

The Chemical Age

VOL. LXXVII No. 1958

19 January 1957

LP POLYTHENE PROBLEMS

(See page 123)

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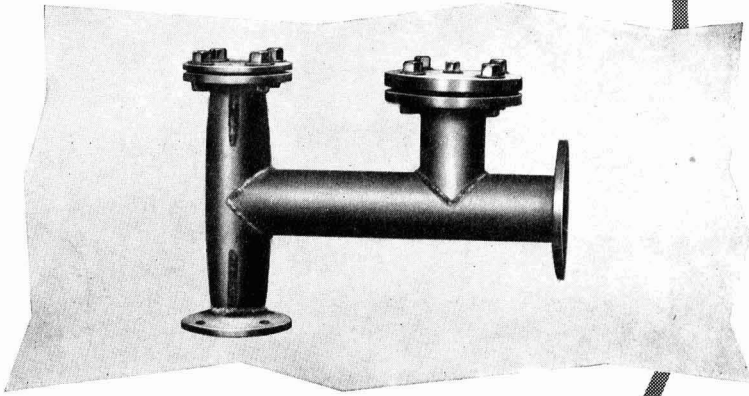
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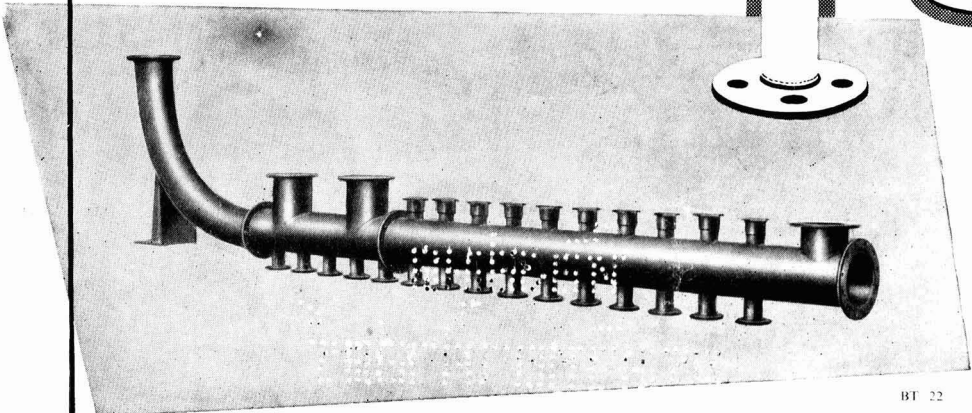
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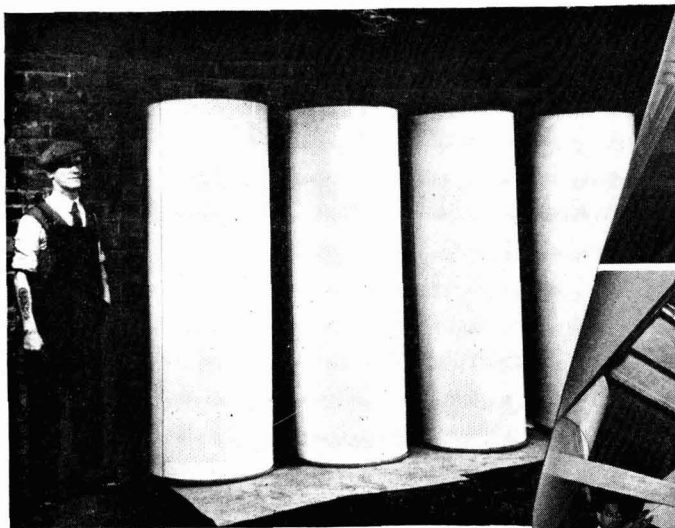
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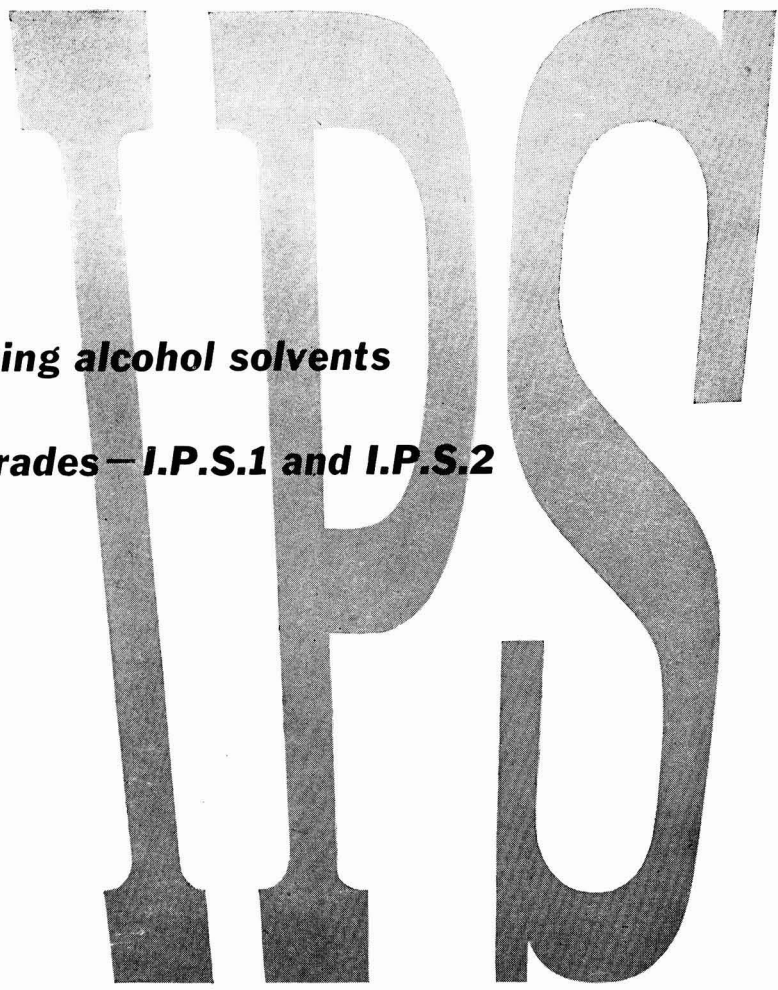
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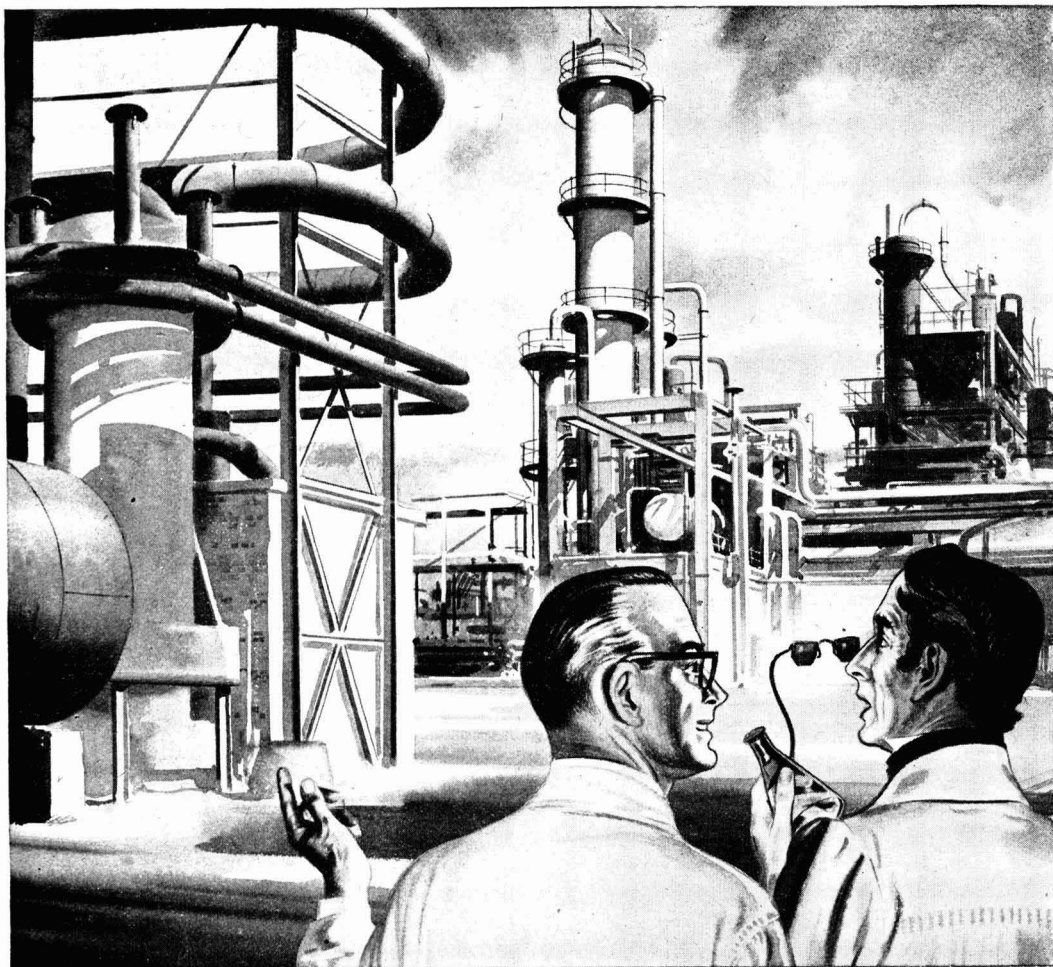
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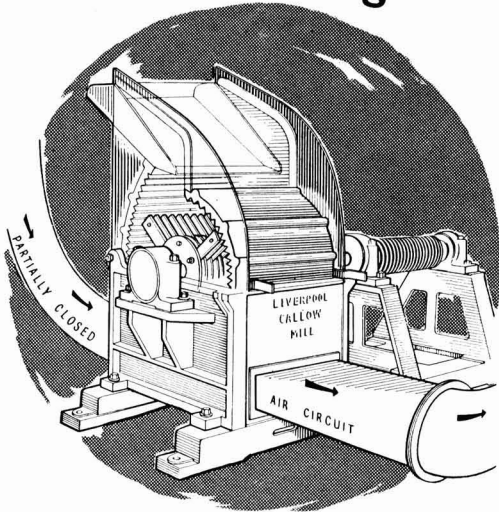
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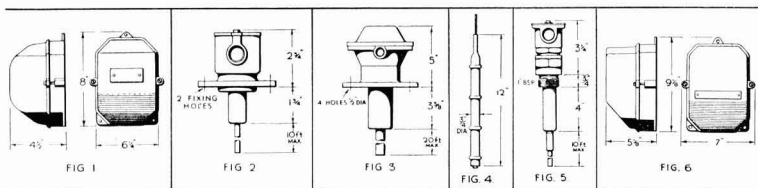
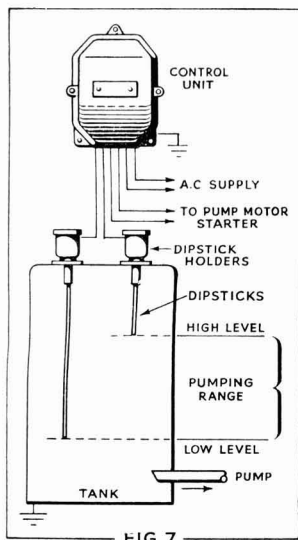
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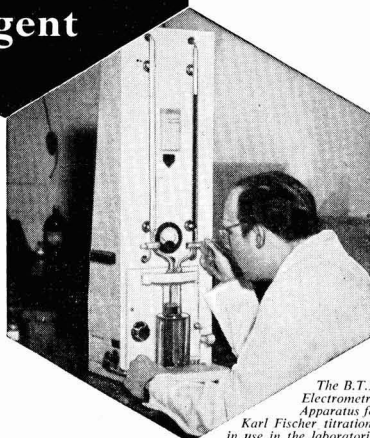
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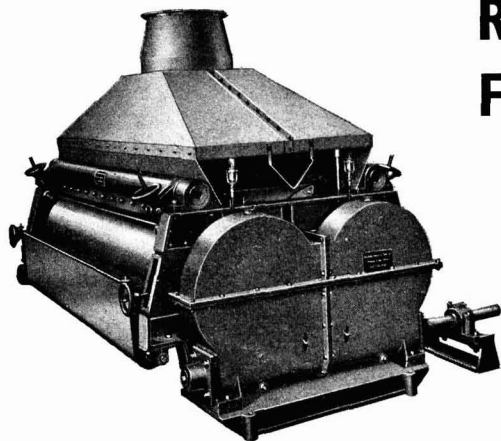


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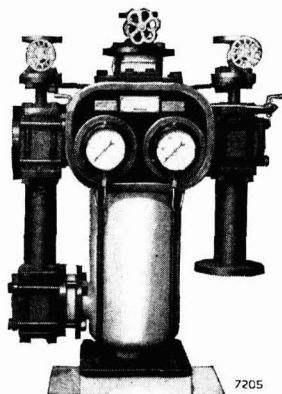


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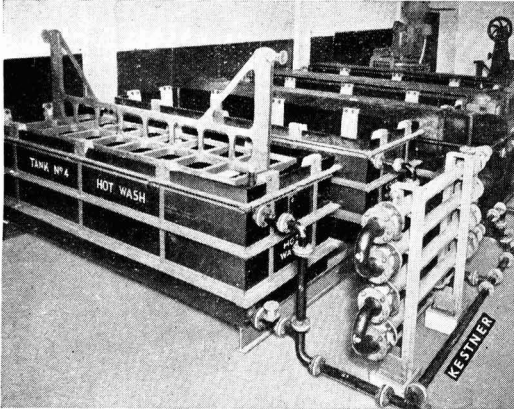
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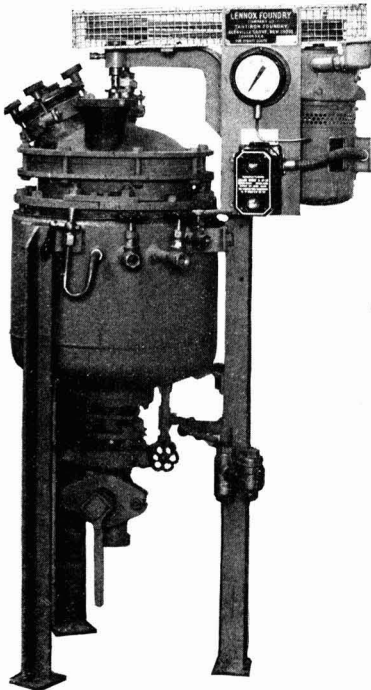
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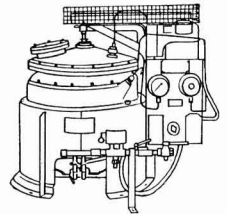
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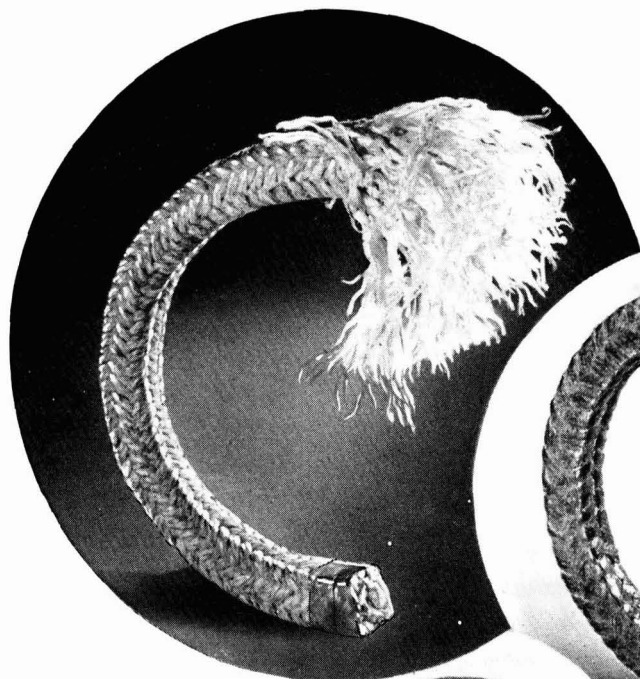
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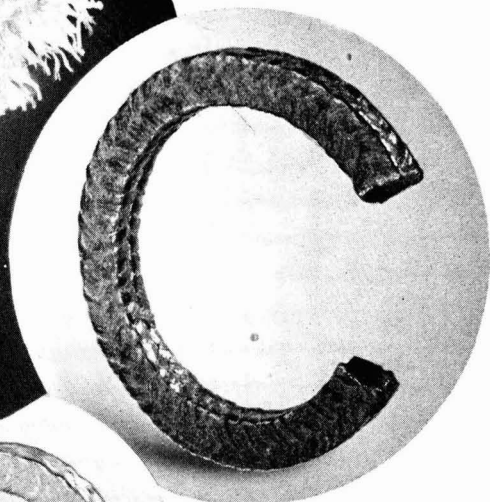
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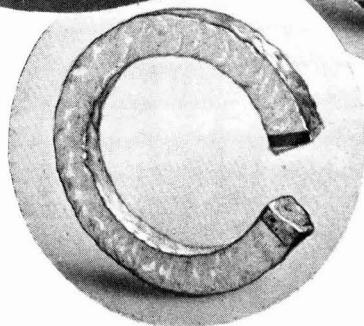
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VOL. 77

No. 1958

19 JANUARY 1957

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THE CHEMICAL AGE

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BOC UNDER FIRE

THERE has now been time to consider the Monopolies and Restrictive Practices Commission's Report on the supply of certain industrial and medical gases and to examine comments on it. The Commission's terms of reference covered three gases: oxygen, dissolved acetylene and propane. The report, however, deals for all intents and purposes with a single concern—the British Oxygen Company.

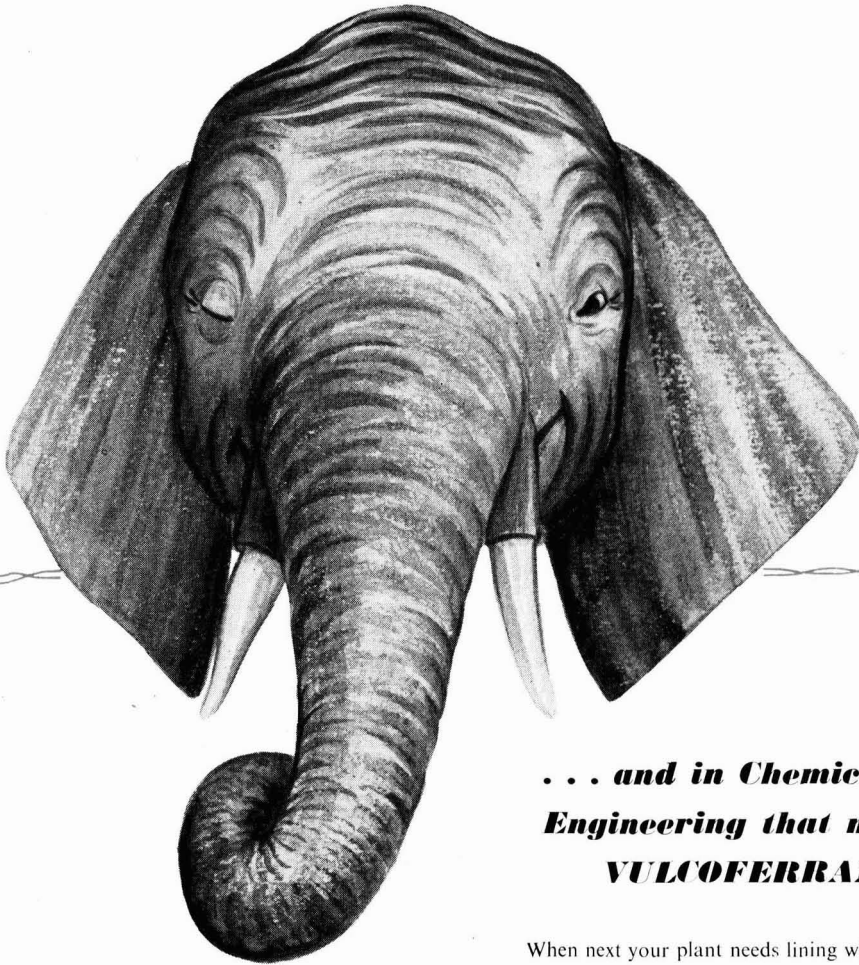
In the Commission's view, BOC has deliberately built up a monopoly for itself, has succeeded in securing 98 per cent of the business in oxygen and 92 per cent in acetylene and has fixed prices which give the company high profits and, due to the absence of competition, this, not unnaturally, must be viewed with suspicion. Also, the fact that BOC has until recently concealed its ownership of three subsidiary companies (Industrial Gases (Scotland) Ltd., British Industrial Gases Ltd., and Oxhycarbon Ltd.) used to operate against competitive firms; that it has required its big customers to take all supplies from BOC; and, that its charges system does not operate fairly among customers.

While the members of the Commission are not all in agreement regarding BOC prices, the majority—six out of eight—consider the company charges unjustifiably high prices for its products to give the company exceptionally high profits.

As an almost complete monopoly BOC does not run the risks of competition and has greater freedom from most commercial problems. The Commission, therefore, suggest that BOC profit margins should be smaller than those of a firm in a competitive industry. The report shows that in 1952-54 BOC earned a profit on capital employed of 23 to 24 per cent which the company regards as the level required to support development and research investigations and to enable it to raise fresh capital if required, on favourable terms. This percentage of profit, however, is one-half to one-third higher than the weighted average for manufacturing industry as a whole.

On this question of profits, it must be pointed out that if the Commission had measured earnings against the total capital employed and not based their analysis on historical costs, profits would have appeared much lower, i.e. about 17 per cent, which is in keeping with the average for this period. Today, too, replacement costs in the chemical and engineering industries are at least two and a half to three times pre-war figures so that BOC profits could be reckoned at 8 per cent or 10 per cent on capital investment. One BOC cost factor is that of cylinders. At the present time the company's cylinders are valued at £10 million. Replacement admittedly is of the order of up to once every 24 years, but a large stock of cylinders is required since cylinders may be on loan for considerable periods.

***Some folk have a lining that's
stronger than others . . .***



***. . . and in Chemical
Engineering that means
VULCOFERRAN***

When next your plant needs lining with rubber, consider the use of VULCOFERRAN. This is an ebonite lining for Steel and C. I. surfaces combining great physical strength with resistance to a wide range of chemical attack. The tensile and compressive strengths of VULCOFERRAN are high, being 3,300 lbs. p.s.i. and 6,500 lbs. p.s.i. respectively. To these advantages may be added flexibility and near unbreakable adhesion to the base metal. This is the obvious lining for plant subjected to heavier than normal wear, and you are invited to write for complete details.

NORDAC CHEMICAL ENGINEERS

NORDAC LIMITED, UXBRIDGE, MIDDLESEX TELEPHONE: UXBRIDGE 5131-4

A point of particular interest is the percentage of income which BOC devotes to research—namely, 2½ per cent. This is certainly a low figure since it has been estimated that UK chemical industry allocates an average of 5 per cent of its income for research purposes while in the US, large chemical concerns of the status of BOC set aside an average of 9 per cent.

It is perhaps significant that BOC has not been responsible for the discovery of any of the successive important new processes for oxygen production or distribution. In fact, almost all, it appears, were first developed abroad and BOC has acquired the necessary patent rights or licences and exploited them in this country. BOC can thus be considered to have modified or developed processes, plant or equipment—not particularly costly procedures. Herein lies the danger that elsewhere in the world, and notably in the US and Germany, new processes and techniques are being developed and other progress is being made in production of gases, which BOC cannot acquire, so that this country may well find itself markedly behind, or forced to depend on overseas manufacturers for new developments.

To date, this report has not been discussed in Parliament, but it is of interest to note comments in the national Press. Thus, *The Times* considers this report is one of the most scathing which the Monopolies Commission have so far produced. In the opinion of *The Times* what stands out clearly is that the company has not made any of the major contributions to new processes. It is pointed out that the possibility of dividing the industry up was not discussed, and the view that the necessity to supply the market quickly requires a national organisation appears to be accepted. However, as the industry is large *The Times* suggests that 'it would surely be desirable to go into the possibility of reviving competition.'

The *Manchester Guardian* in its editorial draws attention to the fact that the present law does not give the Government power to enforce a change in BOC practises which are judged to be against the public interest (a point also made in the editorial columns of *The Scotsman*). With regard to the Commission's suggestion that the Board of Trade should supervise the companies activities, the *Guardian* points out that it is often much easier to influence a commercial company than one owned by the State. It suggests that if the present law does not allow the Government to break up this monopoly, then the law should be further amended. The question of high profits is dismissed. What matters, it is stated, 'is the rigidity established in an important sector of industry, and the irresponsible power derived from its stranglehold.'

Similarly, the *Daily Telegraph*, in its editorial, is not concerned with the high profits which is considered 'debatable ground.' The *Glasgow Herald* remarks that one answer to the charge of high profits is that 'even a monopolist should be entitled to charge what the market will bear provided his customers are satisfied with the quality of their purchases.' This paper is, however, disturbed about BOC's future developments and technical progress to keep abreast of overseas manufacturers. This, the *Glasgow Herald* rightly states, 'is a heavy responsibility for a single firm to carry, and one which is ultimately much more important than questions of existing profit margins.'

In the view of the *Yorkshire Post* 'the picture is much as might have been expected. A big concern which has reached a dominant position through drive and enterprise is in danger of running to fat. A case for reform exists.' It agrees with the suggestion of supervision by the Board of Trade of all the questions raised by this report. One which certainly requires an explanation is the difference between 11s charged per 1,000 cubic feet of oxygen for the Air Ministry and the same oxygen delivered to hospitals at 31s per 1,000 cubic feet. Even hospitals within a group may be charged different prices.

SULPHATE OF AMMONIA

SULPHATE OF AMMONIA is still the world's predominant nitrogenous fertiliser. Thus, in 1947-48 it comprised 28 per cent of world use, its closest rival being ammonium nitrate at 23 per cent (including lime-ammonium nitrate combinations such as 'nitro-chalk'). In 1955-56, sulphate of ammonia's share in world fertiliser nitrogen use was slightly higher, 30 per cent, and ammonium nitrate still held the runner-up's position with 23.5 per cent. In this country the place of sulphate of ammonia is exceptionally dominant, for it had a 72 per cent share in 1947-48 and a 67 per cent share last year.

Nevertheless, there are distinct movements of competition. Even here, where in compounding (except for the CCF range of Imperial Chemical Industries) almost all the nitrogen used for years has been sulphate of ammonia, some manufacturers are said to be experimenting with ammonium phosphate as a part-source of nitrogen. In the US, where sulphate of ammonia is produced in considerable quantities as a coke-oven by-product, three leading producers have recently converted to ammonium phosphate production.

The US and European trend seems to be the production of di-ammonium rather than mono-ammonium phosphate. This provides a better balance for the two nutrients, and it is also better suited in all probability to the modern granulation process with its hot drying stage; for with the mono-salt some manufacturers found that a liberation of sticky phosphoric acid was possible under heat, resulting in serious production delays. A greater proportion of the di-ammonium salt can no doubt be mixed without this risk, though at some point the risk of reverting to soluble phosphate in the mixture may also have to be faced, a problem that would not be easily solved under the British code of fertiliser legislation by which soluble phosphate is given so much economic premium.

However, significant advances in the use of ammonium phosphates in Britain are somewhat unlikely. ICF's production largely supports their own compound tonnage; and other nitrogen production enterprises now in hand are likely to be based upon increasing the national output of ammonium nitrate. It would seem, therefore, that any increased use of ammonium phosphate in compounding would have to be met by supplies imported from the Continent—and surely any large development of this kind will be discouraged when in fact home production of sulphate of ammonia yearly exceeds home needs?

CONTROL APPARATUS EXPORTS ROSE SIX PER CENT LAST YEAR



At the BIMCAM lunch, left to right, L. S. Yoxall, president, R. G. Kent, chairman and Dr. W. A. Macfarlane, chief executive, NIFES

THE PROSPECTS are that our external trading account will still be roughly in balance for the 12 months to April 1957, said the Parliamentary Secretary to the Board of Trade, Mr. F. J. Erroll, MP, at the annual luncheon in London on 8 January of the British Industrial Measuring and Control Apparatus Manufacturers' Association (BIMCAM). He pointed out that after a difficult 1955, the year 1956 had shown a healthy improvement. For the first 11 months, imports were only 1 per cent higher in value than in 1955, while exports were 6 per cent higher in volume and 10 per cent higher in value.

Calder Hall

He emphasised the achievements of Britain, mentioning the work done by British science and technology in splitting the atom, and leading from that the building of the first commercial nuclear power station at Calder Hall.

BIMCAM members played an important part in direct exporting and in promoting the efficiency of other exporting industries by means of their products. Nuclear plants could not be operated without a full range of control instruments.

New Committee

The Board of Trade had recently set up an instrument industry advisory committee, which was due to meet for the first time this year. He was confident that this new body would provide a most useful liaison between the industry and the Government.

Mr. R. G. Kent, BIMCAM chairman, referred to the formation by the Association of an education committee, which should result in material advances in technical education in the field of industrial instruments. He mentioned the Instruments, Electronics and Automation Exhibition to be held in London in May. They looked forward to a great success for this Exhibition.

The national failing in public relations was deprecated by Sir Norman Kipping, JP, director-general of the Federation of British Industries. We were critical of ourselves by nature, but a young and vigorous trade association such as BIMCAM had a special opportunity to put this matter right. While grappling with the growth of technical complication and variety, we should bear prominently in mind the need for public relations and publicity at home and overseas.

B & K to Hold Third Instrument Show

THIRD International Instrument Show, sponsored by B & K Laboratories Ltd. and Allied International Co. Ltd. is being staged at Caxton Hall, Westminster, from 25-29 March inclusive.

Over 50 leading instrument manufacturers from the US, Switzerland, West Germany, Denmark, Holland, Sweden, Austria and Great Britain will be displaying some three hundred items of test equipment and apparatus, a number of which will be demonstrated in typical applications.

Caxton Hall provides double the display area of last year's show. Many new features are added and about twenty new exhibitors will be present. Tickets for the show, which will be open until 6.30 p.m. daily, are obtainable on request from B & K Laboratories, 57 Union Street, London SE1.

Benzole Producers

AT AN extra-ordinary meeting held on Wednesday 9 January the name of National Benzole Holdings was changed to Benzole Producers.

DSIR Plans New National Science Lending Library

PLANS for a British National Lending Library for Science and Technology are now being worked out by the Department of Scientific and Industrial Research.

The purpose of this library is to supply books and periodicals to scientists and technologists throughout Britain. It will take over from the Science Museum Library the responsibility for providing a lending service and it will also take over from that library some of its literature. It is planned to use automatic equipment for cataloguing, recording and sending out demand notes for overdue volumes on loan and for checking availability of volumes requested.

According to Dr. D. J. Urquhart of the DSIR, during the first years of its establishment the number of volumes is expected to double every 20 years, with a gradual slowing down in the rate of expansion. It has been estimated that by the year 2025, the library may have to hold between 12 million and 18 million volumes, about one-quarter of which will be in the Chinese language.

Problems which arose in planning the new library included, Dr. Urquhart said, how to estimate the future world output of scientific literature,

how to estimate the future demand for literature, the extent to which photocopies and micro-forms will be used and the possibility of developing new techniques, including data processing.

Scientific literature has increased greatly. This can be seen by the fact that the estimated number of serial periodicals in the World List of Scientific Periodicals has increased from 16,700 in 1933 to 23,400 in 1950. In 1950 only 34 per cent of these periodicals were available in the Science Museum Library.

The new library will be located outside London and will aim at providing a postal lending service for all types of organisations. A recent, but as yet unpublished, survey has shown that the users of science in industry do most technical reading at home.

Cyanamid Change

CYANAMID PRODUCTS LTD. changed its name on 1 January to Cyanamid of Great Britain Ltd. The company states that this was done 'to bring a degree of uniformity to the styling of the names of the numerous companies which comprise the Cyanamid organisation throughout the world.'

LP POLYTHENE PROBLEMS DISCUSSED BY HOECHST CHEMIST

New Type of Hostalen Produced

A NEW TYPE of polythene, Hostalen GM5010, has been produced by Farbwerke Hoechst AG, of Frankfurt am Main, Western Germany. This was announced at a conference held in London by Hoechst Chemicals Ltd. on 10 January in which Dr. Von Klenk, head of the technical application centre of Farbwerke Hoechst, discussed low pressure polythene with particular reference to recent developments in Hostalen.

Considerable interest has been shown recently in the whole field of low pressure polythene (see THE CHEMICAL AGE, 1956, 75, 107; 1956, 76, 17; 1956, 76, 286) and Dr. Von Klenk discussed some of the results of his own company's experiences.

'When we planned this meeting,' said Dr. Von Klenk, 'we thought we would stress one of the most important uses of Hostalen polythene pipes, for we feel that that is perhaps the most difficult service which the material is asked to give; so that in covering the manufacture of pipes we are more or less covering everything that can be said.'

Several Types

'When we first put Hostalen on the market we had several types which were specially developed for use in injection moulding, spray coating, extrusion processes in the manufacture of pipes, and so on. We have sold these different types to different industries and so far everything seems to be quite well on the way.'

Dr. Von Klenk went on to say that in the course of various experiments they had come to the conclusion that one or two facts they had found might be pointed out to manufacturers of pipes. Those experiments were made not only with their own product, but with all sorts of products, and because of their findings in the case of Hostalen they decided that some care should be exercised in the use of pipes made of this material for certain purposes.

Whereas in the UK pipes made of their low pressure polythene, Hostalen, had to compete with other plastics pipes, the situation in Germany was totally different. There were not many plastics pipes used for the trans-

port of cold water in Germany; it could more or less be said that only steel pipes were used there. The manufacturers of steel pipes said they had to give certain guarantees on their steel pipes. So it was necessary to find a basis for guarantees of Hostalen pipes. It was found that a Hostalen pipe would perhaps not last so long as a steel pipe or would not endure the same pressures or temperatures.

That did not mean that you could not make a pipe out of Hostalen; it did not mean that Hostalen would be any worse than any other plastics material already on the market.

At the present moment, he claimed, the normal type of Hostalen would serve very well as a plastics pipe.

This was an outline of one of the problems of the failure of pipes, and Dr. Von Klenk said he did not want to leave this point without saying that thousands of yards of these pipes had been installed in Germany and so far they had not had any real failure. In Hoechst's factories they had installed 30,000 metres (approximately 18 miles) of Hostalen piping and there has been only one failure; that occurred when live steam was blown into a pipe for quite a long time before it was noticed.

Contamination

Other subjects had arisen. For instance, the contamination of the water passing through a low pressure polythene pipe. The explanation hinted at mostly was the presence of catalysts. The ash content of the materials put out by Hoechst was about 0.01 per cent, which was very low. This ash content was not catalyst, but was the inactivated form of the catalyst, and was aluminium oxide and titanium dioxide, both of which were harmless. It was pointed out that there was little chance of this ash getting into the water.

Extensive tests had been made on animals and it had been found, by incorporating large amounts of Hostalen in the foods fed to rats and other animals, that no harmful changes occurred.

It had also been thought that there was stress cracking. This was a phenomenon which occurred in a very wide variety of materials and it was

suggested to be due to stress, strain or to the reaction of certain liquids. Dr. Von Klenk had read that stress cracking in Hostalen occurred by the action of polar liquids, including cold water. This, he claimed, was absolutely incorrect.

Asked about a rumour that a grade of Hostalen was withdrawn from the market Dr. Von Klenk said that this was not true. The grade referred to was the extrusion grade GFI, but it was still sold in Germany and there were people making pipes with it. At present they did not sell those pipes to municipal authorities for the distribution of drinking water on account of the guarantees, special guarantees which were required by the municipal authorities in Germany, but not in this country.

Very soon the company would have a new type which they were certain would meet all the guarantees.

When asked what conditions for acceptance were laid down by the municipal authorities, he said that for a certain type of pipe the conditions were 50 years' life at a constant pressure of about 150 p.s.i., and at a temperature of 20° C.

Different Specifications

Mr. A. J. Risby, of Hoechst, said it had not been made very clear that the existing GFI material had not fallen below previous expectations in piping fields, but different specifications had been included for Hostalen than for others.

Dr. Von Klenk agreed that that was so, in view of the competition with steel pipes.

Referring to the tests on the life of polythene pipes, which Dr. Von Klenk had said had not been made by anyone else in Europe, it was pointed out that, in spite of the findings that had been offered to the pipe industry, the tests had still shown that the low pressure polythene pipes were in no way worse than any other pipes made of practically all available plastics materials.

Dr. Von Klenk replied that this point was a rather tricky one for him, because in Germany there were very strict laws about comparisons of different materials.

Asked what would be the company's normal commercial recommendation for upper temperature limits in operation, if the German municipal authorities' regulations did not exist Dr. Von Klenk said that normal drinking water had a temperature of up to 16° of 17° C in summer.

It was commented that one of the original claims for low pressure polythene was that it was suitable for use in pipes for carrying hot water. Dr. Von Klenk said it was best to state

very clearly that his company did not think it was suited for use at elevated temperatures.

When asked if he could give a figure, he said he would not claim that it could be used for conveying water for central heating. His company had installed pipes which were conveying water at 45°C in a bath house in their own factory; they had been working in perfect order for more than a year, but they were not sure whether they would withstand that service for long periods.

He had tried to make it clear that, while the company did not feel safe with the normal material, they now felt safe with the new. They did not think there would be any bursting of pipes made of the old material, but, he claimed, they were quite sure there would not be with the new material.

It was also asked whether, in Hoechst's own range of materials, it was found that stress corrosion was a function of molecular weight.

Dr. Von Klenk replied that that was absolutely correct. They had managed to get the rate of flow index in

hand, which was very important for the pipe manufacturer because his production depended on the speed at which he could draw his tubes. The company could go to higher molecular weights, and that was one of the things they had done in their new type.

In reply to a further question he said that stress cracking became less with increasing molecular weight.

Discussing the anxiety on the part of users that higher molecular weight material might be more difficult to work Dr. Von Klenk said that if one plotted workability or flow index against molecular weight one obtained a declining curve. So that we had to improve the melting index in order to set the whole curve higher to enable us to use, for a given flow index, a higher molecular weight material.

He was asked if the firm had actually achieved the production of material of much higher molecular weight which was just as easily workable as the previous material. He said it was almost as easily workable.

there, for the Court had also to decide whether the sale of information as to the secret processes was to be regarded as a sale of capital or income. The income tax commissioners had taken the view that there was no more than an obligation to provide services without any sale or assignment. The Master of the Rolls would not accept this conclusion and said that on the basis of previous decisions it would not be just to conclude that the obligation to disclose the secret processes was merely incidental to the main obligation undertaken by virtue of the agreement. Lord Justice Romer went further and said that this secret knowledge was property.

The Court of Appeal unanimously decided that such part of the £100,000 as was attributable to the disclosure of secret processes ought to be treated as capital and therefore not be taxable. An order was made that the case should be referred back to the Commissioners to determine to what extent the £100,000 was referable to the secret processes.

It is unlikely that the reference back will take place yet. Both the Revenue and the company were given leave to appeal to the House of Lords.

Appeal Court Hears Case of Evans v. Moriarty

THE COURT OF APPEAL has reversed the decision of Mr. Justice Upjohn given in the case of *Evans Medical Supplies v. Moriarty* (See THE CHEMICAL AGE, 1956, 75, 359). The case concerned the liability of a pharmaceutical company to tax in respect of the sum of £100,000 paid to it under a single contract by the Government of Burma. Under this contract Evans Medical Supplies undertook to assist that government in the establishment of a pharmaceutical industry. It was to supply the technical data and designs for the erection of a factory and the installation of machinery required for the manufacture of pharmaceutical products. It was also to disclose to the Burmese Government the secret processes used in the preparation, storage and packaging of the various products, which were of great value to the company, the products themselves being of known composition.

Mr. Justice Upjohn decided that the transaction recorded in the agreement did not fall within the scope of the company's business as it was carried on at the time when the agreement was made. He further decided that the sum of £100,000 ought to be treated as capital and not as income or as part of the annual profits or gains arising from the company's trade. The evidence was that the processes had never been disclosed before to anyone

else and during the seven years' currency of the agreement the company agreed not to disclose them to anyone else in Burma. The company was to be permitted to continue its agency in Burma when the seven years were up, but the agency would obviously become of less value as the home industry was established.

In giving the leading judgment, the Master of the Rolls first recorded his dissent from Mr. Justice Upjohn's conclusion that the agreement fell within the scope of the company's business. He said that the situation which faced this world-wide Evans business in Burma was that, as a matter of policy, the Government of that country had determined to undertake locally themselves, or through a Government agency, the production of articles which had hitherto been imported into Burma from abroad. In his view there was ample evidence to justify the conclusions of fact arrived at by the income tax commissioners that the company had chosen the method which appeared to its directors to be the best means of exploiting its business as wholesale druggists in Burma; and that the sum of £100,000 arose to the company either in the course of the trade which it had hitherto carried on or in the course of a new trade which it commenced on 20 October 1953.

However, the matter did not rest

SAC Paper on Newer Insecticides

AT an ordinary meeting of the Midlands Section of the Society for Analytical Chemistry on 10 January, Mr. K. Gardner, Chief Analytical Chemist, Fison's Pest Control Ltd., gave a paper on the 'Analytical Chemistry of Some Newer Insecticides and Herbicides.'

The speaker stated that apart from the complex problems associated with the analysis of pesticide residues on and in vegetable matter, determination of the active ingredient content in the technical product was often made difficult by closely related impurities. The analytical chemistry of some chlorinated hydrocarbons and organophosphorus compounds was discussed. The compounds described included the insecticides demeton, dimefox and malathion and the herbicides CMU and sodium trichloroacetate.

£25,000 Gift to University

THE University of Leeds, announcing a gift of £25,000 from Shell-Mex and BP Ltd., which has brought the University Building Fund up to £360,000, states: 'It is interesting to note that in spite of the present circumstances of the oil industry, the Shell Company feels that this is not a time when industry can afford to neglect education in general and technical education in particular.'

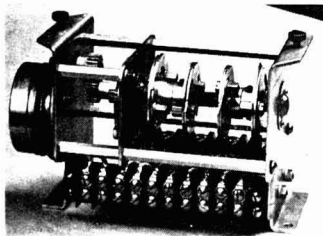
EQUIPMENT REVIEW

Chemical Plant : Laboratory Apparatus Safety and Anti-Corrosion Products

SELF-RESET SEQUENCE TIMER

A SELF-resetting multi-circuit timer or sequence controller has been produced by D. Robinson & Co., of Worcester Park, Surrey. Known as the Rodene type 2600, this model is intended for such purposes as starting slip-ring motors, for circuit-breaker re-closing and the many applications in machine tools, mechanical handling, chemical plant etc., where a sequence of events must occur at pre-determined times after a starting signal, and where any trip-cut or mains failure must prepare the equipment for a re-commencement of the sequence.

Drive is provided by the self-clutching, Rodene synchronous motor, and each circuit has a 5 amp. snap-action switch operated by a pre-set steel cam.



There are two standard models. One can run for up to 15 sec. and control up to four circuits; the other runs for up to one minute and controls up to eight circuits. Other gearings can be supplied.

When the shaft has turned through 300° it is stopped and held, but interruption of the motor supply at any time results in a spring driving the shaft back to the start position. Alternative models can either run continually without re-setting, or turn through 360° and then stop until a switch is changed over when it will make a further revolution. These units have speeds down to one revolution per week.

PORTABLE CO₂ TESTER

PRODUCTION of a portable CO₂ tester is announced by James Gordon & Co. Ltd., of Stanmore, Middlesex. Built in a light steel case with removable front, the Mono portable tester is fitted with a four-inch dia. dial type indicator graduated in percentage CO₂. An absorption bottle in the case contains a solution of caustic potash on top of which is a small quantity of oil.

Mounted alongside the gauge is a cock with three operating positions and below this is a visible gas filter, the filling of which can be renewed as necessary. Under the gas filter is a

nipple for fixing the rubber tubing which connects to the point of sampling. The absorption bottle is connected to the instrument by means of rubber tubes and a handball is provided for the aspiration of gas into the tester.

With the cock in position 1 the gas sample is drawn into the absorption bottle. The cock is then turned slowly through position 2, in which any excess pressure is released, into position 3 which connects the bottle to the gauge. By shaking the bottle the CO₂ in the gas is absorbed by the caustic potash, producing a partial vacuum which is indicated on the gauge as percentage of CO₂.

The oil on the caustic potash prevents partial absorption of CO₂, while the sample is being drawn into the bottle. When the pointer remains stationary all the CO₂ has been absorbed and the reading can be noted, after which the cock is once more passed slowly through position 2 to position 1 when the apparatus is ready for the next reading to be made.

Dimensions of the apparatus are approximately 11½ in. wide, 8½ in. high and 3¼ in. deep. Approximate weight is 6 lb.

ONE-PIECE WELDING HELMET

Goggles, a division of J. & R. Fleming Ltd., of London. As shown in the photograph, it is of one-piece construction and the shape has been streamlined to improve comfort and appearance. The deeply curved sides



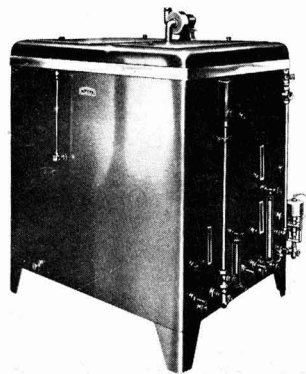
give protection against sideflash and reflected radiations and the total weight of the helmet, with filter and cover glass, is 23 oz.

The glass-holder is of shock resistant plastic and takes filters size 4½ in. by 2 in. The coloured filter is of Protex glass to BS 679:1947, and is protected by a clear cover glass.

The headband is lined with a washable sponge sweatband. An adjustable chinstrap is also fitted.

BOWSER OIL CONDITIONER

AN oil conditioner (number 832) has been added to the range of Bowser industrial equipment now being manufactured in the UK by Liquid Systems Ltd., of Croydon, Surrey. It is designed to condition turbine or other low viscosity, high-demulsibility oils containing dirt and other foreign matter and for removing water, either emulsified or 'free'.



Made in one size only, with a capacity of 45/90 gallons per hour, the model will subsequently be available with capacities up to 1,080 gallons per hour.

The manufacturers claim that it not merely filters oil but re-conditions it, making it resistant to sludging and acid formation. Operation is said to be simple and it requires little attention. Easy cleaning and complete accessibility are afforded by the removable vertical filter and dehydrating units, and the accessible cleanout connections and removable cover lids.

BOTTLE CAPSULING MACHINE

THE FRENCH-designed Astra bottle - capsuling machine is being made in Britain for the first time, by Chelle Ltd. This machine, which makes capsules from special reels of foil supplied by Venesta Ltd. and supplies them to a wide variety of closures, ranging from screwcaps to crown corks, is claimed to reduce substantially the cost of capsuling.

By producing capsules from alumi-

nium foil reels an initial saving of some 30 per cent is said to be made on the cost of raw materials. Further savings are made by combining the dual operations of making and applying the capsules on one machine. Intermediate handling, storage and packing associated with pre-formed capsules is also avoided, with a consequent saving in labour costs.

Astra machines have been made in France for some time by Esablissements Chelle. This concern has linked with Metal Closures Ltd. to form Chelle Ltd., which is now making the machines in this country.

TILE-LIKE FINISH FOR WALLS

TYLEX, which produces a tile-like finish for walls, is being marketed by Tretol Ltd., of London. It is applied like a paint but, says the company, unlike ordinary paints it does not pick up dirt or break down under atmospheric or chemical attack. It is claimed that Tylex can be used on old or new wall surfaces, in any situation where conditions such as excessive humidity, chemicals, steam, grease and oil would normally demand the use of tiling.

GENERAL PURPOSE RELAY

Works, London SE20. The relay, type MOL/GS is available in one version only. It is of moulded construction, having screw-type terminals, coil voltage—200/250v. 50~ a.c. with 2 changeover contacts—6 mm. silver rated 5 amp. at 250 v. a.c. It is priced at 31s plus 15 per cent each net. The company will not be able to accept orders of more than 12 relays at present.

ELECTRONIC AIR FILTER

THE Trion electronic air filter has recently been introduced into the UK and is being marketed by W. C. Holmes & Co. Ltd., of Huddersfield, and Harris Engineering Co. Ltd., of London. Holmes is handling industrial applications and Harris commercial applications.

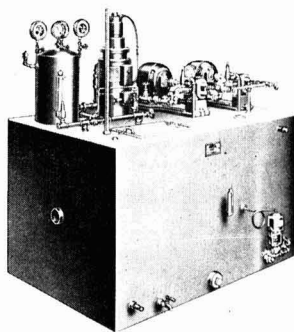
The filter, which utilises the principle of electrostatic precipitation, is said to collect airborne particles less than one hundredth of 1 micron in size.

Particles in the air receive a positive electric charge as they pass through the high voltage ionising

screen. These particles are then attracted and adhere to the collecting plates which form the negative elements of an electrostatic field set up between series of parallel plates, electrically charged alternately positive and negative. Dirt is removed from the collecting cell by opening a valve which sprays the cell with water and washes the dirt into a drain.

SELF-CONTAINED LUBRICATION UNITS

SELF-CONTAINED units for lubricating individual machines or for use as a complete circulating filtering system are being manufactured by Liquid Systems Ltd. of Croydon, Surrey. These units (Bowser No. 829) are compactly designed with the filter, necessary pumps, pressure tank (where used) and piping all mounted on the storage tank.



The dual self-contained units are suitable for installations where quantities of sludge, water or other foreign substances are present in the oil. By using two receiving tanks, the foreign substances in one batch of oil are permitted to precipitate while the clean oil in the other tank is being circulated through the system. Dual tanks are supplied with steam coil, temperature regulator, clean out, draw-off cock, oil level indicator, thermometer and threaded connections for attaching the necessary piping.

CEMENTABLE PTFE TAPE

CHEMICAL treatment of one surface of PTFE tape has overcome its non-stick properties and it is now possible to bond it to a variety of materials using readily available adhesives. The bonded film is impervious. It will stand up to high frequency spark testing and has a temperature range of -110°F to $+500^{\circ}\text{F}$.

It is claimed to be inert to all chemicals except molten alkali materials and fluorine. Water absorption is zero

and the static co-efficient of friction against polished steel 0.09 to 0.12. Cementing of the tapes to various shapes of metal can be carried out with unskilled labour.

Details of the new range are available from Hydralon Ltd., Southampton.

SPRING MOULD LUBRICANT

AMBERSIL, a silicone spray mould lubricant, is now being produced by Amber Oils Ltd., 11a Albermarle Street, London W1.

The silicone fluid on which Ambersil is based is too expensive for application without a carrier. It is therefore applied as a spray under pressure from a propellant contained in an aerosol pack.

Apart from its uses as a mould release agent for plastics, including thermoplastics, thermosetting plastics, laminating resins, synthetic rubber and other polymers, the makers claim that Ambersil can be used in zinc alloy and aluminium die-casting, giving improved finish and decreased cycle time compared with conventional methods.

Other suggested uses are in rubber manufacture, baking, packaging, printing, welding and cutting.

The low surface tension of Ambersil allows it to coat and lubricate highly finished surfaces to which usual oils cannot adhere.

ARKON FLOW INDICATOR

A SIMPLE indicator which shows at a glance whether flow of liquids is taking place, is made by Walker, Crossweller & Co. Known as the Arkon flow indicator, it is supplied to fit pipe sizes from $\frac{1}{2}$ inch to three inches.

The bronze cast body contains the only moving part, a vertical spindle element with an impeller at the bottom in the flow region and a chromium-plated ring at the top, situated under a toughened glass dome. The dome fits on to the body and is held in position by a screw cap. It stands completely clear of the liquid as it flows through the pipe. If the flow stops, the ring stops spinning, thus giving an immediate warning. The movement is so definite that, it is claimed, it cannot be mistaken or misread and it can be clearly seen from a distance even in bad light.

The Arkon flow indicator is suitable for operating at pressures up to 40 to 50 lb. p.s.i. and can be fitted at any point in the circuit in a horizontal pipe line.

TRANSMISSION DENSITY OF LIQUIDS

PHOTOMETERS and densitometers made by Baldwin Instrument Co. Ltd., Brooklands

Works, Dartford, Kent, are described in a new leaflet (No. 117/2) produced by the company.

The comparator densitometer is described as a new instrument, and in conjunction with the Photometer MNB, is used for measuring the transmission density of liquids. It may also be used for many purposes requiring accurate control of a liquid.

Fitted with eight spectrum filters, the comparator densitometer enables the operator to select a filter of the desired wavelength to give an absorption maximum for the material under measurement.

Suggested applications include the measurement of effluent from dairies, paper mills, etc., together with the measurement of water and other liquids and the comparison of transmission densities of translucent solids.

AUTOMATIC CAMERA MICROSCOPE

A NEW automatic camera microscope made by Carl Zeiss of Western Germany

will shortly be available in this country. Known as the Ultraphot 11, this instrument is claimed to be suitable for visual observation as well as photomicrography and in addition it can be used for microprojection on to a ground glass screen, making it useful for instructional purposes.

A feature of the Ultraphot 11 is the fully automatic photographic mechanism which is said to eliminate the difficulties of computing exposures in photomicrography.

United Kingdom agents for the camera are Degenhardt & Co., 32 Maddox Street, London W1.

RUST AND SCALE REMOVER

A PRODUCT tetrasodium TeTrine, for removing rust and scale from iron and

steel has been developed by the Glyco Products Co. Inc., Empire State Building, New York 1, NY, U.S. This will work without previous removal of paint, grease or other deposits. It can also be used for cleaning brass, copper, magnesium and other metals and for strip phosphate coatings.

It is composed of tetrasodium TeTrine 33 per cent, sodium hydroxide 63 to 66 per cent, foaming agent $\frac{1}{2}$ to 1 per cent. This is dissolved in water and the part to be treated is immersed in the solution formed and heated to boiling point. This is fol-

lowed by rinsing in hot water and drying. If the part is not to be surface-finished, it may be covered with a light protective oil.

NEW PITCH INHIBITOR

A PRODUCT (Amber PC 115) for pitch control in the making of paper and roofing

and in processes where wood in defibrators is used is announced by Amber Industrial Chemical Treatments, a division of Amber Pharmaceuticals Ltd.

A balanced formulation of calcium, iron and metallic ion sequestering agents, it inhibits the formation of pitch deposits by preventing, rather than by dispersing, the agglomeration of pitch particles. It is supplied in 10, 25 and 45 gallon drums.

CANADA'S CHEMICAL MAKERS EXPECT HIGHER SALES THIS YEAR

CANADIAN chemical industry, according to a number of leading officials of the industry, is anticipating further expansion in 1957. Sales for the year 1956 have recorded gains generally and plant expansion programmes are planned by several divisions of the industry.

Mr. H. Greville Smith, president of Canadian Industries Ltd., Montreal, in a new year's comment, said that the favourable business outlook for 1957 suggests that a further increase in employment and output in the chemical industry is in prospect for the coming year. The industry's ability to participate in the growth of the Canadian market should be strengthened by the substantial enlargement of capacity which has taken place during the past few years.

Foreign Competition

Despite keen competition from foreign suppliers, who obtained a considerable share of the more than 10 per cent increase in chemical consumption in Canada last year, the industry continues to enlarge and modernise its facilities. Investment outlays in 1957 should fall not far short of the near-record amount spent for this purpose in 1958.

According to Mr. L. D. Smithers, president of Dow Chemical of Canada Ltd., Canadian manufacturers have good reason for optimism in 1957. The future, however, is somewhat less certain than it was last year at this time. He said:

'We expect the demand for chemicals to remain strong, and we are anticipating some increase in our sales.

Revised Standards Reflect Improvements in Materials

THE British Standards Institution has just issued the first four of a series of revisions of standards for solvents and allied products: Ethanol (B.S. 507: 1956), *n*-Butanol (B.S. 508: 1956), *n*-Butyl acetate (B.S. 551: 1956), Ethyl acetate (B.S. 553: 1956). Those standards in the series which are now five or more years old are either in course of revision, or their revisions are about to be started.

Changes in the specification limits reflect improvements in the qualities of material now available and considerable clarification has been achieved in the details and presentation of the test methods.

Copies may be obtained from the Institution, 3s each.

We are not expecting a significant increase in earnings because chemical prices do not seem to be keeping pace with rising costs of our raw materials and labour.'

Record Sales

President of Union Carbide Canada Ltd., Mr. A. A. Cumming, stated 'Sales of Union Carbide Chemicals reached record levels in 1956. This increase in business was aided by our continuing plant expansion programme and by the strengthening demand for our products which include alloys, chemicals, industrial gases, plastics, carbon products and consumer products.'

'Canada's large capital investment programme, said Mr. Herbert H. Lank, president of Du Pont of Canada, one of the mainstays of our economy, is indirectly contributing to a rise in Canadian manufacturing costs which are increasing faster than those of competitor nations, thus placing our manufacturing industries at a disadvantage in both domestic and foreign markets. The premium on Canadian funds aggravates the difficulty.'

High Level Assured

Nevertheless, a high level of industrial activity would seem assured in Canada in 1957 because the demand for goods and services continues to exceed the country's ability to meet that demand.

'Business expansion in 1957 will probably be on a more selective basis than recently and it is unlikely that the rate of growth in the chemical industry will be as rapid as during 1956.'

● **THE HON. SIR FRANCIS HOPWOOD**, a managing director of the Shell Petroleum Co. Ltd. and a principal director of N. V. De Bataafsche Petroleum Maatschappij, is to retire on 30 June, 1957. He will remain a director of Shell Transport and Trading Co. Ltd. and of Shell Petroleum Co. Ltd.

He will be succeeded in his managing directorships by Mr. H. Wilkinson, president of Canadian Shell Ltd.

● New manager of the industrial engineering department of the British Thomson-Houston Co. is Mr. W. Spence who succeeds Mr. W. J. Pool. Recently Mr. Pool has studied nuclear power projects and he has relinquished the managership of the department to concentrate on this subject.

● **MR. H. W. ROCKE**, managing director of Mobil Oil Co. Ltd., has accepted an invitation by the committee of the Oil Industries Club to become president of the club for 1957. Formed in 1925, the club is designed to bring together the persons and firms engaged in the oil and allied industries. In addition to the annual dinner



and the annual dinner/dance, the club organises about 10 luncheons during the year, at which addresses are given by people prominent in a wide range of activities.

● **DR. HENRY PHILLIPS** retires at the end of this month after 10 years as director of research and secretary of the British Leather Manufacturers' Research Association, Milton Park, Egham. He will be succeeded as director of research by **DR. K. W. PEPPER**, deputy director since 1953 and as secretary by **MR. A. GORDON BEVAN**. During the war, Dr. Pepper was in charge of research on plastics and high polymers at the DSIR Chemical Research Laboratory, Teddington. After the war his work at Teddington was mainly directed to a broad study of ion exchange resins.

● **WILLIAM G. HULL**, for the past two years associate editor in charge of the London office of the American Chemical Society applied publications, is returning next week to the US to take charge of the New York editorial office. He has served as secretary of American Scientific and Technical Representatives (in Europe) and is a member of the Society of Chemical

People in the NEWS

Industry, of Dechema (Germany) and of the Société de Chimie Industrielle (France), and a fellow of the Chemical Society. **ALBERT S. HESTER** will replace Mr. Hull in the European editorial office, which is in London.

● **MR. GORDON W. MCBRIDE**, chemical engineering consultant, has joined the Washington, DC, staff of Carbide and Carbon Chemicals Co., a division of Union Carbide & Carbon Corporation. Previously he was with Procter & Gamble Co., Cincinnati, where he took part in the development of the first successful continuous soap making process.

● **MR. HUGH MICHAEL SELLS** has been appointed field manager of the Scottish District of British Oxygen Gases Ltd. The appointment took effect from 1 January, and Mr. Sells will be based at Glasgow.

● **MR. W. PITKETHLY** has been appointed manager of the purchases and supplies department of The British Aluminium Co. Ltd. from 2 February, in succession to **MR. R. L. C. McDONALD**, who retires from the company's service on that date.

● **MR. B. R. HOOK** has been appointed sales director of Price's (Bromborough) Ltd. in succession to



B. R. Hook

MR. W. G. BURNETT, who retired from the board in December 1956. From 1 January, **MR. A. VICKERY**, M.Sc., has been appointed home sales manager jointly with **MR. T. A. WINNEY**. Mr. Vickery will be responsible for

the Northern area of the UK and Mr. Winney for the Southern area. **MR. R. E. DAVIES**, M.A., assistant sales manager of the chemical sales department of Joseph Crossfield & Sons Ltd., an associated company of Unilever Ltd., has been appointed commercial sales manager of Price's (Bromborough) Ltd.

● **MR. R. T. DE POIX** has been elected chairman of the Zinc Development Association for 1957. Mr. de Poix is the managing director of Henry Gardner & Co. Ltd., and represents the Canadian zinc producers—the Consolidated Mining & Smelting Co. of Canada Ltd., and the Hudson Bay Mining & Smelting Co. Ltd.—on the council of the association.

● **Shell-Mex and BP** have appointed **MR. A. C. DURIE** as general manager (administration). He succeeds **MR. A. L. KING** who will become general manager (sales) on the retirement of **MR. A. M. MACKINTOSH** in March.

● **DR. W. I. PUMPHREY**, Ph.D., M.Sc., research manager of Murex Welding Processes Ltd., Waltham Cross, Herts.



has been awarded the degree of D.Sc. in industrial metallurgy by the University of Birmingham for his work on hardenability, the transformation of steel during continuous cooling and the metallurgy of welding. Dr. Pumphrey is a member of a number of scientific and technical societies and is the author of numerous papers on metallurgical subjects.

● **PROFESSOR B. S. PLATT** has succeeded **PROFESSOR S. J. COWELL**, who has retired from the Food Standards Committee, Ministry of Agriculture, Fisheries and Food. Dr. Platt is Professor of Human Nutrition at the London School of Hygiene and Tropical Medicine.

● With the aim of advancing the latest managerial techniques of control, The United Steel Companies Ltd. is establishing a new central department of operational research and cybernetics at Sheffield. **MR. STAFFORD BEER**, formerly production controller, Samuel Fox & Co. Ltd. (a United Steel subsidiary) has been appointed head of the new department. He will work under the general direction of **MR. S. R. HOWES**, a director of United Steel.

(Continued on p. 134)

Overseas News

MEXICAN FIRM ENTERS CHEMICAL FIELD WITH NEW FORMALDEHYDE PLANT

CONSTRUCTION of a new chemical plant near Mexico City for the manufacture of formaldehyde and the formulation of synthetic resins derived from that intermediate raw material has been started by Celanese Mexicana, SA, an affiliate of Celanese Corporation of America.

The new plant, located 12 miles north of Mexico City at San Cristobal Ecatepec, will supply Mexico's growing needs for components used in the manufacture of plastics and the finishing of various textile products. The planned production of formaldehyde marks the entry of Celanese Mexicana into the chemical producing field.

Additional facilities will be constructed at San Cristobal Ecatepec to house certain Celanese Mexicana manufacturing and storage operations now located in Mexico City. These include units for the production of polyvinyl acetate emulsions and the production of polyester resins, as well as a chemical storage tank farm. The company's other plastics manufacturing facilities will remain in Mexico City.

Celanese Mexicana's production range now includes Cellophane, acetate plastic sheet and film, polythene sheet, film and tubing, polyvinyl acetate emulsions, purified cellulose made from Mexican cotton linters and fabricated polyester resin products.

US Refinery Planned

CONSTRUCTION of a refinery near Everett, Washington, with a daily capacity of 60,000 to 100,000 barrels is planned by Standard Oil Co. of California. A statement by the president, Mr. T. S. Petersen, estimated that the refinery would cost Standard a minimum of £65 million.

Increase in Italian Sulphur Exports

DURING the financial year 1 August 1955 to 31 July 1956 a considerable increase (8.4 per cent) was registered in the sales of sulphur. These totalled 117,078 tons compared with 107,919 tons for the previous financial year. Italian sulphur exports showed a spectacular improvement. For the financial year ending 31 July 1956, 91,576 tons

of sulphur were exported compared with 10,157 tons for the previous year. This exceptional increase in Italian exports of sulphur is accounted for, it is stated, by the unsatisfactory sulphur situation in 1954-1955 and also by the fact that the number of countries purchasing Italian sulphur has been doubled.

Czech Research Project on Aromatic Insecticides

REACTIONS of insects to various odours have been studied by a Czech biologist, Jaromir Pospisil, at the Academy of Sciences in Prague, according to a UNESCO report. He has found for instance that flies are attracted by the smell of lactic acid in foods and repulsed by various chemicals such as menthol.

The research project aims at finding specific aromatic chemicals for use in insecticides which would not eliminate certain useful species of insects, and at developing other chemicals, repulsive to the insect's sense of smell, which would prevent them from attacking foodstuffs.

New Container for Fused Soda Ash

PURITE fused soda ash for foundry use is now being shipped by Olin Mathieson Chemical Corporation in non-returnable pallet boxes, specially designed to reduce car-unloading time by as much as 90 per cent, compared with bag and bulk shipments. Each container holds 700 lb of fused ash, the boxes being of open-top wooden construction.

Peru Plans Plant for Alkalis in Huacho

PLANS for the installation of a factory to manufacture calcium carbonate, caustic soda and other alkalis in Huacho, some 100 kilometres north of Lima, Peru, are well advanced. W. R. Grace & Co., heads a group of well-known industrialists who are said to have subscribed some 100 million soles capital for the project. Initial production this year will be at the rate of 10,000 tons a year.

Installation of a factory for the manufacture of calcium carbide is planned by Hornos Electricos Peruanos S.A., Edificio Tacna, Dept. 85, Lima.

It is reported that in return for a concession of a discount of 5 per cent on Government purchases of the factory's products, this company have obtained authorisation for duty-free importation of necessary machinery and equipment.

Israeli Research Project

UNDER the joint sponsorship of the Government, the US Operations Mission, the Israel Institute of Technology and the Rubber & Ceramics Research Association, construction of an IL 100,000 laboratory for rubber and ceramics research is to be started shortly in Haifa.

US Sulphur Output Reached Record Level

PRODUCTION and consumption of sulphur in the US reached new levels in 1956 and exports were near the record amounts of the past few years.

Output of sulphur from all sources increased to an estimated 7,875,000 long tons, or 825,000 tons more than in 1955, according to a report by Langbourne M. Williams, president of Freeport Sulphur Co.

More than four-fifths of the total production came from the salt dome deposits of Louisiana and Texas. These deposits, which are mined by the Frasch process, produced an estimated 6,450,000 tons compared with 5,750,000 tons in 1955. Of the balance of the supply, 500,000 tons represented sulphur recovered from gases, 425,000 tons sulphur contained in pyrites, and 500,000 tons sulphur in various forms from other sources.

Consumption of sulphur in the US was estimated at 5,900,000 tons compared with 5,650,000 tons in the previous year, and exports were expected to about equal the 1,600,000 tons shipped in 1955.

Colombia Conference on Atomic Projects

AT THE END of November a group of US atomic scientists visited Colombia to discuss nuclear development in that country. Barranquilla has been provisionally selected as a site where the construction of a nuclear power station might be an economic proposition.

Chairman of the Atomic Energy Commission of Greece, Admiral

Spanides, recently visited the US for discussions with the US Atomic Energy Commission's Chairman, Admiral Strauss. He took delivery of a reactor for use by the armed forces for experimental purposes.

In Switzerland a new company, Atomelektra AG, has been set up with the ultimate object of constructing an atomic power station. Elektro-Watt AG is stated to be behind the venture.

The State Power Board in Sweden has filed an application with the Swedish Ministry of Commerce for building and operating a commercial nuclear energy plant. The 75,000 kW plant will be used for district heating at Vasteras, central Sweden, and it is planned to go into operation in 1960.

German Polythene Production

IN THE COURSE of the next three years, the annual output of polythene (or Lupolen H as it is known in Germany) from the Rheinische Olefinwerke, Wesseling, near Cologne, is to be raised from 10,000 tons to 35,000 tons. There is a favourable market for polythene in Germany.

Mexican Caustic Soda Firm Links with Dow Chemicals

LEADING PRODUCER of caustic soda, Productos Químicos Mexicanos, SA, is now associated with the Dow Chemical Co. Inc. This association will enable the Mexican company to double its production. Dow Chemical Co. will hold 50 per cent of the holdings of the reconstituted Mexican company and Productos Químicos, the remainder.

New Rome Refinery

SOCIETA Purfina Italiana and the ENI group of companies will jointly build a new refinery near Rome. Each participant will contribute 50 per cent. To be known as Raffineria di Roma, the new refinery will replace existing refineries in Rome which will be closed for reasons of town planning.

Olin Mathieson to Make Unsym. Dimethylhydrazine

LAKE CHARLES, La., plant operated by the industrial chemicals division of Olin Mathieson Corporation, has started production of unsymmetrical dimethylhydrazine, in addition to hydrazine hydrate, anhydrous hydrazine and other hydrazine derivatives.

Unsymmetrical dimethylhydrazine is a strong reducing agent that is useful in aviation fuels, as an oxygen scavenger

and anti-skinning agent in paints. It may also have value in the separation of acidic gaseous mixtures.

A colourless, hygroscopic liquid, it has an amine type odour, a boiling point of 63.1°C, freezing point of -57.15°C and specific gravity of 0.782. Although chemically reactive, it can be handled safely by observing ordinary precautions for flammable and corrosive liquids.

New Russian Process for Tantalum/Titanium Separation

A NEW PROCESS for the separation of tantalum from titanium was described recently in the Russian journal *Zavodskaya Laboratoriya*. Organic solvents are used to separate out the tantalum. It is stated that complete separation of the tantalum from the titanium can be achieved within a few hours, and at the same time complete extraction of the tantalum is obtained even when niobium is present. The solvents in the process are fluoride compounds, with the addition of cyclohexane in a solution of sulphuric acid.

Pakistan Fertiliser Plant

IT IS REPORTED that the Pakistan Industrial Development Corporation intends to set up a fertiliser factory in East Pakistan to be run on Sylhet natural gas. US, Japanese, French and Italian firms are already interested; the Italians and US are reported to have submitted bids for a 'turn-key' job.

Waste Convention to be Held in Indiana

THE 12th Purdue Industrial Waste Conference will be held on 13, 14, and 15 May 1957 in the Purdue Memorial Union Building, Purdue University, Lafayette, Indiana, US. Approximately 50 papers will be presented on subjects dealing with industrial wastes and their treatment.

Hotel reservations can be made at the Purdue Club, Fowler Hotel, Cedar Crest Hotel and Morris Bryant Hotel and registration blanks will be sent on request.

Refractories from Titanium & Zirconium Tailings

HIGH-GRADE kyanite-sillimanite products have been recovered from tailings obtained at plants producing

titanium and zirconium minerals, says a report from the US Bureau of Mines. Tests carried out by the Bureau at its research station, Tuscaloosa, Alabama, show that these tailings can be treated by magnetic flotation to produce a concentrate containing nearly 96 per cent kyanite and sillimanite. Both these materials can be used for making refractories.

Chilean Nitrate Loss

IT IS REPORTED that the 83-day strike at the Anglo-Lautaro Nitrate Corporation plant represents a loss of 280,000 tons of nitrate. The company has obtained a loan of US \$10 million from the Eximbank for the purchase of American machinery and equipment to expend its plant etc.

New Aluminium Plant for Montecatini

MONTECATINI Co. has decided to build a factory at Crotona in Southern Italy for the production of aluminium. This, the first plant of its kind in Southern Italy, will be erected with an eye to possible future expansion.

The new venture will increase considerably the possibilities of employment in this not yet fully developed area. It was Montecatini that began industrialisation of Crotona 31 years ago by building their first fertiliser factory there.

Israeli Bromide Plant

IT IS stated that the new £500,000 bromide plant at Sodom, on the Dead Sea, is expected to double its present capacity of 1,000 tons a year when a secret Israeli patent is introduced which economises in the use of steam.

32% Rise in Italian Mercury Ore Output

IN THE first ten months of 1956 244,000 tons of mercury ore were mined in Italy, an increase of about 32 per cent compared with the 188,500 tons recorded during the corresponding period of 1955.

During the same period the production of metallic mercury reached 1,746 tons or about 15.7 per cent more than during the first 10 months of 1955 (1,508 tons).

New Telephone Number

THE telephone number of DSIR's Building Research Station has been changed to Garston (Herts) 4040.

EYE INJURIES IN CHEMICAL WORKS

Prevention and Methods of Treatment

By K. P. Whitehead, M.R.C.S, L.R.C.P

IN 1955, in three large factories with a total population of approximately 4,500, the overall number of eye injuries from all causes was 1,163. Although it is true that the majority of these injuries were due to airborne foreign bodies of various sorts, 129 of these were caused by chemical splashes. Eight of these were lost-time accidents. When it is considered that 97 per cent of chemical eye injuries are treated entirely in the medical department, it will be appreciated that lost time occurs only in extreme cases. Of these eight, in fact, one man lost his eye and was fortunate not to lose the other. During the same period, at a factory employing about 400 men there were a total of 139 eye injuries and 44 of these were due to chemical action. It would appear from these figures that in 12 months one in three of the population report to the medical department with an eye injury and that at least 10 per cent of these injuries are caused by chemicals.

Accident Rate Reduced

Over the last ten years there has been a great improvement in the incidence of eye injuries in the chemical factories on Merseyside but these are still formidable. A great deal of the responsibility in keeping the incidence of eye injuries at a low level obviously rests with the individual on the plant. Protection of the individual is only the second line of defence, the first being to remove the risk. *Good plant design* should aim at preventing the escape of noxious substances from the process into the atmosphere where they can injure the workman. The ideal situation is that all chemical processes should be enclosed and remotely controlled and ventilation should be sufficient to remove fumes, gases, dusts and smoke. Where liquids have to be transferred from one vessel to another, this should be done by vacuum suction or by gravity feed, rather than by pumping under pressure, providing this is technically possible. If there is pressure on a pipeline and the pipe breaks, liquid will be sprayed over the surrounding area, but if the pipeline is under vacuum or is carrying fluid by gravity this is less likely to occur and the risk of contamination or splashes is reduced to a minimum. Now and again the unexpected happens and a sight glass breaks, therefore, it is advisable to have these checked at convenient intervals.

Another important preventive measure is to replace as far as possible all *cinder paths* with tar macadam or concrete and loose surfaces with grass. Foreign bodies

PREVENTION and treatment of eye injuries in a chemical works have always been a matter of great concern to management, safety and medical departments. In all matters pertaining to the eye the ophthalmologist should always be regarded as the expert. However, it is probably true to say that the medical officer and nurse within industry, by reason of their environment, have greater opportunity of seeing the immediate effects of chemical action on the eye than their colleagues in other branches of medicine. This paper by the Medical Officer, Imperial Chemical Industries Ltd. and Medical Adviser, Albright & Wilson Ltd., Widnes Works, was read at the First Albright & Wilson Medical Services Conference. It deals with the possible action of chemicals on the eye, emphasises the need for efficient and immediate treatment and suggests ways of preventing such injuries.

in the eye are frequent occurrences in all situations, but it must be remembered that in chemical factories every foreign body is potentially contaminated. By planting grass there is a considerable reduction in the number of foreign bodies likely to be carried in a high wind. Not only is this a protective measure, but also an improvement in the general layout of a chemical factory.

Protecting the Individual

Having done all that is possible in plant design, the next stage is to *protect the individual*. The ideal situation is that eye protection of some sort should be worn by everybody in the factory, even though they may not be in the proximity of dangerous or hazardous processes. People who normally wear spectacles are not nearly as prone to foreign bodies in the eye as those with normal vision.

In general use at the present time is a pair of spectacle type goggles made of nylon, which is extremely serviceable, is comfortable to wear and will give about 90 per cent protection. The process worker, however, often requires more protection than this and a selection of protective appliances is available from which to select the best type. In dealing with liquids, for example, face shields or visors are ideal and in dealing with gases or liquids which also have a gas hazard the chemical gas-tight goggle is essential. Whatever type is selected, two points should be remembered. The first is that one pair of spectacles will not fit every face and that, if possible, there should be some effort made to have an adequate fitting service. Secondly, goggles must be well looked after, they must be clean and must not mist up too easily. It is advisable, therefore, to introduce a servicing department for cleansing, demisting and repair of protective goggles.

A particular problem in industry is the one-eyed man. If he becomes involved in an accident affecting his good eye the disaster of total blindness may befall him. Such an occurrence can be forestalled by providing free of charge, all one-eyed or potentially one-eyed men with spectacles fitted with unbreakable corrected lenses. The only condition which is laid down in providing these glasses is that the recipients must wear them. In this respect it is of interest that at the Widnes factory of

Albright & Wilson there are at present employed 11 one-eyed men.

Some factories in Widnes have devised a scheme in which their plants are labelled either 100 per cent or 75 per cent goggle-wearing areas and no person is allowed in these plants unless wearing the appropriate eye protection. It is understood that this scheme is meeting with some success in reducing the risk of eye injuries.

Propaganda in the form of posters, lectures to foremen, plant managers or groups of workers and discussion at Works Council all helps to bring home to those concerned the necessity of protecting the eyes from injury.

In any discussion on prevention there are, in the writer's opinion, two other factors of paramount importance—supervision on the plant and the education of the worker. Plant managers and foremen, when going round the plants, should always be on the look out for men not wearing their eye protection. A considerable number of defaulters will be found. At one factory of about 1,000 strong in 1955 there were 35 chemical eye injuries. Of these 26 had failed to wear their eye protection, i.e. 75 per cent. Among them you will find those who habitually disobey orders and regulations, many of whom sooner or later find themselves in hospital. The only measure one can take is a disciplinary one. Fortunately, this type of worker is in the minority but there is always the irresponsible type who doesn't really see the need for protection and regards the wearing of goggles as a nuisance. He is the man who tackles a job without his goggles either because he doesn't realise the danger or is prepared to chance it.

It is obviously the duty of someone in authority to talk to this type of man and explain to him the risk he is running and to make him clearly understand that the

wearing of goggles is part of his job and that in not doing so he is breaking the law. Section 119 of the Factories Act states that where any means or appliances for securing health or safety is provided for the use of any such person under this act, he shall use the means or appliance. The man should surely be told that any recurrence of such behaviour will be regarded as a serious offence.

A certain proportion of the men employed are men who have never been in a chemical factory before. These are the people who are most easily educated, as they are unbiased by previous experience in other factories. They should be shown how to wear their goggles and how to apply nil mist. Where spectacles are worn under goggles nil mist should be applied to both sides of the spectacle lenses. It should not be forgotten that the habitual wearing of eye protection by senior members of the staff serves as an example to the rest of the population and as a constant reminder that whatever a man's status in the factory he only has two eyes.

While the external action of chemicals on the eye is the main concern at the same time it should be remembered that certain chemicals by slow cumulative action within the body, following ingestion, inhalation or absorption through the skin may likewise cause severe eye injury and may give rise to characteristic changes in the ocular apparatus.

Lead is perhaps a good example of a material used throughout all types of factories which is known to be toxic and over which rigorous control must be exercised. The control has been so effective that it is rare to meet cases of lead poisoning nowadays but it can be responsible for an albuminuric retinitis. Other chemicals which can cause injury to the eye by internal absorption are carbon bisulphide and the well-known methylated spirit or red biddy. (To be concluded)

Publications

Spectrochemical Analysis Apparatus by Hilger & Watts

FIVE NEW CATALOGUES describing a complete range of apparatus for emission spectrochemical analysis, have been issued by Hilger & Watts Ltd., 98 St. Pancras Way, Camden Road, London NW1.

First of the catalogues, which are numbered CH.401 to CH.405, gives a general introduction to spectrochemical analysis, describing the method, discussing the results obtainable by its means, and suggesting the instruments needed for particular types of analysis. This catalogue could be considered a useful introductory text on spectrochemical analysis.

Source units and electrode-holders as well as descriptions of other supplementary instruments are dealt with in the second catalogue. The instruments described have been found to provide carefully controlled and accurately reproducible source conditions.

Photographic spectrographs, including prism and grating instruments are described in the third catalogue. Spectrographs for Raman studies, vacuum work, or astronomy are dealt with in other catalogues.

The fourth catalogue is concerned with interpretation equipment, such as microphotometers, compara-

tors, measuring microscopes etc. The last catalogue deals with direct-reading spectrographs which are now of considerable importance in the metallurgical industry.

Tetrapotassium Pyrophosphate

A REVISED and expanded technical bulletin on tetrapotassium pyrophosphate (TKPP) has been published by the Westvaco Mineral Products Division of Food Machinery and Chemical Corp., Chrysler Building East, 161 East 42nd Street, New York 17, NY. The bulletin lists typical analysis and properties, rate of solution and vapour pressure of hydrates, together with the use of TKPP in detergents, synthetic rubber, latex-based paints and water treatment. Because of its high solubility and building characteristics, claims the bulletin, TKPP increases the detergency efficiency of liquid soaps and shampoos. Its ability to sequester calcium and magnesium ions aids in promoting the clarity of such soap based detergents. TKPP forms soluble complexes with ferrous iron and this property is used in the preparation of the catalyst activator for synthetic rubber from ferrous sulphate. Wherever the lower solubility of tetrasodium pyrophosphate is a disadvantage it is suggested that TKPP be used instead.

INDIA'S PLANNED EXPANSION OF HEAVY CHEMICALS PRODUCTION

by Our Special Correspondent

MUCH progress has been made in the past 10 years in building up India's heavy chemical industry, particularly the alkali chemical section. This was stated by the Minister for Heavy Industries at a recent meeting of the Development Council for Heavy Chemicals (Alkali) of the Ministry of Commerce and Industry at Calcutta.

He described the programmes contemplated by the Government of India for the expansion of the heavy chemicals industries during the second Five Year Plan.

Table 1 gives production figures for some chemical industries in 1951 and 1955, and the targets for 1961. These targets are tentative and represent only the minima for each industry. In addition to these chemicals there are others which have been produced for the first time in the country, the output of which has increased considerably in recent years.

Table 2 records the 1955-56 production figures for some important industries employing heavy chemicals, together with the targets for 1960-61.

TABLE 1—Production Figures and Targets for some Heavy Chemicals (Tons)

	Production during		Target for 1961
	1951	1955	
Ammonium sulphate	52,600	393,090	1,600,000
Super-phosphate	61,000	74,160	720,000
Sulphuric acid	106,930	164,840	470,000
Soda ash	47,530	77,270	230,000
Caustic soda	14,720	34,250	135,400
Liquid chlorine	—	11,570	17,000
Bleaching powder	3,580	2,700	15,000
Dichromates	3,270	2,930	6,000
Sodium bicarbonate	1,630	4,130	8,000
Potassium chlorate	1,590	2,140	3,800
Calcium carbide	—	3,110	24,000
Alum	2,460	4,370	50,000
Aluminium sulphate	19,350	27,690	
Copper sulphate	500	1,040	3,000
Ammonium chloride	—	1,680	5,000
Acetic acid	—	2,370	—
Benzene hexachloride	—	1,600	3,000
DDT	—	170	3,000
Hydrogen peroxide	—	—	1,500
Sodium hydrosulphite	—	—	1,500

To achieve these targets, a much speedier fulfilment of the targets set for heavy chemicals is required.

This article summarises some of the steps the Indian Government proposes to take to achieve the targets indicated for heavy chemical industries.

Ammonium sulphate Present production at Sindri Fertilisers Ltd. will be increased. Urea, ammonium nitrate and ammonium phosphate will also be manufactured at Sindri as well as at Travancore Chemicals and Fertilizers Ltd. Further manufacturing units are being set up at Bhakra Nangal, Rourkela steel works and at the Neivelli lignite project.

Superphosphates Annual capacity for superphosphate production in 14 plants was 47,000 (P_2O_5) tons. Licences have been issued to seven other plants having an annual capacity of 60,000 (P_2O_5) tons.

14 Units Licensed

Sulphuric acid There are 37 units with a production capacity of 245,000 tons a year. Licences have been issued for 14 units (some of them expansion schemes) for an additional capacity of 240,000 tons. As recommended by the Development Council for Heavy Chemicals (acids and fertilisers) the size of the units to be installed has been raised to 50 tons per day or more. The Government are considering the setting up of units for the manufacture of sulphur from indigenous raw materials, mainly pyrites; gypsum and sodium sulphate are the other raw materials available. It is hoped to instal one or two units to produce at least 30,000 tons of sulphur during the second Five Year Plan period.

Soda ash Only two plants with a total capacity of 80,000 tons of soda ash are operating at present. Two large factories are to be set up in the immediate future and a factory to produce 400 tons per day of soda ash will be built at Porbandar (Saurashtra State). Tata Chemicals has already increased production to 200 tons a day and is planning to produce 400 tons a day. Another unit to produce soda ash by the modified Solvay process is also to be set up. When these units go into production, the current needs of soda ash will be fully met.

There is no production of heavy soda ash in the country at present and

40,000-50,000 tons are being imported to supply glass and dichromate industries. Schemes have been drawn up by the Government for the production of this chemical.

Caustic soda and chlorine Although the present capacity of the 12 units of the caustic soda industry is only 45,000 tons, licences have been issued for the expansion of the existing units and the setting up of eight new units, giving a total additional capacity of about 113,000 tons. The size of future units has also been raised. Caustic soda of high purity will be manufactured.

Demand for chlorine has been steadily increasing as a result of the establishment of new industries such as the manufacture of ammonium chloride, DDT, stable bleaching powder, benzene hexachloride, dicalcium phosphate and ossein, and it is likely the demand will increase further with the stepping up of DDT production, production of rare earth chlorides and development of drug, dyestuffs and plastics industries and chemical pulp production. At the moment there is no proper utilisation of chlorine.

Calcium carbide About 4,000 tons a year of this chemical are now being produced. New units with a capacity of 20-30 tons per day are being set up at favourable locations such as Bombay and Cochin, so that this chemical is not only made available to engineering industries but is also an important raw material for the establishment of the synthetic organic chemicals industry.

Miscellaneous industries India imports Rs.15 crores worth of dyestuffs and intermediates. It is proposed that 60 per cent of the country's requirement of dyestuffs and intermediates shall be manufactured in India by the

TABLE 2—Production Figures and Targets for Industries Consuming Heavy Chemicals

	Production during		Targets for 1960-61
	1955-56		
Steel, tons	1,380,000	4,300,000	
Pig iron, tons	380,000	850,000	
Ferro-manganese, tons	28,000	160,000	
Aluminium, tons	7,500	25,000-30,000	
Paper and board tons	200,000	500,000	
Newsprint, tons	4,200	60,000	
Rayon, mil. lb.	15	68	
Chemical pulp, tons	—	30,000	
Petroleum, mil. tons	3.6	4.3	
Sulpha drugs, kg.	—	450,000	
PAS kg.	—	113,000	
Synthetic moulding powder, tons	725	11,400	
Vanaspati, tons	270,000	400,000	
Soap, tons	200,000	300,000	

end of the Second Five Year Plan period.

About Rs.35 crores worth of drugs and pharmaceuticals are manufactured in the country which includes about Rs.15 crores worth of imported basic and penultimate drugs. In the Second Five Year Plan period it is intended that 70 to 80 per cent of the annual requirements of the country shall be produced from indigenous resources.

In the plastics field schemes have been drawn up for the production of polythene, polystyrene and polyvinyl plastics. The development of the heavy organic chemical industry, based either on indigenous raw materials

such as alcohol or imported petroleum products, is expected in the near future.

The National Development Corporation is investigating possibilities for the manufacture of raw films, synthetic rubber from alcohol, phosphorus and phosphates by electrothermal process, synthetic petrol, carbon black, chemical pulp for rayon.

Production of hydrogen peroxide started recently. Units for the manufacture of sodium hydrosulphite and precipitated activated calcium carbonate have been licensed. Production of fatty acids and synthetic detergents is also under consideration.

Joint ICI/BP Search for Natural Gas

IMPERIAL Chemical Industries Ltd. has recently agreed with BP Exploration Co. Ltd., the exploration subsidiary of The British Petroleum Co. Ltd., to undertake joint exploration for natural gas in the Whitby (Yorkshire) district. In the past few months seismic reflection surveys have been carried out in this area to get more information about the strata lying deep underground. The data so obtained have been correlated with what is known from boreholes already sunk in the area to look for natural gas, and a tentative map of underground contours has been drawn.

The conclusions from the survey are held to justify further drilling for natural gas, and as a first step it has been decided to deepen a borehole at Robin Hood's Bay which was originally drilled by Fisons Ltd. in 1949/1950 during the search for potash. The limestone formations in which natural gas may be present lie several hundred feet below the potash beds.

Planning permission for the deepening of the borehole was granted at the meeting of the area planning committee held on 10 January, and it is expected that work will begin during the course of a week or two.

Otley Chemical Firm Has Secret Petrol Formula

SYNTHETIC petrol is said to have been made to a 'secret formula' by Kepec Co. (Eng.) Ltd., manufacturers of leather chemicals, Otley, Yorks. It is reported that a car powered by this 'petrol' climbed a one-in-six hill easily, performed well in traffic and had normal acceleration. If given permission, the firm could produce 10,000 gallons a week at 7s a gallon.

British Standards Vacuum Salt

A REVISED British Standard (BS 998: 1957), specifying requirements for dried and undried vacuum salt, as packed by the manufacturer, for butter and cheese making, has been published by the British Standards Institution, 2 Park Street, London W1, price 3s 6d.

Methods of Testing Plastics

PUBLICATION of BS 2782 : 1956, *British Standard for Methods of Testing Plastics. Part 1: Effect of Temperature*, launches the first part of what will become a series of test methods used by the plastics industry for assessing the quality of its products. Copies may be obtained from the sales branch of the Institution, 2 Park Street, London W1, price 10s.

Obituary

The death has occurred in Cornwall of DR. MALCOLM PERCIVAL APPLEBY, a former research director of the Billingham (Durham) Division of Imperial Chemical Industries Ltd. In 1929 Dr. Appleby was appointed a director of the company, and in 1944 when ICI was organised into divisions, he retained his seat on the board as research director. He retired 11 years ago.

The death has occurred in hospital of Mr. John A. Montgomerie (79), chairman of Montgomerie, Stobo & Co., paint and varnish manufacturers, Bridgeton, Glasgow. Born at Ochiltree, Ayrshire, he came to Glasgow 50 years ago to found the business which is now a subsidiary of the IIBE Co.

Plastics Exhibition

THE International British Plastics Exhibition will be held in the Grand and National Halls, Olympia, from 10 to 20 July this year (1957) not next year as stated in last week's issue.

People in the News

(Continued from p. 128)

● MR. RALPH D. PARKER, a vice-president of The International Nickel Co. of Canada Ltd., has been elected a director of the company in succession to Mr. JAMES S. DUNCAN, C.M.G., who has resigned from the board on being appointed chairman of the Hydro-Electric Power Commission of Ontario.

● LIEUTENANT-COLONEL L. A. M. BATES-OLDHAM has been appointed a special director of International Combustion.

● MR. PETER D. COOPER is retiring as a vice-president and director of Celanese Corporation of America, after 32 years with the company. A native of Glasgow who went to America in 1924 at the request of the company's founders to serve as cost accountant, he was previously associated with Nobel Explosives Co. and British Celanese.

● MR. E. E. HADDON has been appointed director of chemical defence research and development in succession to Mr. A. E. CHILDS who retired on 16 January.

● Two sales appointments are announced by the Chloride group of companies. MR. T. DAWSON has taken up the new post of group export sales manager and will, in addition, be responsible for commercial liaison with the group's overseas associate companies. MR. P. C. ASPINALL, who was assistant export manager, becomes the new export manager for Chloride Batteries Ltd. in succession to Mr. Dawson.

Inerto Appoints UK Agent for Ground Hectorite

PRODUCTION CHEMICALS (ROCHDALE) LTD., of 32 Deansgate, Manchester, has been appointed general agent in the UK and Western Europe of the Inerto Co., San Francisco, California, US, for the sale of its ground hectorite which is a magnesium lithium Bentonite, and Macaloid, a beneficiated purified Hectorite, used in oil-in-water emulsions, emulsion paints, cleaners and polishers, pharmaceutical and cosmetic industries etc.

Chemist's Bookshelf

FISCHER-TROPSCH SYNTHESIS DISCUSSED

CATALYSIS. VOL. 4. HYDROCARBON SYNTHESIS, HYDROGENATION AND CYCLIZATION. Edited by P. H. EMMETT. Reinhold Publishing Corporation, New York; Chapman and Hall Ltd., London. 1956. Pp. vi+570. 100s.

This volume is devoted mainly to a discussion of the Fischer-Tropsch synthesis but it also includes four chapters on closely related reactions.

The first three chapters are written by R. B. Anderson who is extremely well qualified for his task of describing in detail the main trends and concepts involved in the Fischer-Tropsch synthesis of hydrocarbons and oxygenated compounds from carbon monoxide and hydrogen. Chapter I gives a short but adequate summary of the information available about the thermodynamic feasibility of various synthesis reactions involving the hydrogenation of carbon monoxide. The information is clearly presented in a series of figures and tables and data about the formation of carbides of iron, cobalt and nickel and nitrates of iron are also given.

Chapter II is an account of the substantial body of work that has been carried out on testing catalysts, promoters and supports for their efficiency in the Fischer-Tropsch synthesis. The task of compressing and expressing the relevant information has been accomplished remarkably well. Relative merits of the various types of catalysts are clearly indicated and extensive use is made of tables and figures. Much of the information that was given in the earlier publication by Storch, Golumbic and the present author entitled *The Fischer-Tropsch and Related Syntheses* has naturally been carried forward in this chapter but particular attention is also directed to developments since that volume was published in 1951.

The third and last chapter by Dr. Anderson describes the kinetics and mechanism of the synthesis. One of the most notable contributions to this subject, which is

described in detail, is the work carried out at the US Bureau of Mines involving the analysis of products along the catalyst bed. Attention is also paid to the work of Emmett and his colleagues on the incorporation of molecules labelled with radioactive atoms in the synthesis products. Nevertheless, one is left with the impression that much work will still be required before a full understanding of the mechanism of the synthesis is achieved.

Chapter IV by L. J. E. Hofer reviews some of the physical information about the types of crystalline phases known to be of value as catalysts in the Fischer-Tropsch synthesis.

The volume concludes with four shorter chapters. The first of these is by E. M. Cohn on the isosynthesis, which was developed in Germany during the last war as a source of materials for high-octane gasoline. The main differences between this type of reaction and the standard Fischer-Tropsch synthesis are the use of certain oxides as catalysts and the proportion of branched molecules in the products, which accounts for the name 'isosynthesis.' Chapter VI by M. Greyson entitled 'Methanation' describes work on catalytic systems designed to produce methane from carbon monoxide and it is followed by a chapter by S. W. Weller in which a good account is given of the liquid-phase hydrogenation of coal.

An excellent concluding chapter by H. Steiner on the processes of catalytic cyclisation and aromatisation of hydrocarbons, although quite short, gives a clear account of the types of catalysts used and the mechanism of these reactions, which is fairly well established.

The high standard of the earlier volumes in the series is maintained. The topics covered may render it of somewhat less general interest than some of the earlier volumes but it has undoubtedly been prepared with great care and is, therefore, an important publication.

CHARLES KEMBALL

Electrostatic Precipitation

AN INTRODUCTION TO ELECTROSTATIC PRECIPITATION IN THEORY AND PRACTICE. By H. E. ROSE and A. J. WOOD. Constable & Co. Ltd., London. 1956. Pp. 166. 17s 6d.

This monograph presents a critical assessment of the present knowledge of the electrostatic precipitation process and gives a general review of current practice. The process is based on principles which have been studied extensively by physicists and electrical engineers, yet the complexity of conditions prevents adequate theoretical treatment. The associated literature is large and widely scattered and, while reviewing this, the authors have added experience from their own researches.

Applications are summarised in the introduction.

Two chapters review the general electrical theory: The production of ions and the electrical charging of the particles, and then the drift of the charged particles to the collector electrode under the influence of the electric field. The next chapter attempts to deduce the theoretical precipitator efficiency. An equation of the right form which has been used extensively is given but, as the authors say, it is difficult to justify the physical conditions required by the mathematical argument. In its derivation, the flow complexities encountered in practice are ignored as is also the re-entrainment of collected particles.

A further short chapter on precipitator efficiency considers the effect of particle shape and size distribution. Then the authors discuss, under 'Precipitator Prob-

lems,' the effects of other factors such as extremes in dust resistivities.

The section on precipitator design and construction reviews present practice and ends with the humbling comment for the theoretician: 'But little guidance can be obtained from theoretical considerations.' The power supply equipment is then surveyed briefly. (There is, of course, much information readily available on this.) In conclusion the subject is summarised in terms of the present experimental and theoretical position, bringing into perspective the problems awaiting solution.

In the preparation of the volume, an 'M' slipped from one of the equations on page 77; this is excusable. But not so, however, is the form of several paragraphs. The introductory chapter begins with a paragraph of *one* sentence defining electrostatic precipitation.

Incidentally, the monograph is an interesting study of a specific scientific application which could well be of interest to the more advanced scientist at school. From it he could gain some insight into the challenge of the complex interactions so frequently encountered in modern technology. J.S.M.B.

Thermodynamic Data on Eight Industrial Gases

THERMODYNAMIC FUNCTIONS OF GASES.

Edited by F. DIN. Volume I *Ammonia, Carbon Dioxide, Carbon Monoxide*; Volume II *Air, Argon, Acetylene, Ethylene, Propane*. Butterworths Scientific Publications, London, 1956. Pp.: Vol. I, viii+175, Vol. II, vi+201. 63s. each volume.

The survey of the thermodynamic properties of gases was organised by the thermodynamics committee of the Mechanical Engineering Research Board, the work being shared among a number of academic and industrial organisations. The object of the work is to provide reliable thermodynamic data on all industrial gases and the present two volumes provide this data on eight gases. The method of publication has been to allow each group of workers to present the properties of the gases they have studied, reporting the literature and experimental studies in an agreed manner.

Volume I contains an introduction by the editor on the thermodynamic diagrams and functions and their preparation. This covers the P-V-T data, Joule-Thompson expansion, specific heats, two phase region and the finished diagram. Each of the following sections on the individual gases contains a survey and critical evaluation of the published data, a record of the experimental work carried out by the authors and the tables of the thermodynamic properties. These include properties of the solid, liquid and vapour, enthalpy, entropy, volume, specific heat at constant pressure and constant volume. The properties are combined in a temperature-entropy diagram which is published separately as a wall chart at a price of 15s each chart. Unfortunately the page size of the book is too small to allow the temperature-entropy charts given in the text to be of use, although there is little need to use them in preference to the tabulated data.

The individual chapters on each gas have been written by the group carrying out the investigation. These are: Ammonia, P. Davies, Imperial Chemical Industries, Billingham; Carbon Dioxide, D. M. Newitt, M.U.Pai, N. R. Kuloor, Imperial College of Science and Technology, and J. A. W. Huggill, Department of Scientific and Industrial Research; Carbon Monoxide, A. Smeeton Leah, University of Leeds; Air, F. Din, British Oxygen Co.; Acetylene, F. Din, British Oxygen Co.; Ethylene, W. F. L. Dick and A. G. M. Hedley, Imperial Chemical Industries, Northwich; Propane, N. R. Kuloor and D. M. Newitt, Imperial College, and J. S. Bateman, Department of Scientific and Industrial Research; Argon, F. Din, British Oxygen Co.

Despite the large number of authors the text is uniform in character and extremely well presented. Not only will the book be of the greatest value to industrial and research engineers, but it is highly recommended to students of mechanical and chemical engineering as a book they will be proud to possess. F.M.

Theories and Recent Advances in Field of Friction

FRICION AND LUBRICATION. *By F. P. BOWDEN and D. TABOR.* Methuen & Co. Ltd., London. 1956. Pp. 147. 10s 6d.

This monograph, written by acknowledged authorities, gives a survey of the basic theories, practices and latest developments in the field of friction and lubrication. The treatment throughout is simplified and non-mathematical. Modern techniques such as the use of electron microscopy, diffraction, and radio-active tracers in the investigation of metallic and non-metallic surfaces are discussed. Other topics include adhesion of metals, wear and surface damage, breakdown of oxide films and the friction of clean surfaces, and surface temperatures of sliding solids with reference to the problem of friction at very high speeds (up to 2,000 m.p.h.).

Many references are made to the properties and potentialities of that remarkable 'low-friction' substance polytetrafluoroethylene (p.t.f.e. or Teflon). After an introduction to the subject of rolling friction, various aspects of lubrication are considered, such as fluid (normal) and boundary (very thin film) lubrication. Recent advances are described in the development of special lubricants for use under conditions of high temperature and heavy load.

The authors are blessed with a sense of humour and a gift for lucid expression. The book is neatly printed and a number of excellent photographs are included. However, considering the wealth of information crammed into the pages, the index is totally inadequate. Nevertheless, apart from this and one or two minor misprints (a wrong page reference to p.t.f.e. in the index) the book is otherwise faultless. It has been written for 'students, engineers, physicists, metallurgists and for practical people who wish to become familiar with the basic ideas current in this field.' It should certainly whet the appetite of interested persons. J. W. MULLIN.

Commercial News

Allotment Letters Posted for ICI 5½% Convertible Loan Stock

Imperial Chemical Industries Ltd.

Imperial Chemical Industries Ltd. announces that applications for the £40,000,000 5½ per cent convertible unsecured loan stock 1977/79 at £96 per cent were received from 67,803 applicants for a total amount of £238,069,150.

Allotment letters were posted on 10 January and the basis of allotment was as follows: (1) Applications (26,723) for £200 or less have been allotted in full; (2) applications (39,274) for £250 to £10,000 (both inclusive) have been allotted the first £200, plus one-eighth of the balance of stock applied for; (3) applications (1,806) for more than £10,000 have been allotted one-eighth of the amount of stock applied for, with a minimum of £1,450. Allotments have been made to the nearest £50.

Greeff-Chemicals Holdings Ltd.

The directors of Greeff-Chemicals Holdings Ltd. announce the private placing for cash at par of £100,000 6½ per cent Unsecured Loan Stock 1972/82. The proceeds will be used by the operating company, R. W. Greeff & Co. Ltd., in financing the purchase of further shares in existing trade investments.

Powell Duffryn Ltd.

The directors of Powell Duffryn Ltd. have declared an interim dividend of six per cent actual, less tax, on the 9,660,471 ordinary shares of 10s each in respect of the year ending 31 March 1957, payment to be made on 26 February 1957 to holders registered on the books of the company at close of business on 4 January 1957.

Turner & Newall Ltd.

Results achieved by The Washington Chemical Co. Ltd. subsidiary of Turner & Newall Ltd. have been satisfactory during the past year, though there was a temporary decline in the consumption of some of the subsidiary's products by certain industries in the home market. Trading conditions overseas remain very competitive but, nevertheless, the sale of the company's chemical goods almost attained the level of the previous year. This is stated in the annual report of Turner & Newall's chairman (Sir Walker Shepherd) which has been circulated. Dividend recommended is 22½ per cent

on the ordinary stock of the group, making, with the interim dividend of 5 per cent already paid, a total distribution of 27½ per cent for the year.

Scottish Agricultural Industries Ltd.

Consolidated profit of Scottish Agricultural Industries Ltd. for the year ended 30 September 1956 amounted to £529,379, after providing for taxation, against £513,699 for the previous year. After further deductions the surplus belonging to SAI was £468,866. The directors have recommended a final ordinary dividend of five per cent less income tax, which will be payable on 24 January 1957 to members on the register on 17 January.

Williams (Hounslow) Ltd.

Williams (Hounslow) Ltd., aniline dye makers, Hounslow, Middlesex, have acquired two associated Heckmondwike concerns, J. C. Oxley's Dyes and Chemicals Ltd., producers of aniline dyestuffs for the textile trade, auxiliary products and chemicals, and Heckmondwike Chemical Co. Ltd., manufacturers of fertilisers, insecticides and allied products.

NEW COMPANIES

DM Industrial Plastics Ltd.

Private company. (576,198). Registered 27 December. Capital £500 in £1 shares. Objects: to carry on the business of manufacturers and merchants of thermoplastic products of all kinds, etc. The directors are: David MacKnight-Thomson and Mary Z. MacKnight-Thomson, both of "Mardavian," Franklyn Road, Walton-on-Thames; and Alan T. Buss, 5 Monks Green, Fetcham, nr. Leatherhead. Secretary: R. E. Cross. Registered office: Kingsbridge Road, Cettimore Lane, Walton-on-Thames.

Safety-Vision Ltd.

Private company (575,850). Registered 19 December. Capital £100 in £1 shares (33 'A', 66 'B' and 1 'C'). Objects: to carry on the business of manufacturers of and dealers in all compounds, mixtures and articles capable of being adapted or applied for the purpose of coating or treating fabrics, materials or other articles so as to render them protective or resistant to atomic energy or rays, X-rays and all kinds of radioactive energy;

optical goods etc. The directors are: Harold Needle, 15 Elsie Road, London SE22; Victor G. McCabe, 32 Lebanon Court, Twickenham, Middx; and Helmut Rothenberg, 49 Holne Chase, London N2. Secretary: Margrit S. Berkenstein. Registered office: 3 Oxford Street, London W1.

F. Francis & Sons Ltd.

Private company. (576,331). Registered 31 December. Capital £50,000 in £1 shares. Objects: to acquire the business of manufacturers of tin boxes and steel drums carried on by F. Francis & Sons (Holdings) Ltd., at Greenwich and Deptford, London SE, etc. The subscribers (each with one share) are: Edward A. Clarke and Michael A. West, both clerks, of 5 New Court, London WC2. The first directors are not named. Solicitors: Theodore Goddard & Co, 5 New Court, London WC2.

Intarchem Ltd.

Private company. (576,178). Registered 24 December. Capital £1,000 in £1 shares. Objects: to carry on the business of merchants, traders, general dealers and manufacturers of all kinds of goods and merchandise, and particularly goods relating to tar, bitumen, chemicals and their various by-products, etc. The directors are: Dolce Maria Hanselman, 8b Rosslyn Road, Watford, Herts; and Arthur R. O. Slater, Oakleigh, Hampstead Lane, N6, director of Trade Journals Ltd. etc. Secretary: Dolce M. Hanselman. Registered office: 9 Clarendon Road, Watford, Herts.

Manning & Co. (Fertilizers) Ltd.

Private company. (576,604.) Registered 3 January. Capital £1,000 in £1 shares. Objects: to carry on the business of manufacturers of and dealers in organic and chemical fertilisers etc. The directors are: Mrs. Nora E. Manning and Maurice W. A. Manning, both of The Firs, Misbourne Avenue, Chalfont St. Peter, Bucks; and Ernest F. Willson, 7 Hambleton Hill, Epsom, Surrey. Secretary: P. S. Tanswell. Registered office: The Firs, Misbourne Avenue, Chalfont St. Peter, Bucks.

National Union of Manufacturers Advisory Service Ltd.

(576,003). Registered 20 December, as a company limited by guarantee, without shares capital, with an unlimited number of members, each being liable for £10 in the event of winding up. Objects: to advise and give practical assistance to members of the National Union of Manufacturers (Incorporated) and others on production techniques and management organisation etc. The income and property of the association, whencesoever derived, shall be applied solely towards the promotion of its objects.

The subscribers are: Charles S. Garland, By The Links, Lodge Road, Bromley, Kent; Rt. Hon. Lord Rochdale, Lingholm, Keswick, Cumberland; Gilbert Salter; B. R. Cumins; Fred T. Jackson; W. G. R. Beckett and E. R. Mayer. The first directors are to be appointed by the subscribers. Solicitors: Moreton Phillips & Son, London EC2. Registered office: 45-6 St. Paul's Churchyard, London EC4.

Plus Ten Company Ltd.

Private company. (576,240). Registered 27 December. Capital £100 in £1 shares. Objects: to carry on the business of dealers in and manufacturers of chemicals, etc. The directors are: Baron Rolf Beck, Layham Hall, nr. Hadleigh, Suffolk, director of Slip Estates Ltd., etc; and Nigel E. Seely, 31 Ovington Square, London SW3. Secretary: Iris R. M. Swain. Registered office: 16 Devonshire Square, London EC2.

Saez & Co. Ltd.

Private company (576,583.) Registered 3 January. Capital £4,000 in £1 shares. Objects: to carry on the business of importers and exporters of and dealers in drugs, chemicals, medicines and other preparations etc. The subscribers (each with one share) are: Carmen B. MacDonald, company secretary; and Manuel Lopez, sales manager, both of 24 St. Mary Axe, London EC3. The first directors are to be appointed by the subscribers.

Solicitors: Botterell & Roche, London EC3. Registered office: 24 St. Mary Axe, London EC3.

Mortgages & Charges

CUTRILIN LTD. London SW, chemical manufacturers. 3 December, mortgage, to Trade Sales Ltd. securing all moneys due or to become due from the company to the mortgagees under an agreement dated 29 November 1955 and also on any account whatever; charged on the benefit of an agreement and moneys due thereunder. 9 July 1956.

Satisfaction

THERMAL SYNDICATE LTD. Wallsend. Satisfaction 14 Dec., of debentures registered 15 Feb. 1950, to the extent of £5,400.

London Gazette

Notice of Intended Dividend

Wilson and Woods Ltd., reg. office, 19 Village Way East, Rayners Lane, Harrow, Middx., manufacturers of chemical compounds. Last day for receiving proofs, 26 January. Liquidator, A. T. Cheek, official receiver and liquidator, Inveresk House, 346 Strand, London WC2.

Release of Liquidator

Arlée Ltd., reg. office, Furnival House, 14-18 High Holborn, London WC1, chemical manufacturers and dealers. Liquidator, G. F. Morris, official receiver and liquidator, Inveresk House, 346 Strand, London WC2. Released on 17 December 1956.

Summer Symposia of the Chemical Society

TWO SYMPOSIA to be held during July are announced by the Chemical Society. The first will be held in Glasgow on recent advances in the chemistry of terpenoid compounds, on 11 and 12 July. Sessions will be under the chairmanship of Sir John Simonsen, and Professors John Read, E. R. H. Jones and A. J. Birch. Professor Sir Ian H. Heilbron will attend and preside at a dinner.

The following have provisionally agreed to make contributions: Professors D. H. R. Barton, A. J. Birch, G. Büchi, W. Cocker, Drs. R. C. Cookson and T. G. Halsall, Professors O. Jeger, E. R. H. Jones, Drs. R. N. Jones, F. J. McQuillin, Professors G. Ourisson, R. A. Raphael, F. Sorm, F. S. Spring, F. S. Wenkert, K. Wiesner and Dr. W. B. Whalley.

The other symposium, on 'Solvent Effects and Reaction Mechanism' is being arranged by the Chemistry Department, Queen Mary College, with the support of the Chemical Society. It will be held in the college on 8 and 9 July.

The following will participate: Professors E. A. Amis, P. D. Bartlett, Mr. R. P. Bell, Professor M. L. Bender, Dr. C. A. Bunton, Professors M. J. S. Dewar, W. Doering, A. G. Evans, Drs. R. J. Gillespie, V. Gold, R. F. Hudson, Professors C. K. Ingold and J. E. Leffler, and Drs. F. A. Long, V. J. Shiner and C. Wilson.

Further details will be available from the general secretary, Chemical Society, Burlington House, London.

Market Reports

Prices Firm with New Enquiries

LONDON There has been little change in the general position either as regards trading activity or prices, but the undertone of the market is firm on a background of rising transport costs. Contract deliveries to the chief consuming industries have been on a good scale and a fair weight of new enquiry has been reported on home and export account. Also more interest has been shown in the market for fertilisers. Pitch is an active item among the coal-tar products and a steady movement is reported for the light distillates and most grades of creosote oil are in good demand.

MANCHESTER Steady to firm price conditions have been maintained in most sections of the Manchester chemical market. The past week has seen a steady movement of textile bleaching, dyeing and finishing chemicals, and most other leading industrial consumers are taking reasonably good deliveries against contracts. A fair

number of fresh inquiries have been reported on both home and export accounts. Demand for fertilisers is gradually improving, and most of the tar products are moving in satisfactory quantities.

GLASGOW The Scottish market has again settled down after the holidays, and business generally has been brisk. The petroleum position is still having its effect, and every endeavour is being made to maintain deliveries in accordance with requirements. On the agricultural side business has been steady, and in regard to export the market continues satisfactory. Although every effort is being made to keep prices steady, some are showing a slight upward tendency.

BURGOYNE BURBIDGES & CO. LTD., High Street, South, East Ham, London E6., name changed to Rawson Chemicals Ltd.

Metals Institute Spring Conference in London

THE 1957 spring meeting of the Institute of Metals will be held in London from Monday to Saturday, 29 April to 4 May. The meeting will be a joint one with the Associazione Italiana di Metallurgia, the Societe Suisse des Constructeurs de Machines and the Schweiz. Verband für die Materialprüfungen der Technik.

All the scientific sessions in London will be held at Church House, Great Smith Street SW1. The May Lecture, on 'Education in Science and Technology', will be given by Sir Eric Ashby on 29 April in the Royal Institution, Albemarle Street W1.

A number of social events have been arranged, including a banquet in the Great Room, Grosvenor House, Park Lane W1, on 2 May. At the conclusion of the meeting, members and ladies of the Italian and Swiss societies will visit Birmingham, Sheffield and South Wales.

FOR YOUR DIARY

MONDAY 21 JANUARY

Royal Institute of Chemistry—Ponders End, Middx: Enfield Technical College, 7.30 p.m. 'The Use of Photography in Scientific and Engineering Investigations' by Dr. R. H. Herz.

SCI (Yorkshire Section)—Leeds: Chemistry Lecture Theatre, University, 7 p.m. 'Fibre Science and Leather Production' by Dr. H. Phillips.

CS—Cambridge: University Chemical Laboratory, 8.30 p.m. 'Radiation-chemistry Reactions in Aqueous and Non-aqueous Solutions' by Dr. E. Collinson.

CS—Leicester: University College, 4.30 p.m. 'Some Recent Developments in Free-radical Chemistry' by Professor D. H. Hey.

TUESDAY 22 JANUARY

CS—Nottingham: Chemistry Lecture Theatre, University, 4.45 p.m. 'Old Metals and New Valencies' by Professor R. S. Nyholm.

WEDNESDAY 23 JANUARY

SCI (Food Group)—London: 14 Belgrave Square SW1, 6.15 p.m. 'Food Technology in Under-developed Countries' by L. E. Campbell and C. A. Adams.

SAC (Biological Methods Group)—London: 'The Feathers', Tudor Street EC4, 6.30 p.m. Annual meeting and discussion on 'The Relationship Between Statistics and Micro-biological Assay' opened by J. P. R. Toothill.

THURSDAY 24 JANUARY

SAC (Midlands Section)—Nottingham: Gas Showrooms, 7 p.m. Annual meeting and lecture on 'Certain Aspects Concerning Irrelevancies in Classical Methods of Analysis' by Dr. R. Belcher.

FRIDAY 25 JANUARY

CS—Birmingham: Chemistry Department, University, 4.30 p.m. 'Some Recent Studies in Relation to Biosynthesis' by Professor A. J. Birch.

CS—Newcastle-upon-Tyne: Chemistry Building, King's College, 5.30 p.m. 'Polymerisation in Heterogeneous Systems' by Professor C. E. H. Bawn.

CS—St. Andrews: Chemistry Department, St. Salvator's College, 5.15 p.m. 'Colour Photography' by R. B. Collins.

SAC (Microchemistry Group)—London: CS meeting room, Burlington House W1, 6.45 p.m. Annual meeting, 7.15 p.m. 'Apparatus and Technique' by D. W. Wilson, 'Primary Standards' by Dr. R. Belcher, 'End-Point Location' by E. Bishop.

ENI OF ITALY REPORT HIGHER OUTPUT OF NATURAL GAS

THE ANNUAL REPORT of ENI (Ente Nazionale Idrocarburi), the Italian State Corporation of Oil and Natural Gas, records up to 30 April, 1956, that the total production of natural gas by the ENI companies (AGIP Mineraria, Ravennate Metano and Mineraria Sicilia Orientale) in 1955 rose to 117,935 million cu. ft. as compared with 95,337 million cu. ft. in 1954, an increase of 23.8 per cent. During the first four months of 1956 production reached 54,730 million cu. ft., showing an increase of 33.5 per cent compared with 40,994 m. cu. ft. weighing one ton.

Total output of liquid and liquefiable hydrocarbons in 1955 amounted to 114,851 metric tons, including 54,700 tons obtained through gasoline recovery at the Cortemaggiore plant.

With regard to hydrocarbon processing, the activity of the Group's Companies in 1955 was chiefly concerned with the qualitative improvement of products, by means of technical improvements to installations.

Two catalytic reforming plants went into production at the Irom refinery, Venice, and the Stanic refinery, Leghorn in 1955. Also taken into service

was the Cortemaggiore distillation and cracking plant for processing the crude obtained from the field. The refineries connected with the Group processed about five million tons of crude.

Of the Group's output of petroleum products, 62 per cent was sold on the home market and 38 per cent on foreign markets. The previous year the percentages were 55 per cent and 45 per cent respectively.

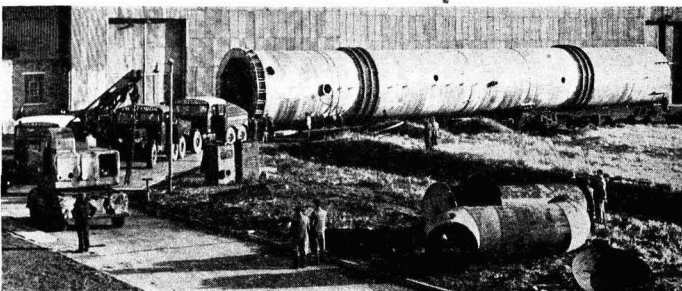
Work on the Anic petrochemical plant at Ravenna, which will process natural gas for the production of synthetic rubber and nitrogenous fertilisers, was begun in 1955. Some plant buildings, warehouses, residential buildings and the road network have reached an advanced stage; initial equipment is to be installed in the autumn. Orders have been placed for the major plants, such as the thermo-electric power station, plants for air liquefaction and the production of oxygen and nitrogen, installations for purifying and separating gases for the production of ammonia and plants for synthesising butadiene as well as a considerable portion of the equipment used in rubber production.

Ashmore's Deliver 131 ft. Nitric Tower

BELIEVED to be the largest stainless steel vessel constructed in this country, this nitric acid absorption tower left the Stockton-on-Tees works of Ashmore, Benson, Pease and Co. on 12 January for the ICI nylon plant at Billingham.

The 18-mile journey took three days and to transport the tower, Ashmore's made a specially cranked drawbar weighing one ton.

The vessel is 131 ft. by 15 ft. and weighs 93 tons. When erected it will stand 140 ft.



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ACCEPTANCES

Applications in the following list, and the specifications filed in pursuance thereof, will be open to public inspection in due course. Persons interested may give notice of opposition to the grant of a Patent on any of the applications included in the list by filing Patents Form number 12 at any time within the prescribed period. See 'Official Journal (Patents)' for dates on which these applications will be open to public inspection.

- 766 798 Composites of synthetic resins and textile materials. Dunlop Rubber Co. Ltd.
- 766 771 Epoxide compounds. Henkel & Cie Ges.
- 766 544 Acetic acid. [Addition to 743 990.] Distillers Co. Ltd.
- 766 345 Vat dyestuffs containing halogen. Farbwerke Hoechst AG.
- 766 646 Heterocyclic compounds. Boots Pure Drug Co. Ltd.
- 766 647 Stabilised phenylhydrazine and process for making it. Farbwerke Hoechst AG.
- 766 548 Cyclopentanophenanthrene derivatives. Syntex Soc. Anon.
- 766 326—766 327 (Divided out of 766 325.) Penicillin salts of an ester of 4-aminosalicylic acid. Rheinpreussen AG Fuer Bergbau Und Chemie.
- 766 549 Hydroxy aryl substituted propane compounds. Bergwerksesg Hibernia AG.
- 766 442 Preparation of steroids. Boots Pure Drug Co. Ltd.
- 766 554 Metal complex forming azo dyestuffs. Farbenfabriken Bayer AG.
- 766 347 Synthetic polyester fibres. Imperial Chemical Industries Ltd.
- 766 654 Plasticisation of aqueous dispersions of polymeric materials. Imperial Chemical Industries Ltd.
- 766 809 N:N'-dibenzyl ethylene diamine. Distillers Co. Ltd.
- 766 810 Titanated alkoxy silanes. Allied Chemical & Dye Corp.
- 766 562 Polymerisation process. British Geon Ltd.
- 766 335 α -(Phenacetyl amino)- n -benzoyl acetic acid benzyl ester. [Addition to 734 270.] Farbwerke Hoechst AG.
- 766 336 Dyeing of highly polymeric linear ester fibres. Imperial Chemical Industries Ltd.
- 766 665 Organopolysiloxane elastomers. General Electric Co.
- 766 666 Production of unsaturated polyesters. Newby, H. (Chemische Werke Hils AG).
- 766 338 Rubber compositions. Monsanto Chemicals Ltd.
- 766 564 Terephthalic acid. Imperial Chemical Industries Ltd.
- 766 813 Bonding of polythene to metals. Imperial Chemical Industries Ltd.
- 766 565 Purified polyvinyl alcohol. Vinyl Products Ltd.
- 766 817 Ethoxyline resin compositions. General Electric Co.
- 766 452 Reducing tendency of petroleum oils to form stable emulsions with water. Shell Research Ltd.
- 766 566 Bi-heterocyclic phosphorus containing compounds. Union Carbide & Carbon Corp.
- 766 819 Modified aminoplast resinous condensation products. Monsanto Chemical Co.
- 766 672 Hydrocatalytic desulphurisation of hydrocarbons. British Petroleum Co. Ltd.
- 766 359 Regeneration of coagulation bath containing sulphuric acid used for spinning viscose. Naamlooze Vennootschap Onderzoekingsinstituut Research.
- 766 575 Urea in granular form. Imperial Chemical Industries Ltd.
- 766 360 Insolubilising artificial filaments, etc., by spinning of solutions of proteins. Imperial Chemical Industries Ltd.
- 766 677 Alcohols. Monsanto Chemical Co.
- 766 576 Lubricating oil compositions. Esso Research & Engineering Co.
- 766 578 Electrochemical oxidation of ortho-toluene sulphonamide to ortho-benzoylsulphonimide. Farbwerke Hoechst AG.
- 766 364 Acrylonitrile polymer compositions. Imperial Chemical Industries Ltd.
- 766 682 Converting optically active aminodiols into racemic aminodiols. Farmaceutici Italia Soc. Anon.
- 766 685 Recovery of glutamic acid. International Minerals & Chemical Corp.
- 766 686 Polystyrene. Distillers Co. Ltd.
- 766 688 Polymerisation of steam-cracked petroleum fractions. Esso Research & Engineering Co.
- 766 370 Cyclopentadiene-type compounds. [Addition to 700 766.] Younghusband Barnes & Co. Ltd.
- 766 690 2-mercaptobenzothiazole derivatives and herbicidal compositions containing same. Monsanto Chemical Co.
- 766 585 Polystyrene plastic materials. Monsanto Chemicals Ltd.
- 766 698 Piperidine compound. Ciba Ltd.
- 766 588 Acid nitrated organic products. Nitroglycerin Aktiebolaget.
- 766 372 Gamma benzene hexachloride. Olin Mathieson Chemical Corp.
- 766 470 Liquid filter. Luber-Finer Inc.
- 766 706 Sulphates of hydroxy ethers. Atlas Powder Co.
- 766 590 Carbon monoxide indicator. Kollsman Instrument Corp.
- 766 591 Gasoline fuel compositions. Esso Research & Engineering Co.
- 766 710 Separating thiophenols from tar acids. Pittsburgh Consolidation Coal Co.
- 766 713 Opening of glass ampoules. Johnsen & Jorgensen Flint Glass Ltd.
- 766 714 2- and 3-Substituted 1-phenyl-5-pyrazolones. Geigy AG.
- 766 837 Basically substituted acid amides. Farbwerke Hoechst AG.
- 766 380 Cyanine dyestuffs. Ilford Ltd.
- 766 381 Stilbene polyazo dyestuffs and metal complexes thereof. Sandoz Ltd.
- 766 720 Separation of cobalt and nickel. Soc. Generale Metallurgique De Hoboken.
- 766 721 Polymers and copolymers of dialkenyl beta-cyanoethane-phosphonates. Victor Chemical Works.
- 766 722 Dialkenyl beta-(carbalkoxy) alkanephosphonates and polymers and copolymers thereof. Victor Chemical Works.
- 766 386 Foamed polyurethane products of high molecular weight. Farbenfabriken Bayer AG.
- 766 840 Perfluoro-chloro-olefin polymers. Kellogg Co.
- 766 387 Purification of picolines. Distillers Co. Ltd.
- 766 600 Thio-acid esters. May & Baker Ltd.
- 766 484 Suspending powders in organic liquids. Philips Electrical Industries Ltd.
- 766 388 Functional fluids. [Addition to 740 078.] Monsanto Chemical Co.
- 766 601 Vinyl chloride from ethylene dichloride. Dominion Tar & Chemical Co. Ltd.
- 766 725 Polystyrene compositions and mono and multifilamentary materials produced therefrom. Dow Chemical Co.
- 766 848 Haloaldehyds from olefins. Naamlooze Vennootschap De Bataafsche Petroleum Maatschappij.
- 766 731 Mixing and delivering water-oil mixtures. Calamai, G.
- 766 604 Liquefying portion of the low boiling fraction of gas mixture fractionating operation. Air Products Inc.
- 766 732 Purifying acrylic acid nitrile. Ciba Ltd.
- 766 605 Esters of N-carbamylamic acids. United States Rubber Co.

- 766 849 Incorporating finely divided substances into highly polymeric polymethylene terephthalates. Imperial Chemical Industries Ltd.
- 766 394 Refining vegetable oils. Staley Manufacturing Co.
- 766 397 Substitute methanes. Badische Anilin- & Soda-Fabrik AG.
- 766 492 Dyeing wool with complex heavy metal compounds of dyestuffs. Geigy AG.
- 766 736 Silicone compositions. Younghusband, J. L.
- 766 494 Separation of gaseous hydrocarbon mixtures. Koppers Co. Inc.
- 766 737 Preparation of seed coke for fluidised-bed coking of hydrocarbons. Esso Research & Engineering Co.
- 766 609 Diazoamino derivatives. Compagnie Francaise Des Matieres Colorantes.
- 766 401 Detergent compositions. [Addition to 741 454.] Unilever Ltd.
- 766 402 Water-soluble azo- and azomethene dyestuffs containing chromium. [Addition to 692.073.] Badische Anilin- & Soda-Fabrik AG.
- 766 404 Gasoline and related lighter products by hydrogenation and catalytic cracking. Naamlooze Vennoetschap De Bataafsche Petroleum Maatschappij.
- 766 498 Methyl-substituted aromatic compounds. Naamlooze Vennoetschap De Bataafsche Petroleum Maatschappij.
- 766 742 Substituted aromatic compounds. Naamlooze Vennoetschap De Bataafsche Petroleum Maatschappij.
- 766 405 Antioxidants for natural or synthetic rubber. United States Rubber Co.
- 766 407 Vat dyestuffs of the anthraquinone series. Badische Anilin- & Soda-Fabrik AG.
- 766 745 Addition products of polythene. Monsanto Chemical Co.
- 766 408 Stable solutions of monosemicarbazone of adrenochrome. Soc. Des Laboratoires Labaz.
- 766 319 Manufacture of foam rubber. Too, J. T.
- 766 747 Gas-purifying installations. Bischoff Ges.
- 766 410 Detergent and solvent resistant sponge material. Wilson, C. L.
- 766 749 Benzimidazole cobalamines, preparation and separation. Aschaffenburg Zellstoffwerke AG.
- 766 754 Derivatives of 1, 3-disubstituted and 1, 3, 8-trisubstituted xanthenes. Geigy AG.
- 766 757 Modified polytetrafluoroethylene aqueous coating compositions and substrates coated therewith. Du Pont De Nemours & Co.
- 766 512 Organic nitriles. Pfizer & Co. Inc.
- 766 417 Aminolysed acrylic ester polymers and methylol derivatives thereof. Rohm & Haas Co.
- 766 761 Calcining coke. Esso Research & Engineering Co.
- 766 764 Removal of heavy metal ions from non-aqueous sulphur trioxide solutions. Dow Chemical Co.
- 766 622 Prevention of surface crazing of rubber-resin blends by aromatic diamines. United States Rubber Co.
- 766 623 Phenol-aldehyde organosilicon resinous compositions. Dow Chemical Co.
- 766 419 Acid-resistant cements. Dow Chemical Co.
- 766 766 Heterocyclic phosphorus-containing compounds. Union Carbide & Carbon Corp.
- 766 625 Hydrogenation of hydrocarbons. Metallges AG.
- 766 420 Crystal violet lactone. Sterling Drug Inc.
- 766 770 Preparation of complex esters. Esso Research & Engineering Co.
- 766 860 Quick separation of fluids and particulate solids. Esso Research & Engineering Co.
- 766 520 Therapeutic compositions containing neomycin and oxytetracycline. Pfizer Corp.
- 766 323 Fluorine-containing compounds. Du Pont De Nemours & Co.
- 766 424 Synthetic resins. Diamond Alkali Co.
- 766 627 Synthetic resinous compositions. Midland Silicones Ltd.
- 766 628 Glucoside. Uelaf.
- 766 629 Polymerisation of formaldehyde. Du Pont De Nemours & Co.
- 766 524 High molecular weight addition polymers of formaldehyde. Du Pont De Nemours & Co.
- 766 864 Polysiloxane compositions for organic fabrics. Midland Silicones Ltd.
- 766 427 Phenyl-ethylacetyl choline chloride. Chimie Et Atomistique.



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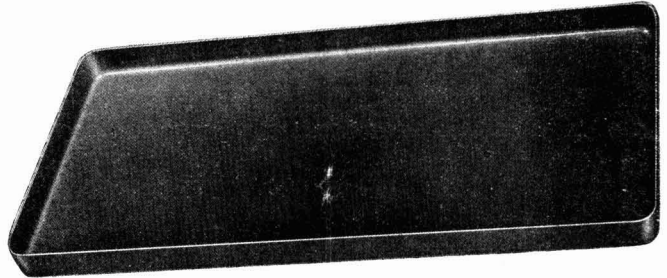
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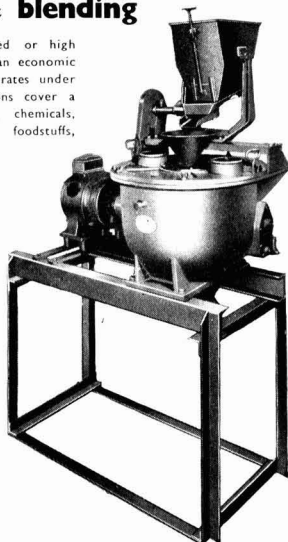
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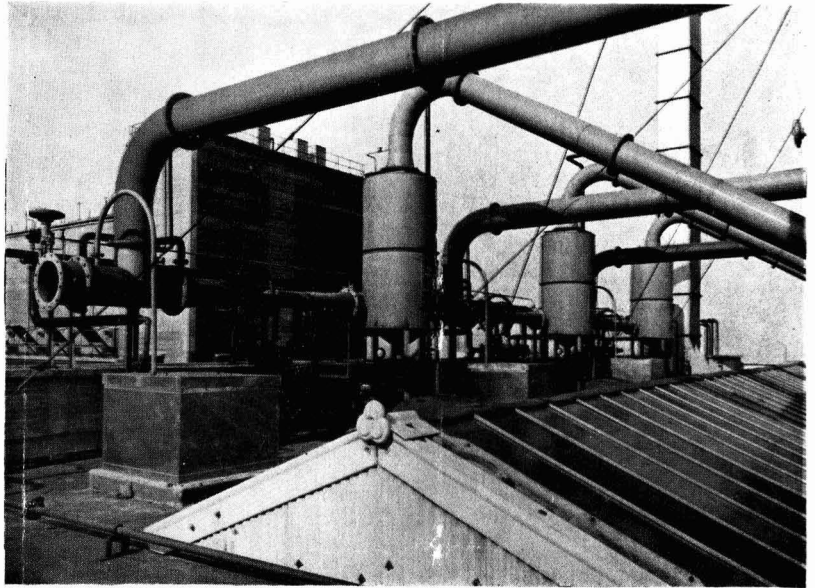
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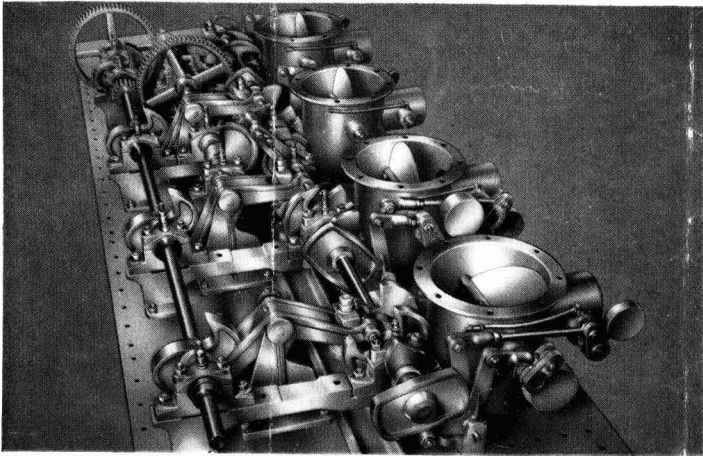


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