal-tar and similar cokes :—		
	(*a*) Petroleum coke ..	Free	Free
	(*b*) Other :—		
	1. From petroleum ..	Free	Free
	2. Not specified ..	Free	Free
238	Salts of hypophosphorous, phosphorous and phosphoric acids :—		
	(*a*) Disodium and trisodium phosphate	4 per cent	10 per cent
	(*b*) Acid sodium pyrophosphate	Free	10 per cent
	(*c*) Others	Free	10 per cent
263 (*a*)	Hydrogen peroxide (oxygenated water) whether or not combined with urea ..	Free	10 per cent
Ex	Persalts :—		
264	(*a*) Perborates :—		
	1. Sodium perborate ..	Free	10 per cent
	2. Others	Free	Free
87	Chemical products and chemical preparations, n.e.s.i.		
	(*a*) Lyes left over from the manufacture of paper pulp	Free	Free
	(*b*) Compounds and charges for fire-extinguishing apparatus, fire-extinguishing grenades and bombs	Free	12 per cent
	(*c*) Others	Free	Free
290	Peptones, nuclein, autolysed yeast, hydrolysates of casein and similar products of the disaggregation of proteins or other albuminous substances, lecithins, preparations with a basis of these substances, n.e.s.i. :—		
	(*a*) and (*b*)	—	Unchanged

The Chemist's Bookshelf

THE PHARMACEUTICAL POCKET BOOK. Sixteenth edition. Published by direction of the Council of the Pharmaceutical Society of Great Britain. The Pharmaceutical Press. 1953. Pp. 422. 18s. 6d.

With the rapid progress being made in this, 'the chemical age,' the vast amount of knowledge that the student must acquire is overwhelming. No one can be expected to retain permanently all that he or she has remembered long enough to pass their examinations. It is small wonder, therefore, that the usefulness of the pocket or handy-sized reference book has grown in recent years. A short paragraph, quickly turned up, can act as a reminder and bring flooding back a great deal of one's former teaching. Sometimes, such paragraphs bring home to the reader the unwelcome fact that changes have taken place and that it is time he brushed up on his knowledge.

The 1953 edition of 'The Pharmaceutical Pocket Book,' like earlier editions, includes much information that is needed from time to time by every pharmacist—information that is frequently difficult to find in a hurry. It is, therefore, bound to find a place within easy reach of most practising pharmacists. While it may be more useful to students than others, it is also an essential tool to even the most experienced. Rightly or wrongly, since the arrival of the National Health Service it has been said that there has been an increase in the amount of careless dispensing, particularly in hospitals. A quick reference to this useful little book would certainly prevent most errors.

The scope of the book, considering its size, is surprising. The section 'The Science and Art of Pharmacy' contains brief but excellent notes on dispensing, percentage solutions, incompatibility, sterilisation of medicaments and homœopathic pharmacy. The section 'Equivalent BP Formulæ' is sub-divided to give information on proportions of active ingredients in BP preparations, injections of the BP, tablets of the BP, doses of official medicaments, doses proportionate to age and equivalent metric and Imperial doses. Next come 10 pages of abbreviations used in prescriptions, many of which are becoming uncommon. Other sections of value for reference purposes are those on hydrogen ion concentration, isotonic solutions, thermometric equivalents, the treatment of poisoning, food and diet, biochemical analysis, microbiology, vitamins, hormones and percentage solutions. The 67 pages on forensic pharmacy are of especial value.

A rather disappointing feature of the book is that in the section on equivalents the preparations are listed in alphabetical order under their Latin titles. In the section on doses a more generous spacing would have made the tables more easily read and removed the possibility of errors being made. The table of solubilities could also be made more useful if they were printed in larger type and spaced out more. If it is a question of keeping the book within a limited number of pages the first section, which deals with the activities of the Pharmaceutical Society and notes 'On Entering Pharmacy,' could easily be omitted. We doubt if they are ever even glanced at by the majority of the users of this book. The preface also appears to be a waste of valuable space. —C.E.

DICTIONARY OF ORGANIC COMPOUNDS. Edited by Sir Ian Heilbron and H. M. Bunbury. New edition. Eyre & Spottiswoode Ltd., London. 1954. In four vols. £7 per volume. £28 the set.

The name of 'Beilstein' is, if not a household, at least a laboratory word to the chemist, but who has not many times cursed the inversions of the German language? and who has not cursed the cumulative volumes, which, though arranged strictly logically, mean a considerable labour before

the necessary information is found? The busy worker often turns instead to 'Heilbron,' which is brief, in English, and, although far from exhaustive, is also far from exhausting.

The reputation of 'Heilbron,' however, has never been quite so high as that of 'Beilstein.' Whatever it was that one wanted to look up, it seemed somehow to have been omitted. Moreover, the information, when given, was very often out of date. Some effort was made in 1942 to issue a new edition, but this had to be abandoned after the first volume appeared in 1943, and supplemented reprints only were issued in 1944 for volumes II and III. A new edition is therefore particularly welcome.

The editors state that the literature has been searched up to the end of 1950 in the preparation of these volumes, and that every effort has been made to include references to work published during 1951, 1952, and even 1953. Over 2,500 new compounds have been added and many thousands of corrections have been made to existing entries. Space has been saved by deleting a number of unnecessary constitutional formulæ, and the type area has been increased, making it possible to issue the Dictionary in the form of four convenient volumes.

Reviewing a work of this nature is no easy job, and all the reviewer can do, to obtain some idea of the value of the volumes, is to make an arbitrary selection of substances, and then see what the dictionary has to say about them.

Piperic acid is mentioned, but not chavicic acid; isochavicic acid is, however. Fungal derivatives such as eburicoic acid, polyporenic acid and gladiolic acid secure an entry, but not thioaurin or gliotoxin. A relatively simple substance such as aletheine (β-alanyl-2-amino-ethyl mercaptan) does not occur, and the wrong structure is given for co-enzyme A. Lest it should be argued that all these substances were very recently discovered, the writer also consulted the Dictionary on some more 'classical' substances. The latest reference given for malic acid is dated 1933, which probably accounts for the statement that its melting point is 98-9°; the latest reference for dihydroxyacetone in 1938, and we are told that it crystallises as the dimer. These latter entries, in fact, are almost unchanged, although recent work has cast doubt on a number of properties such as melting points.

In view of the highly critical tone of the preceding paragraph, it would be only fair to redress the balance a little. This edition has all the faults, but also all the virtues, of the former edition, and it should prove at least as useful to at least as many people. For the chemist who cannot afford the money or the time for 'Beilstein,' it represents a good jumping-off point. He will be able to ascertain his principal facts, and the sources of the pioneer work in the subject. If eventually he has to fall back on the indexes to *Chemical Abstracts*, it is probably what he would have had to do, even with 'Beilstein' on his shelves.—B.I.

INORGANIC SYNTHESES. Vol. IV. Editor-in-Chief, John C. Bailar, Jr. McGraw-Hill Book Company Inc., New York and London. 1953. Pp. xii + 218. Figs. 19. 36s.

It ought not to be necessary to introduce this series of publications to the practising chemist, any more than it would be considered necessary to introduce its organic counterpart, although the latter is of considerably longer standing.

The excellence of previous volumes is fully maintained, and possession of this volume will be just as essential as possession of its predecessors. In this volume there are 58 sections. The actual number of preparations is considerably greater than this, since some of the sections cover several related compounds. It is difficult to single out any particular parts for special emphasis, since the balance is fairly evenly distributed throughout several groups of the periodic classification. One could perhaps mention the urea derivatives, the series of phosphorus compounds, of fluorides and of anhydrous halides, and the further examples of co-ordination compounds of cobalt as small groups which are more readily classified. However, the overall scope is as extensive as in any of the preceding volumes.

It is most commendable that the cumulative subject and formula indexes are being continued, making for convenient reference to the series as a whole. The production and presentation are of the high quality that one has been led to expect of the series. One looks forward to the appearance of the further volumes which are at present in preparation.—CECIL L. WILSON.

HOME

RIC Lecture Cancelled

It is regretted that owing to illness Sir Wallace Akers, C.B.E., B.A., D.Sc., F.R.I.C., will be unable to deliver the lecture which he was due to give to the London Section of the Royal Institute of Chemistry on 17 February in University College Mechanical Engineering Lecture Room, Gower Street, London, W.C.1. In his place Dr. E. Glueckauf, of AERE, Harwell, will speak on 'Chemical Aspects of Atomic Energy in Industry.'

Research Grants

The following grants for research have been announced by the University of Cambridge: a further grant of £1,071 from the American Cyanamid Co. for research in organic chemistry and biochemistry under the direction of Professor Todd; and two grants of £400 each from Vinyl Products Ltd., for research into the scientific study of metallic corrosion and means of its prevention under the direction of Professor Austin.

Employment Figures Go Up

According to statistics published in the latest issue of the *Ministry of Labour Gazette*, the number of people employed in the chemical and allied trades in Great Britain at the end of November, 1953, was 499,100, compared with 497,500 at the end of the previous month and 485,300 at the end of November, 1952. Most of these—219,100—were employed in the chemicals and dyes industries, compared with 217,800 at the end of October, 1953, and 211,300 at the end of November, 1952.

More Synthetic Fibres

Production of staple fibre and continuous filament yarn by the rayon and synthetic fibres industry in December, states the *Board of Trade Journal*, amounted to 34,900,000 lb. and brought the total for 1953 to 419,300,000 lb., 48 per cent more than in 1952 and 9 per cent greater than in 1951, the previous peak year. Total output reached its highest level in October, 1953, when production of staple fibre was the best so far achieved; apart from the incidence of holidays, the sharp recovery towards the end of 1952 was maintained throughout 1953, although at a rather slower rate.

Electrical Engineers' Exhibition

Under the auspices of the Association of Supervising Electrical Engineers, an Electrical Engineers' Exhibition will be held at Earls Court, London, from 16-20 March. A feature will be made of all types of switchgear.

Ceramists Spring Meeting

The spring meeting of the Building Materials Section of the British Ceramic Society is to take place in Birmingham on 31 March. The meeting in the morning, in the rooms of the Chamber of Commerce, 95 New Street, is to be devoted to the reading and discussion of papers, and in the afternoon members will visit the Hednesford Brick Works of the National Coal Board. An informal dinner is being arranged for the evening of 30 March. The full programme is to be issued later.

New Infra-red Absorption Technique

The annual report of the Birmingham University Joint Standing Committee for Research states that achievements of the Department of Chemistry at the university during the past year included development of an infra-red absorption technique for the determination of certain polysaccharide structures. This technique can be used in measuring blood plasma substitutes and takes only a few minutes. By methods previously used it took days and sometimes weeks to take such measurements.

Non-Ferrous Metals Advisory Services

The British Non-Ferrous Metals Research Association is expanding the services it offers to industry in applying research results and other scientific knowledge to production practice. For this purpose the association is taking advantage of £15,000 allocated to it by the Treasury from the sterling counterpart funds created to balance the dollar aid received by this country under the US Mutual Security Act, 1952. An advisory service for electroplaters has already been announced (THE CHEMICAL AGE, 2 January, p. 278). Now the association states that certain new technical services to the lead pipe industry are to be provided.

• OVERSEAS •

Spanish Potash

Japan has provisionally agreed to import 42,000 tons of potash from Spain, in exchange for 17,000 tons of steel plates for shipbuilding.

Kenya's First Cement Factory

Built north of Mombassa at a cost of £750,000, the first cement factory in Kenya came into production in January with an initial output at the rate of 100,000 tons a year.

USA Ammonia Shortage Predicted

An American spring shortage of ammonia for agricultural purposes is forecast by Mr. E. W. Thomas, newly-elected president of the Agricultural Ammonia Institute. He considers that increased demand during April, May and June will be greater than the 20 per cent increase expected in supplies.

MCA Widens Scope

Following a revision of its by-laws, the American Manufacturing Chemists' Association recently raised its membership to over 140 and widened its scope by the election of two Canadian companies, Consolidated Mining & Smelting and Shawinigan Chemicals.

Intermediate for 'Terylene'

Hercules Powder Co. is to spend more than $11,700,000 this year on plant construction. One of the major projects will be the construction of a dimethyl terephthalate plant at Burlington, New Jersey, which is scheduled for completion early next year. DMT, produced by oxidation of *p*-xylene, will go to the 'Terylene' plant of I.C.I. at Millhaven, Ontario.

French Industry Recovering

France is now recovering from the chemical industry slump of late 1952, according to the latest figures given by l'Union des Industries Chimiques. Oil refineries are producing at record levels: Shell-St. Gobain is making about 7,500 tons per year of acetone and other solvents at Berre, and at Laverra, Naphthachimie is using a direct-oxidation method for the first time in Europe to produce about 6,000 tons per year of ethylene oxide. Textile production is still below that of 1951, but is beginning to rise again.

Paper Mill Uses Bagasse

From Brazil it is reported that the Fabrica de Papel a Celulose Piracicaba will soon begin production of paper, at the rate of ten tons a day, using sugar cane bagasse. It is stated that a new machine is being installed to increase the capacity to 50 tons a day. The plant is located at Piracicaba in the State of Sao Paulo.

Pacific Refinery

It is reported that the California Texas Oil Co. is investing about $30,000,000 in an oil refinery under construction in the Phillipines. The Foster Wheeler Corp. has the construction contract, and hopes to complete the plant towards the end of this year.

Wyoming Discoveries

Union Pacific Railroad officials report that large deposits of iron ore and titanium have been found in the south eastern part of Wyoming. Geologists say the area contains an estimated 228,000,000 tons of ore which can be mined by open pit methods.

Italy Produces More Cement

Italian cement production in the first seven months of 1953 totalled 4,389,586 tons, compared with 3,738,633 tons during the same period of 1952. Consumption in the first seven months of 1953 totalled 4,428,490 tons, against 3,813,443 tons during the same period in 1952. New cement plants at Catania (Sicily), Trieste and Bagnoli (Naples) will soon be in operation. Production this year is expected to rise by 1,000,000 tons and thus provide for estimated increased requirements.

Southern Rhodesia's Chrome Ore Output

Southern Rhodesia is fast overhauling South Africa as a producer of chrome ore. At present South Africa is second to Turkey as a producer, followed by the Soviet Union and Southern Rhodesia. Chrome ore deposits in the Union are mainly chemical and refractory types. Those in Southern Rhodesia are the metallurgical type that is in world demand. In both the Union and Southern Rhodesia, exports are restricted by transport problems, particularly a shortage of freight cars. The Southern Rhodesian authorities expect rail shipments of chrome to show a big improvement this year.

PERSONAL

MR. LEON K. MERRILL has been appointed a director of Bakelite Ltd. MR. HOWARD S. BUNN has resigned from the board.

SIR JAMES REID YOUNG has joined the board of James Booth & Co., metallurgists and makers of various alloys.

MR. G. L. R. PEARCE has joined Enamelled Metal Products Corporation (1933) Ltd. as technical representative on the chemical side, succeeding MR. A. R. WYATT, who has now left the company.

DR. RALPH A. RAPHAEL, lecturer in chemistry at Glasgow University, has been appointed to the Chair of Organic Chemistry at Queen's Unversity, Belfast. He will take up the appointment on 1 October. Dr. Raphael is a graduate of London University and was a research fellow in London before going to Glasgow five years ago.

THE EARL OF SCARBOROUGH formaliy opened the new chemistry buildings at Sheffield University on 5 February. Following the ceremony, the Vice-Chancellor, Dr. J. M. WHITTAKER, bestowed the honorary degree of D.Sc. on SIR CYRIL HINSHELWOOD, past-president of the Chemical Society, and PROFESSOR C. K. INGOLD, president of the Chemical Society. MR. T. A. MCKENNA, chairman and managing director of the Staveley Coal & Iron Co. Ltd., received the honorary degree of LL.D.

MR. CHARLES P. M. GREEN, a director and general manager of J. C. & J. Field, has resigned.

The electors of the University of Cambridge have determined that DR. H. C. LONGUET-HIGGIN'S tenure of the John Humphrey Plummer Professorship of Theoretical Chemistry shall be from 1 October this year.

MR. EUGENE J. HOUDRY recently received the John Scott Award from the Board of City Trusts of Philadelphia, for his pioneer work in the catalytic cracking of petroleum, which he carried out in France. Mr. Houdry retired as president of the Houdry Process Corp. in 1948. The award, founded in 1816 by John Scott, an Edinburgh chemist, includes a copper medal and $1,000.

Officers of the Scottish Section of the Society for Analytical Chemistry for the ensuing year, elected at the recent annual meeting in Glasgow, are: *Chairman,* MR. R. S. WATSON; *vice-chairman,* DR. F. J. ELLIOTT; *hon. secretary and treasurer,* MR. J. A. EGGLESTON, Boots Pure Drug Co. Ltd., Motherwell Street, Airdrie, Lanarkshire.

The Minister of Fuel and Power has appointed MR. JOSIAH ECCLES, deputy chairman (Operations) of the British Electricity Authority, to be member of the Scientific Advisory Council in succession to SIR JOHN HACKING.

The Chemical Society have announced that the Harrison Memorial prize for 1953 is to be awarded to DR. R. J. GILLESPIE for his work on the electrochemistry of strong-acid solvents published during the five years 1949-53. Dr. Gillespie, a lecturer in chemistry at University College, London, is at present carrying out research on the dielectric properties of polar liquids at Brown University, USA.

AIR COMMODORE SIR FRANK WHITTLE, the British pioneer in the field of jet propulsion, has taken up an appointment with the Bataafsche Petroleum Maatschappij (BPM), of The Hague, which is one of the principal operating companies of the Royal Dutch/Shell Group. In his present assignment, Sir Frank will give advice in the field of mechanical engineering relative to the development of techniques and equipment in the petroleum and chemicals-from-petroleum industries. He has already familiarised himself with the activities, including the work of the research laboratories, of the Royal Dutch/Shell Group.

Achema Year Book

Forthcoming Exhibition Guide

WORK has now commenced on the Achema Year Book 1953/55—'the European Catalogue of the Chemical Apparatus and Equipment Industry.' This is an introduction and pre-survey to the Achema XI—Chemical Apparatus and Equipment Congress and Exhibition, 1955.

The Achema Year Book will enable participants in the Achema XI to make complete and thorough preparations for their visit. It is only after such a thorough preparation, it is claimed, that a successful study can be made of the pieces of chemical apparatus and equipment for use in scientific and engineering work, the many control and regulating units and the materials of chemical engineering that will be displayed on the more than 42,000 square metres of exhibition space.

As the European catalogue of the chemical apparatus and equipment industry the book will furnish reliable answers to questions such as 'Who can supply?' and 'Who can give information on?'

In order that the book may be able to accomplish these important tasks in the most efficient way, it will appear in the English, French and German languages. All European manufacturers and producers of chemical apparatus for scientific and technical purposes, all manufacturers of control and regulating equipment and all producers of materials and auxiliary materials for the chemical engineering industry can find their appropriate place.

The book will appear during the second half of 1954 and will be sent free of charge to all personally registered participants in the Achema XI Congress and Exhibition.

The last day on which matter for inclusion in the Achema Year Book can be accepted is Monday, 1 March.

Monopolies in Industrial Gases

The supply in the United Kingdom of certain industrial and medical gases is the subject of a new reference to the Monopolies and Restrictive Practices Commission. This was announced on Tuesday by Mr. Thorneycroft, President of the Board of Trade, in a written answer to a question in the House of Commons. The gases referred to are oxygen, dissolved acetylene, and propane.

First Atomic Battery

THE world's first atomic battery converting nuclear energy directly into electricity was successfully tested in New York recently. The battery converted the rays of a radioactive substance into a thin but distinct squeal in an earphone. Scientists at the Radio Corporation of America, which developed the battery, termed the squeal as significant as Edison's conversion of electricity to light.

The tiny battery—it is the size of a pencil eraser—turns out only one-thousandth of a watt in power, but ten of them would run a modern portable radio for 20 years. Brigadier General David Sarnoff, chairman of RCA, said the battery will probably be used in portable and pocket-sized radio receivers, hearing aids, portable short-range transmitters for radio, telegraph and telephone communications and radio navigational beacons.

Hanover 1954

THIS year the German Industries Fair at Hanover has combined the light and heavy industries into a single fair covering an area of more than 60 acres. It will be held from 25 April to 4 May, and will thus fit into the cycle of European trade fairs, and every effort is being made for the convenience of visitors from abroad.

Hall 6 is to be given over to the chemical and synthetics industries, and the list of 66 firms who will be exhibiting includes all of the large well-known German chemical companies. Concurrently with the Fair, the 'International Exhibition of Containers' will, after a long interval, once more be held in Hanover.

Full details of the Fair, and of special facilities for foreign visitors, may be obtained from the official UK agents, Schenkers Ltd., 27 Chancery Lane, London, W.C.2.

£1,000,000 Savings

Employees at the Thorncliffe works of Newton Chambers & Co. Ltd., Sheffield, have saved £1,000,000 since 1939 through the firm's savings organisation which includes a National Savings Group having its own departmental savings committees, and the Thorncliffe Savings Bank, which is run under the auspices of the Sheffield Savings Bank.

Publications & Announcements

IN view of the considerable interest now shown in the application of magnetic amplifiers, Electro Methods Ltd., Caxton Way, Stevenage, Herts, have developed a unit which is supplied with full working instructions, so that engineers who have not yet gained experience in this relatively new technique may satisfy themselves on its many applications and apply these methods to new fields of control equipment. The amplifier is designed in such a way that its basic principles of working can be easily investigated. All the important measuring points are easily accessible and the circuit can be traced by following the colour coded connections. Briefly, the amplifier specification is as follows: *Supply Voltage*: 20 volts, 50 c/s; *Input Resistance*: two independent windings of 100 ohms each, which may be connected in series or parallel or used independently; *Recommended Load*: not lower than 30 ohm; *Output Power*: 2.7 watts in 30 ohm load; *Power Amplification*: 40,000 with 100 per cent self excitation in 30 ohm load.

* * *

A SERIES of five technical publications on soldering and related topics is available free from Grey & Marten Ltd., City Lead Works, Southwark Bridge, S.E.1. Subjects embraced are the recommended practice for cleaning and fitting parts for soldering, with a guide to the selection and use of fluxes; the soft soldering of aluminium, including repair of coachwork and sheathed cables; the use of 'Amalgam' fusible alloys for tube bending, etc.; the lining of bearings with 'Amalgam' alloys; and silver soldering and brazing.

* * *

QUICKFIT & Quartz Ltd., manufacturers of interchangeable laboratory glassware of Stone, Staffs, have now issued a complete edition of the catalogue listing their range of products. This catalogue contains a section dealing with apparatus of a more specialised character than that described in any previous publication. This specialised apparatus is nevertheless designed to be used wherever possible in conjunction with general purpose 'Quickfit' components. Each part is carefully designed to be interchangeable so that, however specialised its use, it may always be replaced by a similar part without affecting the other components. This apparatus covers—among other processes—extraction, moisture determination, water distillation, fractionation, semi-micro distillation, filtration and chromatography.

* * *

IT is quite impossible to give details of the contents of L. Light & Co.'s 1954 organic chemicals catalogue, which lists a wide range of amino acids, peptides, nucleotides, sugars, enzymes, steroids, pterins, alkaloids, bile acids, vitamins, flavones, amines, carcinogens, nitriles, silanes, quinoline and pyridine derivatives, and many other intermediates and reagents, totalling more than 2,500. For the first time a number of items are included which are not carried in stock, but which will be prepared to special order. Copies of the catalogue may be obtained from the company at Poyle Estate, Colnbrook, Bucks.

* * *

THE third in the series of booklets under the general title 'Natural Rubber Latex and Its Applications' has been published by the British Rubber Development Board. It is entitled 'The Manufacture of Dipped Rubber Articles from Latex,' and the author is Lucian Landau. Conforming in style with Nos. 1 and 2, the booklet begins with some general notes covering the background of the subject before passing on to a detailed description of the compounded forms in which latex is now used in industrial dipping and the various processes and the equipment required. A useful section is included which gives suggested formulæ for the dipping of some of the commoner consumer articles such as rubber gloves and toy balloons. This section also stresses the importance of sound process control and recommends a number of methods of testing and inspection. A final section contains 80 odd abstracts of the more important British patents relating to latex dipping. This 60-page booklet is well illustrated with 26 monochrome photographs plus three whole-page colour plates and has a name and subject index. Copies of all or any of the booklets may be obtained, free of charge, from the British Rubber Development Board, Market Buildings, Mark Lane, London, E.C.3.

Law & Company News

Commercial Intelligence

The following are taken from the printed reports, but we cannot be responsible for errors that may occur.

Satisfactions

BOWMANS CHEMICALS LTD., Widnes. Satisfaction, 8 January, of debenture stock registered 22 July, 1952, to the exent of £51,500.

BRITISH CELANESE LTD., London, W. Satisfaction, 16 January, of debenture stock registered 24 September, 1946, to the extent of £3,541.

KENT ALLOYS LTD., Rochester. Satisfaction, 15 January, of debenture registered 14 March, 1952.

Changes of Name

The following changes of name have been announced:—SATURN OXYGEN CO. LTD., to SATURN INDUSTRIAL GASES LTD., on 30 December, 1953; ALBION COMPOUNDS LTD., to HUBRON RUBBER COMPOUNDS LTD., on 5 January; SOCIETY OF PUBLIC ANALYSTS & OTHER CHEMISTS, to the SOCIETY OF ANALYTICAL CHEMISTRY (word Limited omitted), on 31 December, 1953.

Increase of Capital

The following increase of capital has been announced:—E. EARNSHAW & CO. LTD., increased from £1,000 to £5,000.

Company News

Borax Consolidated Ltd.

In respect of the year ended 30 September last, a final dividend of 9 per cent on the deferred ordinary stock is being recommended by the board of Borax Consolidated Ltd. The total payment for the year will thus be brought up to 11 per cent, which is 1 per cent more than the previous year. A preliminary statement shows that the group trading profit for the year under review totalled £1,385,539, an increase of £48,242 compared with the previous year.

Kaylene (Chemicals) Ltd.

It has been found impracticable to maintain two trading companies with similar names. For this reason the recently formed Kaylene (Chemicals) Ltd. is being wound up and the name Kaylene Ltd. is in process of being changed to Kaylene (Chemicals) Ltd. The well-established business of Kaylene Ltd. will continue to trade under the name of Kaylene (Chemicals) Ltd.

Pest Control Ltd.

Reference was made in THE CHEMICAL AGE on 30 January (p. 335) to an announcement by Pest Control Ltd. that the directors had begun preliminary discussions with Fisons Ltd. which might lead to an offer being made to the former company's ordinary shareholders. A joint statement issued this week announces that an offer has been made by Fisons to acquire the whole of the Pest Control ordinary share capital. The basis of the offer is one ordinary £1 share of Fisons and 2s. 6d. in cash for each six ordinary 5s. shares of Pest Control. Each of the directors of Pest Control has agreed to accept the offer in respect of his own holding and the board will recommend its acceptance by the shareholders. The offer is subject to the consent of the Capital Issues Committee to the issue of shares of Fisons and to its acceptance by holders of 90 per cent of the ordinary shares in Pest Control (or such lesser percentage as may be agreed by Fisons).

Thos. W. Ward Ltd.

A letter has been sent to shareholders of Thos. W. Ward Ltd. with reference to the board's proposal to increase the authorised share capital from £2,200,000 to £4,000,000 and to capitalise £11,100,000 of the company's reserves by applying such sum in paying up in full £1,100,000 £1 ordinary shares. 'These shares,' states the letter, 'will be allotted by way of bonus among the ordinary shareholders on a one-for-one basis so that the ordinary share capital will then become £2,200,000. The necessary application is being made to the Capital Issues Committee for permission to effect this'.

New Canadian Company

Three British companies have combined to form a new Canadian company with head offices in Toronto. The companies concerned are British Chrome & Chemicals Ltd., Eaglescliffe, Durham; John & James White Ltd., Rutherglen, nr. Glasgow; and E. P. Potter & Co. Ltd., Little Lever, nr. Bolton. All three are prominent in the manufacture of chrome chemicals.

Next Week's Events

MONDAY 15 FEBRUARY

Royal Institute of Chemistry

Leeds: The University (Chemistry Lecture Theatre), 6.30 p.m. Joint meeting with Chemical Society. Dr. T. P. Hoar: 'Corrosion Theory in Practice.'

Chemical Society

Cardiff: University College (Chemistry Department), 5.30 p.m. Professor W. Baker: 'Recent Work on Organic Inclusion Compounds & Their Uses.'

Society of Chemical Industry

London: Hall of Institute of Structural Engineers, 11 Upper Belgrave Street, S.W.1, 6.15 p.m. Meeting of Microbiology Group. Dr. N. J. Berridge: 'Inhibitory Substances of Bacterial & Other Origins in Milk & Milk Products.'

London: Chemical Society's Rooms, Burlington House, Piccadilly, 5.30 p.m. Meeting of Crop Protection Panel. K. F. Goodwin Bailey and Dr. M. Elliott: 'Allethrin.'

Institute of Metal Finishing

London Northampton Polytechnic (Room 153, Connaught Building) St. John Street, E.C.1, 6.30 p.m. Discussion: 'Technical Education: How it Can Help You.'

Incorporated Plant Engineers

Liverpool: Radiant House, Bold Street, 7.15 p.m. D. W. Evans: 'Mechanical Service Equipment in a Medium Sized Chemical Factory.'

TUESDAY 16 FEBRUARY

Society of Chemical Industry

London: Royal College of Science, Imperial Institute Road, South Kensington, 2.30 p.m. Meeting of Agriculture Group. Dr. K. L. Robinson: 'Antibiotics in Chemical Feeding.'

Parliamentary & Scientific Committee

London: Savoy Hotel, 11.30 a.m. Annual general meeting, followed by annual luncheon.

WEDNESDAY 17 FEBRUARY

Royal Institute of Chemistry

London: University College, 6.30 p.m. Dr. E. Glueckauf: 'Chemical Aspects of Atomic Energy in Industry.'

Chemical Society

Gloucester: Technical College, 7 p.m. Joint meeting with RIC and SCI. A. Smales: 'The Use of Radio-chemical Methods in Analysis.'

Belfast: Queen's University (Agriculture Lecture Theatre), 7.15 p.m. Joint meeting with SCI. Dr. A. J. Lloyd: 'Krilium Soil Conditioner.'

Society of Chemical Industry

Newcastle: King's College (Chemical Lecture Theatre), 6.30 p.m. Jubilee Memorial Lecture by S. Robson: 'The Changing Pattern of Plant Design in the Basic Chemical Industries.'

Manchester Metallurgical Society

Manchester: Central Library, 6.30 p.m. Dr. G. K. T. Conn: 'New Optical Techniques.'

THURSDAY 18 FEBRUARY

Chemical Society

London: Burlington House, Piccadilly, 7.30 p.m. Meeting for the reading of original papers.

Aberdeen: Robert Gordon's Technical College, 7.30 p.m. Joint meeting with RIC and SCI. Dr. A. E. Werner: 'The Scientific Examination of Paintings.'

Edinburgh: North British Station Hotel, 8 p.m. Joint meeting with RIC and SCI. Dr. W. H. J. Vernon: 'Recent Progress in the Study of Metallic Corrosion.'

Hull: University College (Chemistry Department), 6 p.m. Joint meeting with University College Scientific Society. Professor E. R. H. Jones: 'Allene Chemistry.'

Society of Chemical Industry

London: Institute of Structural Engineers, 11 Upper Belgrave Street, S.W.1, 6 p.m. Joint meeting of Corrosion Group with Road & Building Materials Group. H. S. Campbell: 'The Use of Non-Ferrous Metals in Domestic Water Supply.'

FRIDAY 19 FEBRUARY

Royal Institute of Chemistry

Dundee: University College (Chemistry Department), 7 p.m. Joint meeting with Chemical Society. Dr. R. P. Cook: 'The Sterols—Their Chemistry & Metabolism.'

Chemical Society

Cambridge: The University (Chemical Laboratory), 8.30 p.m. Joint meeting with University Chemical Society. Professor A. Robertson: 'Usnic Acid & Related Topics.'

Glasgow: The University, 7 p.m. Annual general meeting of local Fellows, followed by reading of original papers.

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Newcastle-on-Tyne: King's College (Chemistry Building), 4 p.m. Meeting for reading of original papers.

St. Andrews: United College (Chemistry Department), 5.15 p.m. Joint meeting with College Chemistry Society. Professor B. Lythgoe: 'Some Naturally Occurring Polyacetylenes.'

Society of Chemical Industry

London: King's College (Chemistry Lecture Theatre, Strand), 7 p.m. Meeting of Fine Chemicals Group. Reading of original papers by members.

Institute of Metal Finishing

Sheffield: Grand Hotel, 7 p.m. Sheffield & North-East Branch annual dinner and dance.

Market Reports

LONDON.—A steady demand together with a broadening of activity in the industrial chemicals market is indicated by reports, and the movement against contracts has been fully up to schedule. The soda products continue to meet with a good inquiry and there has been a fair buying interest in acetic anhydride and acetone at the lower rates now ruling. Methyl acetate which was also recently reduced continues in fair call. The basis prices for white lead, red lead and litharge were reduced on 5 February, white lead now being quoted at £119 5s. per ton, and read lead and litharge at £113 10s. per ton. There has been little change either as regards activity or prices on the coal tar products market and current supplies have no difficulty in finding an outlet.

MANCHESTER.—Values of chemical products on the Manchester market during the past week have been maintained pretty well throughout the range and little change of any consequence has occurred. Caustic soda and most of the other alkalis are meeting with a steady demand on home-trade account, on the whole, a fair export business is being arranged. A fair inquiry has been dealt with for a wide range of other products, including borax, alum and aluminium sulphate, and most of the potash and ammonia compounds. In the aggregate the movement of fertiliser materials tends to expand, and a ready outlet is being found for the leading tar products.

GLASGOW.—The feature of this week's trading has been the increased demand from the textile and allied trades, and a considerable volume of business has been booked, both for spot and forward delivery. There has been no variation worth mentioning in prices and, of course, the demand for agricultural chemicals is progressing.

Tube Works Closing

SCOTTISH Non-Ferrous Tube Industries Ltd., who opened one of the first factories on the Hillingdon industrial estate at Glasgow, is closing the factory at the end of this month. Eighty-two workers will be affected. An official of the firm said: 'Manufacture will be transferred to the Kirkby, Liverpool, works of Imperial Chemical Industries Ltd., who will maintain service to Scottish customers.' Scottish Non-Ferrous Tube Industries is owned by I.C.I. and the Colness Iron Co. Ltd. New production methods require machinery of new design necessitating heavy expenditure. The Liverpool works have this machinery already in production.

CLASSIFIED ADVERTISEMENTS

EDUCATIONAL

THE POLYTECHNIC,
309, REGENT STREET, W.1,
DEPARTMENT OF CHEMISTRY AND BIOLOGY
HEAD OF DEPARTMENT: W. DAVEY, B.Sc., Ph.D., F.R.I.C.

SIX Lectures, illustrated by Films, on "Aspects of Pest Control," will be given on Fridays at 7 p.m., commencing March 5th, 1954. Fee for the course, 15s. Further details and forms of application may be obtained from the Head of the Department.

J. C. JONES,
Director of Education.

SITUATIONS VACANT

The engagement of persons answering these advertisements must be made through a Local Office of the Ministry of Labour or a Scheduled Employment Agency if the applicant is a man aged 18-64 inclusive, or a woman aged 18-59 inclusive, unless he or she, or the employment, is excepted from the provisions of the Notifications of Vacancies Order, 1952.

HER MAJESTY'S COLONIAL SERVICE

APPLICATIONS are invited for the following post:—

HER MAJESTY'S COLONIAL RESEARCH SERVICE
EAST AFRICA HIGH COMMISSION

A vacancy exists for a **BIOCHEMIST** in the East African Tsetse and Trypanosomiasis Research and Reclamation Organisation (CDE77/88/02). Candidates, between 26 and 45, must possess at least a B.Sc. (Honours) Degree, with three years' post-graduate experience. Duties will include research on animal and insect physiology in connection with trypanosomiasis investigations in East Africa; routine biochemical tests; assist with biochemical problems in trypanosomiasis.

Appointment is on probation in Colonial Research Service in Senior Scientific Officer scale of £750 by £30—£950 per annum, on Principal Scientific Officer scale £1,000 by £40—£1,200 by £50—£1,375 per annum, according to age, qualifications and experience. In addition, Overseas Research Allowance of £135 per annum, increasing to £240 per annum and then decreasing to £175 per annum, according to salary. Cost-of-living allowance of 35 per cent of salary and Overseas Research Allowance subject to maximum of £350 per annum. Outfit allowance, £60.

Contributory Superannuation Scheme. Quarters provided at rental of 10 per cent of basic salary. Taxation at low local rates. Free passages for officer, wife and all children under the age of 13.

Apply in writing to **THE DIRECTOR OF RECRUITMENT, COLONIAL OFFICE, GREAT SMITH STREET, LONDON, S.W.1,** giving briefly age, qualifications and experience. Mention the reference number CDE77/88/02.

EXPERIENCED CHEMIST required by Northern Rhodesia Company situated on Copperbelt. Applicant must possess University Degree or equivalent qualification and have at least three years' experience. Basic salary will depend on experience of successful applicant, with minimum of £68 monthly, plus bonus (at present 65 per cent of basic salary), and cost-of-living allowance (at present £9 2s. per month.). Married or single accommodation available. Applications to **BOX NO. 443, WALTER SKINNER, LTD., 20, COPTHALL AVENUE, LONDON, E.C.2.**

SITUATIONS VACANT

CHEMIST, qualified, aged 25-40, wanted for Laboratory engaged in the manufacture of Adhesives and Finishes for the Boot and Shoe Industry. Write, giving full particulars of experience, qualifications, age and commencing salary, to the **PERSONNEL MANAGER, F. H. & H. S. POCHIN, LTD., SPINNEY HILL ROAD, LEICESTER.** All replies treated in confidence.

CHIEF CHEMIST required by company producing purified and chemical cellulose. Applicant must have cellulose, paper or cellulose derivative experience. This is a senior executive position and applicant should have a First or Second-Class Honours Degree and have occupied positions of responsibility in industry. Work involves responsibility for all technical functions, quality control, development and customer problems. Age 35-45 years. Salary commensurate with position. In first letter state complete record of education and positions held, plus personal data and a small photograph. Reply to **THE GENERAL MANAGER, HOLDEN VALE MANUFACTURING COMPANY, LIMITED, HASLINGDEN, LANCS.**

CHIEF PLANT ENGINEER required by company producing purified and chemical cellulose. Applicant should hold a Degree in Mechanical Engineering and have extensive experience in plant maintenance in the paper mill field. Age 35-45 years. Position is largely maintenance supervision, including steam plant, with emphasis on preventive maintenance and improving mechanical features including instrumentation. Salary commensurate with position. In first letter state complete record of education and positions held, plus personal data including a small photograph. Reply to **THE GENERAL MANAGER, HOLDEN VALE MANUFACTURING COMPANY, LIMITED, HASLINGDEN, LANCS.**

FOR SALE

600

MIXERS

SIFTER MIXER by Gardner. Mixing trough, 60 in. by 19 in. by 19½ in. deep. Ribbon-type agitator. Brush sifter driven through gearing by 2½ h.p. motor 415/3/50. Bottom gate discharge.

500 gal. **C.I. MIXING VESSEL,** 5 ft. diam. by 5 ft. deep. Anchor-type agitator driven through bevel gears and fast and loose pulleys.

M.S. Lead-lined **MIXER,** 2 ft. 3 in. i.d. by 3 ft. deep, with 12 in. cone bottom, 2 in. flanged bottom outlet. Vessel totally enclosed; lead-covered paddle-type agitator. Motorized 400/3/50.

Double Trough **JACKETED MIXER** by Werner Pfleiderer Trough 29 in. by 21 in. by 22 in. deep. Twin fin blade agitator, motorised 400/3/50, through reduction gear.

Double-troughed Jacketed **TILTING MIXER** by Werner Pfleiderer. Trough, 28¼ in. by 28½ in. by 28 in. deep. Unglanded twin fin type agitators. Pulley drive. Bottom half of mixer jacketed for water cooling or low pressure steam.

Double **TROUGH MIXER** by Baker Perkins, 42 in. by 42 in. by 30 in. deep. Twin "Z"-blade agitators. Motorised 400/3/50.

GEORGE COHEN SONS & CO., LTD.,
WOOD LANE, LONDON, W.12.
Tel.: Shepherds Bush 2070 and
STANNINGLEY, NR. LEEDS.
Tel.: Pudsey 2241.

FOR SALE

C. BARBER, LTD.

C.I. **FILTER PRESS,** 25½ in. square, by **MANLOVE ALLIOTT,** plate and frame type, 13 chambers, arranged for washing. Excellent condition.
TWO HYDRO EXTRACTORS, 72 in., by **BROADBENT.** (One new and unused.)
TWO "HORMANN" 30 cm. Stainless Steel **FILTER PRESSES.**
STORAGE BINS in stainless steel, cylindrical, with covers. 40/12/14/10 gallons capacity.
CANNON STEAM-JACKETED ENAMEL-LINED PANS, 10 and 25 gallons. All new and unused.
DOULTON 25-gallon **COPPERS** with lids. **NEW** and unused.
WELDED VESSELS of all types, in mild steel or stainless. Fabricated to customer's specifications.
HYDRO-EXTRACTOR, 26 in., by **CHERRYTREE.**

C. BARBER LTD.
SILVERDALE GARDENS
HAYES MIDDLESEX
Telephone—Hayes 2735/6

7 BRAND NEW Jacketed **STERILIZING VESSELS**—7 ft. long by 3 ft. diam., complete with fittings.
2—18 in. **KEK PLATE MILLS,** complete with feeders, delivery bins, motors and entablature.
9—Worssam **ROTARY PRESSES.**
POWDER DRESSING OR SIFTING MACHINES.
1—Johnson **FILTER PRESS**—36 in. sq. plate and frame
1—Johnson **FILTER PRESS**—47 plates, 32 in. sq.
1—Johnson **FILTER PRESS**—30 plates, 25 in. sq.
Wood **FILTER PRESS**—69 plates, 2 ft. 8 in. sq.
24 in., 30 in. and 36 in. **HYDRO EXTRACTORS.**
Heavy Cake **CRUSHING MILL**—2-pair high, by Nicholson.
Bennett Copper-built **EVAPORATING UNIT.**
"U"-shaped Horizontal Jacketed **MIXER**—7 ft. long, 3 ft. wide, 3 ft. 3 in. deep, belt and gear driven.
3—5-roll **REFINERS** by Baker Perkins.
1—No. 1A Water-cooled **CIRCULATOR MILL.**
2—Excellent Nickel-lined Jacketed **TILTING PANS.** 60 gal. capacity and for 40 lb. working pressure.
2—Brand New Enclosed Aluminium **TANKS,** approx. 11 ft. long by 4 ft. 9 in. wide by 7 ft. 3 in.
5—Excellent Porcelain **DISC MILLS.**
1—Aluminium **STILL,** steam jacketed, dished top and bottom; 4 ft. 8 in. diam. by 6 ft. deep.
1—Very Fine **GARDNER SIFTER** and **MIXER,** trough 5 ft. 9 in. by 24 in. by 28 in. deep, with wood-built hopper, elevator, A.C. motor and starter.
RICHARD SIZER, LIMITED, ENGINEERS, HULL.
Telephone: 31743.

SELWOOD FOR TANKS

ONE 1,500-gallon **ENAMEL-LINED STORAGE TANK,** ex-milk storage. Cork insulated motor-driven agitator fitted. Mounted on adjustable legs.

ONE 800-gallon **DITTO.**

Full details of these and other Tanks on application to:—

WILLIAM R. SELWOOD, LTD.,
CHANDLER'S FORD,
HANTS.
'Phone 2275.

SACK AND BAG MERCHANTS AND MANUFACTURERS. New and reconditioned for Home and Export. (Use **JUTEX** for sack repairing). **ALTRINCHAM JUTE LTD., WRIGHT STREET, BROADHEATH, ALTRINCHAM, CHESHIRE.**

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MORTON, SON AND WARD LIMITED,
offer
MIXERS
"MORWARD" "U"-shaped Trough Mixers in any size up to 3 tons.
MIXERS, Horizontal or Vertical. Jacketed or unjacketed, made to requirements. Several in stock.
3-cwt. Trough **MIXERS** by **CHALMERS** and **GARDNER.** Stainless steel lined troughs.

JACKETED PANS
In stainless steel or mild steel. With or without mixing gear.
500g. Jacketed **AUTOCLAVE** with detachable cover. 150 lb. in jacket.
500g., 300g. and 200g. **AUTOCLAVES** in mild steel riveted construction with detachable covers.

ONE Centrifuge by **SHARPLES,** motorised, bowl speed, 15,000 r.p.m., 500 g.p.h. As new.

PUMPS
A large selection of **MONO** and other Pumps in stock, 2 in. to 6 in., new and second-hand.

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MORTON, SON AND WARD LIMITED,
WALK MILL,
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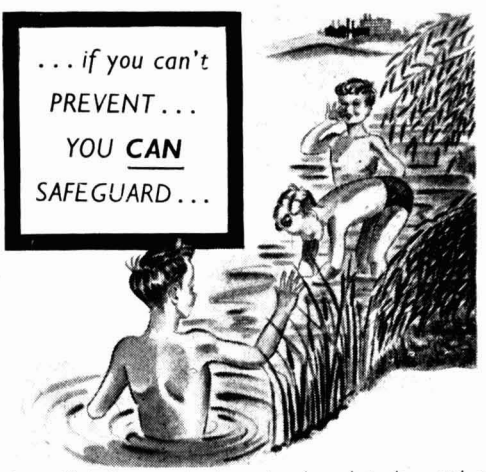

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