

THE Chemical Age

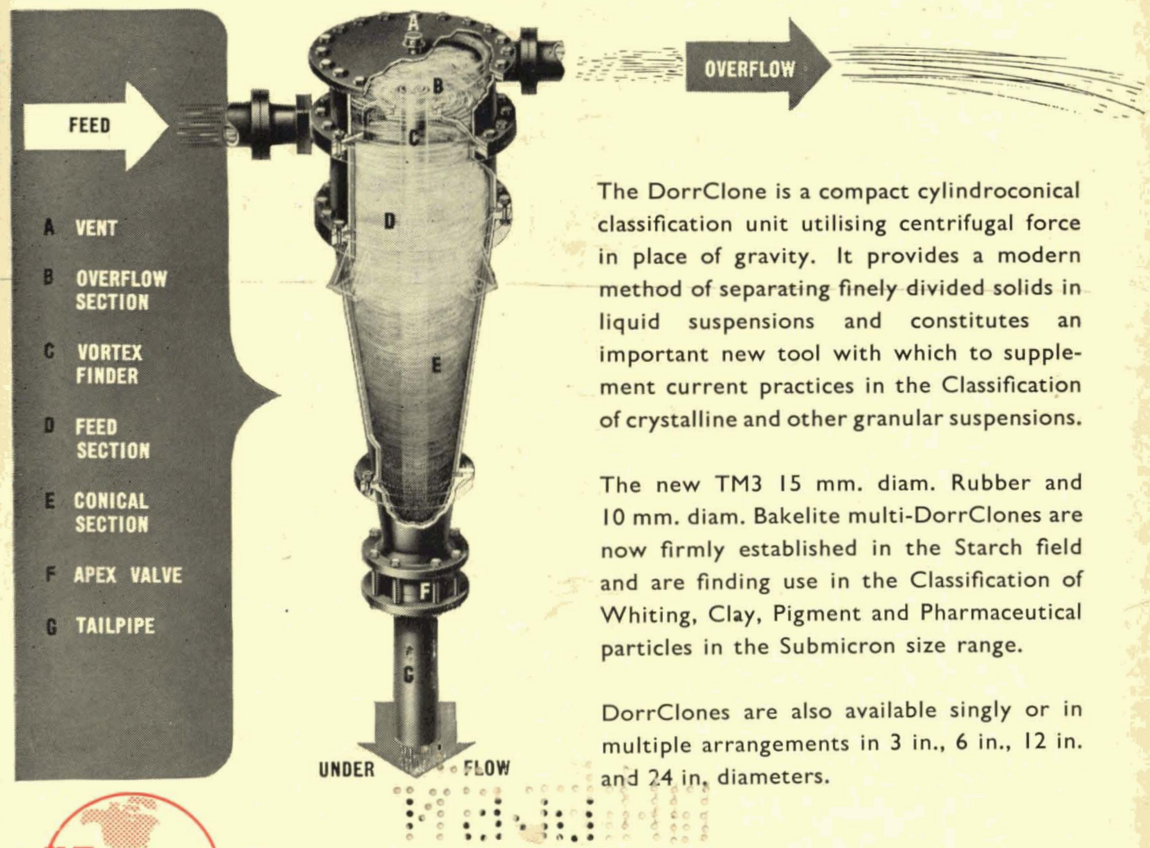
VOL. LXXIII

10 SEPTEMBER 1955

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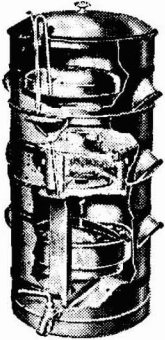
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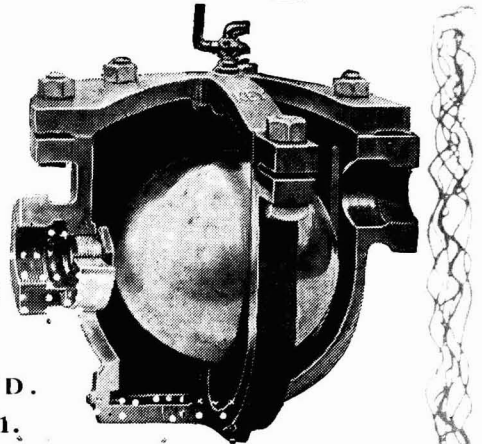
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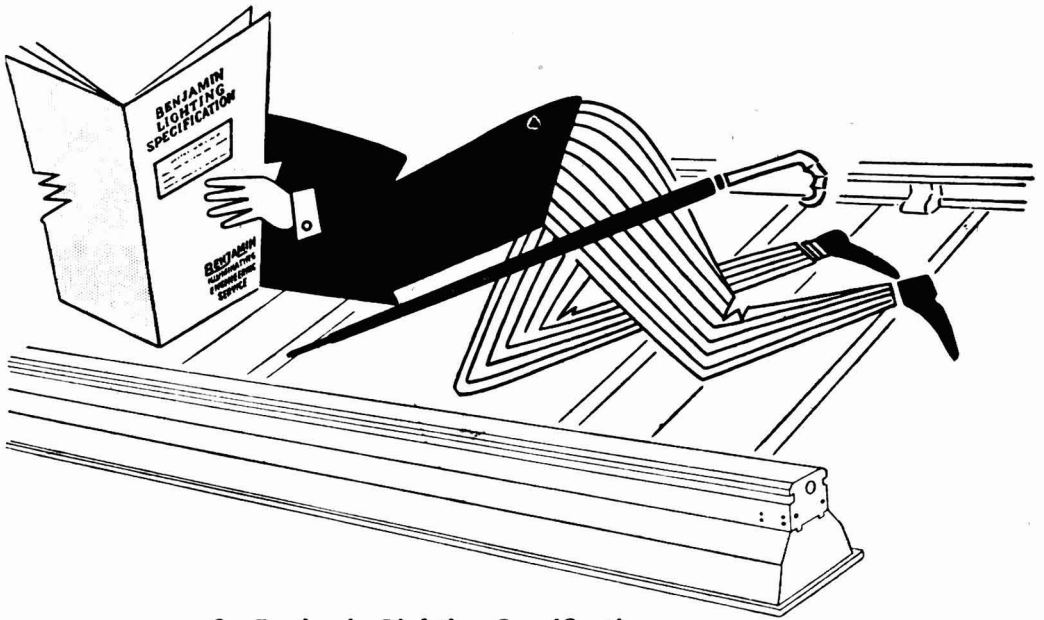
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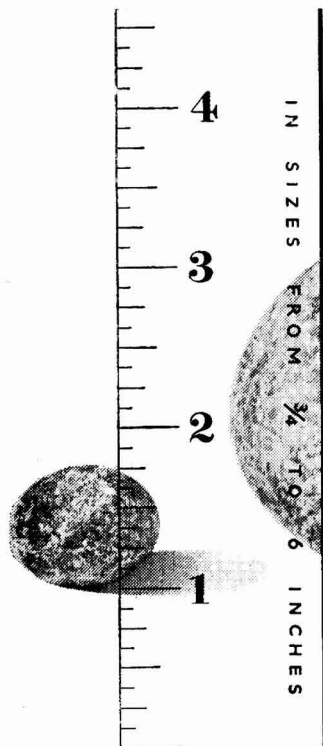
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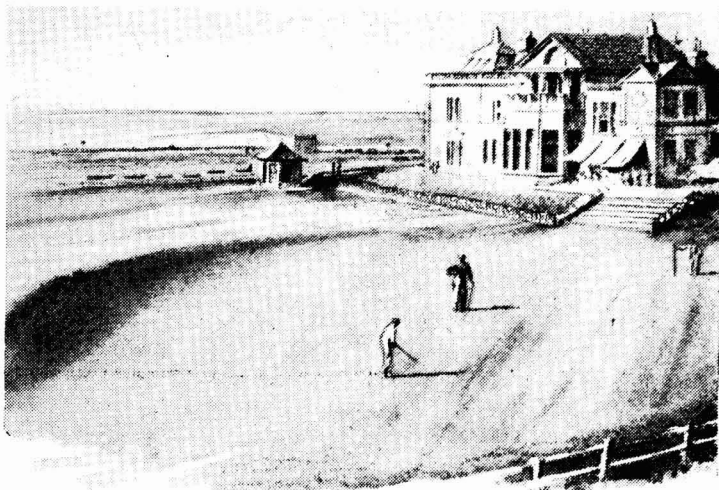


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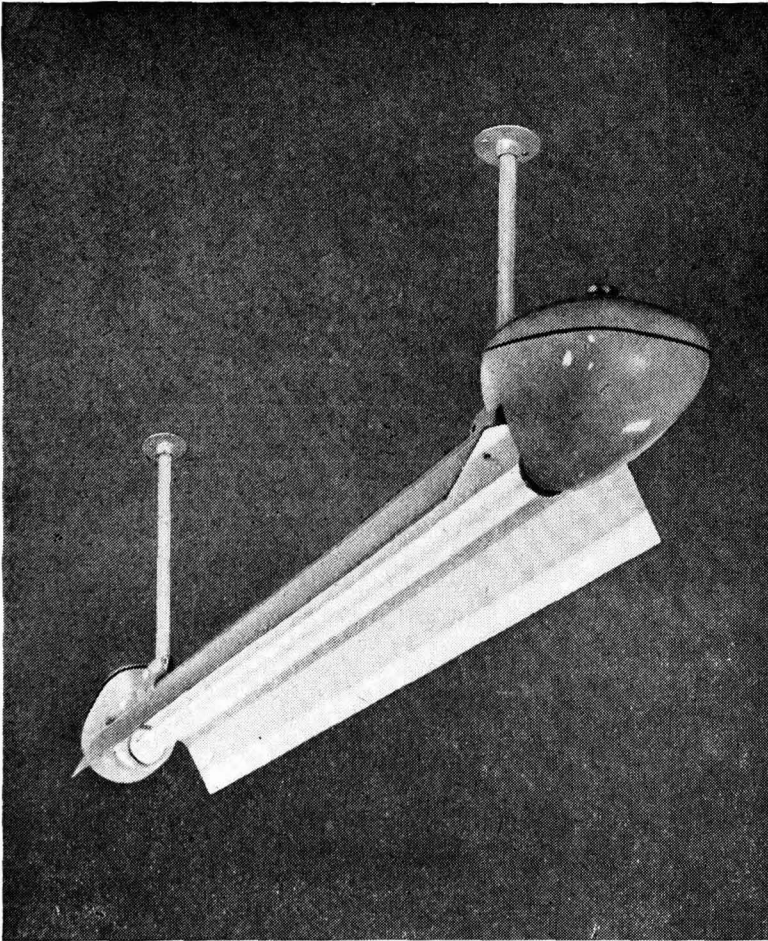
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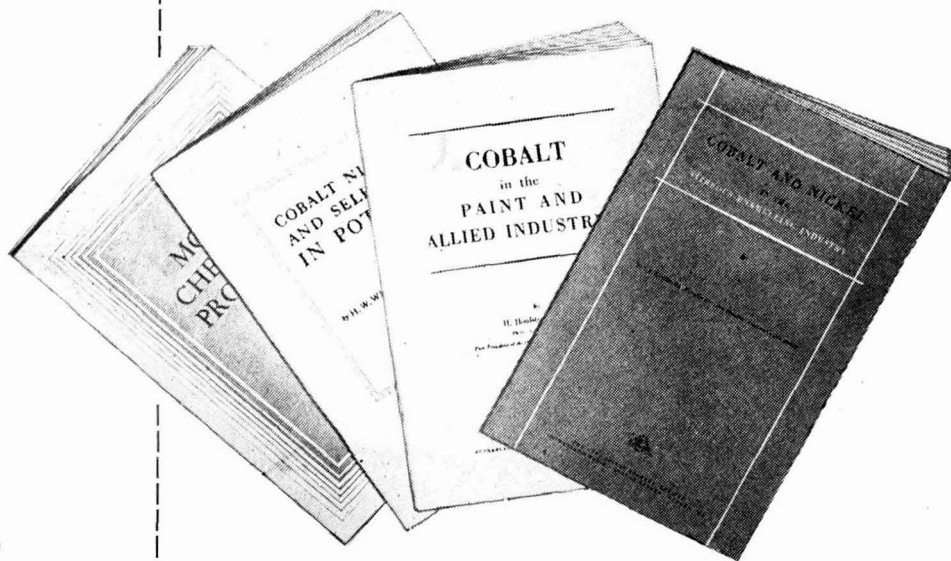
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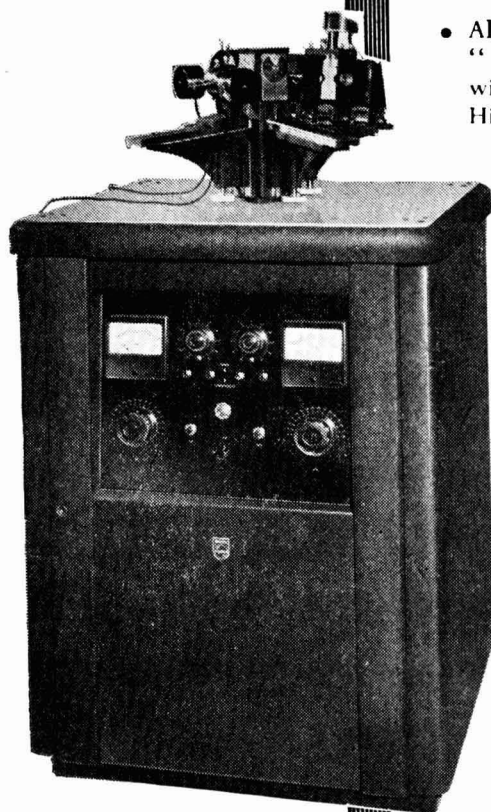
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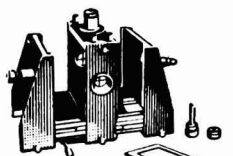
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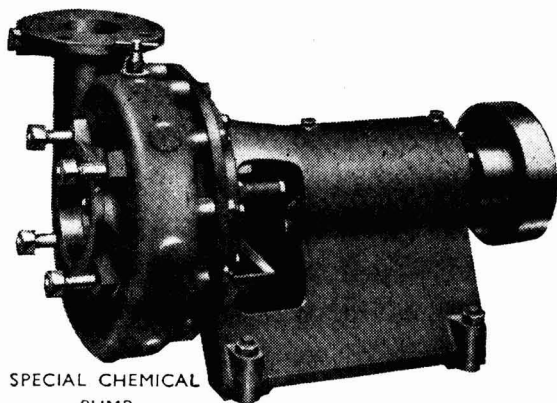
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Aspects of Safety

IT has been said that accident prevention is predominantly an attitude of mind. Few will quibble over the rights or wrongs of that generalisation. It follows with reasonable logic that if the right attitude of mind can be generally developed throughout a works, the accident risk can be greatly reduced. An individual's mental outlook, however, is not wholly formed by persuasion and 'propaganda'—some of that outlook, some of the tendencies it must adopt, are formed by deeper-rooted inherent influences. The fact that the British way of life has been more dangerous and considerably less secure since 1939 has already brought marked and apparently permanent changes in the outlook of younger generations.

It may be that the pursuit of security was no more than an illusion in the earlier part of this century, but in its own time it was an illusion with all the trappings of reality. Post-war generations have had to face a variety of starker circumstances and it has been a reasonable reaction to live in terms of the present and shut out prospects of tomorrow. Those whose attitudes to life have been formed earlier—say, prior to 1935—seldom appreciate how common or how deep this difference in outlook is; though occasionally the extent of the gulf between today's middle-aged and youthful outlooks flare up almost painfully in some casual family or social discussion. The atomic bomb, the housing shortage, the effect of constant inflation upon the purpose of saving, these are all powerful influences to which the present 20-25 age group has been constantly exposed. In addition, the

older, more individual attitude to economic security has been considerably displaced by the mass operation of the so-called welfare state.

An instinct of personal caution is not readily fostered in social soil of this kind. As the proportion of older workers in factories falls, so the steadying influence of the pre-war outlook is likely to diminish, and the task of safety officers may easily become more arduous, with greater and greater efforts of persuasion being required to maintain the same degree of response. Part of the appalling accident rate on our roads may well be attributable to the same cause, and not as much as is supposed to the state of the roads and the excessive presence of aged vehicles.

Nevertheless, works safety schemes face a perpetual dilemma. Over-emphasis can engender anxiety, and anxiety can in turn produce the state of mind that actually causes accidents to happen, the so-called 'accident syndrome'. In a small works it may still here and there be possible for a stern disciplinarian to compel attention to safety practices, but in general the power of even the benevolent disciplinarian has waned with full employment. The solution to the dilemma is paradoxical, but this is not unusual when the 'human factor' is principally involved. If the persuasive appeal is powerfully allied with appeals to the sense of humour, there is small risk of either danger from over-emphasis—of anxiety or of indifference. The light approach, even the cartoon approach to warning notices, secures attention.

It may be argued that this will not secure the right kind of attention, but

facts would seem to point in the opposite direction. The Du Pont organisation has a remarkably low accident-rate (see *THE CHEMICAL AGE*, 1955, 73, 484). This is reasonably claimed to be the lowest in the world for chemical industry. Substantial use of the light approach has been made in Du Pont works. It has certainly not been the main form of approach, but it has been skilfully employed to maintain attention and prevent the development of complacency where accidents themselves have ceased to operate as warnings of accident-risk.

Good use is also made of the group-competitive influence. A low accident-rate is not merely something to be reported to shareholders as one of the annual sidelines of commentary. A low accident-rate is vigorously 'put over' as a works target, and acknowledged as a works achievement. A sense of pride in safe working is stimulated. It might certainly be argued that such a stimulus should be unnecessary, that the sense of self-preservation from injury or worse should be a sufficient incentive for any man or woman; if this were true, there would be no need for safety officers and safety programmes and accident-rates would not vary nearly as widely as they do from factory to factory.

Against this background of appeals to sense of humour and the group-spirit, the direct approach of safety-training and the frequent presence of simple and straightforward safety notices is not rendered ineffective by familiarity or apathy. Du Pont's record in 1954 was a rate of 0.33 injuries per million man-hours compared with a rate of 3.27 for the rest of US chemical industry and rate of approximately 11 injuries per million man-hours for all US manufacturing industry. In this total performance nearly 100,000 workers at more than 100 different places were involved. The accident-rate has now been so reduced that it is now about 90 per cent concerned with the everyday type of accident that can occur anywhere—tripping over, bumping into an obstacle, falling off a ladder, etc.—that is to say, accidents of an entirely non-chemical nature.

Nor is this remarkable safety performance a matter of size. It is often said that low accident-rates are far more

easily secured in large works than in small ones. To some extent Du Pont's statistics for different works support this opinion, but to a degree of differential so small that the significance of the opinion is lost. In 24 works with up to 100 employees, the injury rate per million man-hours was 0.61; in 22 works with over 1,000 employees the rate was 0.26. But the higher rate of 0.61 must be compared as well with the national rate for chemical industry of 3.27; in that perspective it still represents a superb safety achievement. 'Safety in numbers' is by no means a rule when Du Pont's small works can divide the national average by five.

The same problem that has been discussed above for chemical industry has been recently dealt with in the *Journal of the Royal Institute of Chemistry* (1955, 79, 405) in relation to chemical laboratory safety. There, too, a sense of awareness but not of anxiety must be engendered. 'The main difficulty encountered in any attempt to inculcate a proper attitude to safety is that the whole issue is entirely contrary to the youthful outlook. Youth today, more than ever, requires life to be spiced with adventure. . . . A plea is made that all 'untoward experiences' in laboratories, whether they in fact cause injury or not, should be recorded for the collective benefit of chemists. It is a plea that should be fully supported for the path of safety cannot be easily charted in experimental work; potential risks remain potential and unguarded until they have become known risks.

Laboratory safety has long relied upon training and individual sense; there is no counterpart for laboratories to the official inspection system of factories. In factories the quicker and easier operation is often the most hazardous, but preventive devices such as guards are discouragingly positioned. Speed in laboratory operations is often associated with an even greater risk enhancement and there are no preventives except discipline and experience. It has become possible for chemical industry to claim that workers are safer at work than at home. We suspect that a similar claim could not at present be made for chemists in laboratories.

Notes & Comments

Fertiliser Shock

THE National Coal Board's sharp increase in the price of coal this summer was quickly followed by equally large increases in the prices of many other important commodities. The price of fertiliser nitrogen, which has kept satisfactorily steady in recent years, has been sharply increased; this, of course, affects not only the 'straight' nitrogenous fertilisers like sulphate of ammonia and 'Nitro-Chalk' but it also raises the costs of nitrogen-containing compound fertilisers. The new rise, coming as it does upon the heels of smaller rises in July for most fertilisers, will hardly be welcomed by farmers. An increase of £2 per ton for nitrogenous fertilisers and £1 to nearly £3 for compounds according to their plant-food content are not small increases for comfortable digestion.

Optimism Hit

THE dependence of nitrogen fixation upon fuel is once again emphasised—the cost of winning nitrogen from the air is largely paid in terms of energy. Manufacturers cannot be blamed—their own production costs are determined by their fuel costs, and ever since the war the profit margin on fertilisers has been very small, certainly much too small to permit any absorption of a major jump in raw material costs. The subsidy payments for nitrogen, which are directly paid to farmers, were increased in July, and the prospects for an increased use of fertilisers seemed particularly favourable. That optimistic view must now suffer something of a reversal. Coal's greater cost has destroyed most of the economic incentive that the improved subsidies offered. Yet the fact remains that we still under-use nitrogen on most of our farms, especially for grass. Per acre (average) Dutch farmers use four times as much; their arable crops regularly have the highest yields in the world and their grassland supports much larger numbers of livestock per 100 acres.

'Arnel'

THE semi-synthetic fibre industry has successfully maintained its size despite wide-ranged competition in quality from the many new fully synthetic fibres. That these older man-made cellulose fibres have their limitations is well enough known, but low costs have always brought ample compensation. In any case their major field of trade is the cotton field. The new synthetic fibres find their expansive opportunities in the wool and silk field or in entirely new applications. Cellulose is an essentially cheap raw material for fibre production; it is relatively cheaper today than before the war, for while costs of natural fibres have made a fivefold advance, cellulose fibres have only doubled. There are signs, nevertheless, that the cellulose fibres industry is striving to reduce its quality limitations. The new cellulose triacetate fibre, 'Arnel', now being produced in America, offers lower shrinkage, better resistance to repeated washing, pleating effect retention, and a wide-ranged ability to be blended with both natural and other synthetic fibres. It also has a high melting-point, said to be about 300° C. Its resistance to stretching when wet is twice that of normal cellulose textile fibres.

Market will Grow

ONE of the initial problems encountered by most new fibres is the need to introduce new yarn spinning machinery and new looms for weaving, but this growing pain is unlikely to delay the use of 'Arnel' in the US textile and garment industries. It can be spun and woven on the same machinery that is now used for the established cellulose fibres. Trade and consumer reactions to this triacetate fibre must obviously be awaited with unusual interest. Will cellulose-based fibres of improved quality compete with the more expensive synthetics? Or will the expansion of opportunity be mainly made at the expense of natural fibres? One

effect seems certain enough—the mass market for cheaper clothes will become larger still for every advance in quality and appearance pulls in more customers.

Chelates in Medicine

THE ability of chelating compounds to grab and hold metallic cations is well enough appreciated today. Utilising this property for the treatment of metal poisoning is a most interesting application. The now familiar ethylenediamine tetra-acetate or EDTA is used in its calcium salt form; this is given by injection in glucose solutions. Clinical tests have shown that lead poisoning is substantially relieved by Ca-EDTA. The excess of lead in the system is 'chelated' and is then held in a non-ionising form; the excretion of lead increases remarkably. Within a week of commencing treatment the sharper symptoms of poisoning depart and it would seem that a complete cure is reached in about three weeks. It has been suggested that workers exposed to lead poisoning risks should be given weekly treatment with Ca-EDTA, as this is likely to increase their lead expulsion rate. This preventative use of Ca-EDTA will probably not be adopted, however; relying upon an additive substance to relieve lead absorption effects invites slackness in the use of more directly preventative safeguards, such as control of the amount of lead in the working atmosphere, etc. To use an antidote regularly is a virtual acceptance of regular poisoning! It is hardly sound in principle.

Relieves Skin Ulcers

IT has also been found that Ca-EDTA relieves chrome-induced skin ulcers. Ointment applications have been able to extract the chromium from the base of these deep lesions, or at least to reduce the amount of chromium present; this has enabled simple and relatively painless treatments to replace much more severe operative methods. Another field being hopefully investigated is vanadium poisoning. Animal tests have shown that

Ca-EDTA is likely to be as effective in treating this kind of metallic poisoning as in treating lead poisoning.

Fuller Testing Needed

A FULLER report of these interesting developments will be found in *Industrial and Engineering Chemistry*, (1955, 47, 99A). It should perhaps be added here that the use of Ca-EDTA for treating lead poisoning and chrome ulcers has reached only the clinical-trial stage as yet, and fuller testing may be required before the therapeutic use of this chelate is widely accepted.

Borax to Increase Prices

FROM 1 October the prices of all boron products of Borax Consolidated Ltd. will be increased by amounts ranging from £1 to £1 10s. per ton. During September, the company announces, orders for reasonable quantities will be delivered at old prices, with first call to contract buyers.

Details of the new prices, net per ton, in hessian bags, are:—

| Borax— | Technical | British Pharm. |
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| crystal | £43 10s. | £52 10s. |
| powder | £44 10s. | £53 10s. |
| powder (extra fine) | £45 10s. | £54 10s. |
| Boric Acid— | | |
| granular | £70 | £83 |
| crystal | £78 | £90 |
| powder | £75 10s. | £87 10s. |
| powder (extra fine) | £77 10s. | £89 10s. |
| small flake .. | £91 10s. | £103 |

Neoboro—

pentahydrate borax £51 10s.

Dehybor—

anhydrous or dehydrated borax £61 10s.

Supplies of granular borax in paper bags will be £40 per ton, granular boric acid, £69, and neobor pentahydrate borax £50, and dehybor anhydrous or dehydrated borax, £60 10s.

Borax & Chemicals Ltd. have also announced that the prices of Three Elephant Brand borax and boric acid will be advanced on 1 October. Borax delcahydrate and V-Bor(borax pentahydrate) will be increased in price by £1 per ton and Pyrobor (dehydrated borax) and boric acid will go up in price by £110s. per ton.

The Purification of Latex

Some Possible Techniques

THE purification and isolation of rubber from latex is of great importance in the early treatment of raw rubber previous to further processing. The problem of quick and efficient isolation of rubber must be regarded as one of fundamental importance. Two important physical processes which have lent themselves to applications in this field are those of dialysis and electrophoresis.

Early processes using dialysis as a means for the separation of rubber from serum involved the use of alkali lyes at elevated temperatures, the creams being stabilised by water soluble emulsifying agents. The cream and serum being separated, further purification was accomplished by dilution of the cream with water, the contents being then dialysed until neutral (1). By this method good grade rubbers were obtained. Other methods involving dialysis for the elimination of crystalloid impurities, subjected the rubber dispersion undergoing dialysis to an applied hydrostatic pressure (2), sufficient to prevent dilution of the latex by endosmosis.

The process, similar to the removal of alkali from alkali-cellulose liquors, utilised diaphragms of vegetable parchment, the latex and water cells being arranged alternately in series. The latex cells were then subjected to a pressure of one to two lb. per sq. in. above that of the water cells. Latex containing 38 per cent dry rubber content, dialysed against seven times its volume of water at 55° C at osmotic pressures around two lb. per sq. in. lost 80 per cent diffusible material in nine hours.

Dialysis Efficiency Improved

The efficiency of the dialysis was improved by the use of soft waters, because hard waters had the tendency to deposit calcium hydroxide at the membranes, this being due to the hydroxyl ions liberated by the ammonia in the latex solution. The resultant purification could then be effected by centrifugation, creaming or evaporation. In processes involving dialysis, endosmosis has been reduced by the utilisation of feebly ionic compounds such as the ammonium soaps.

In the earlier electrodecantation techniques

rubber was separated from its solutions by means of appropriate galvanic electrode pairs, such as zinc or carbon, and short-circuiting the electrodes used. Such a method showed that the separation of rubber in half an hour was of the order of 1.5 mg. per sq. cm. Such methods however invited drawbacks such as the appearance of parasitic back e.m.f.s which would serve to depress the deposition rate of rubber and at the same time to augment the release of oxygen *in situ*.

Polarisation Phenomena

The suppression of such polarisation phenomena was later achieved by the use of easily reducible metal oxides such as those of lead, barium and nickel as cathodes, metallic zinc, cadmium or lead being used as anodes. Comparing solutions of identical conductivities (50×10^{-4} ohm⁻¹ cm⁻¹) during the same period of operation, 0.31 g. of rubber was obtained, a considerable increase over the former method (3).

As far back as 1928 workers of the Siemens and Halske Aktiengesellschaft noted that the yield of rubber from latex dispersions using AC currents often varied with the generator used, even under conditions of the same operating frequencies and this phenomenon was later interpreted as being dependent on the varying wave forms of the generators used. It was further observed that the more the observed wave form departed from the conventional sine wave, the greater were the yields of rubber per watt.

It was not long therefore before unsymmetrical wave forms found some practical applications such as for example the separation of rubber from its more dilute solutions. The required unsymmetrical voltages have been obtained by means of alternating current dynamos, having unsymmetrical magnetic fields or by the use of commutators alternating to two varying current sources.

In the more recent Nyrop patent (4), the amplitude and periodicity of the unsymmetrical wave forms were exploited so that the velocity of large ion-like particles as are present in rubber solutions under marked

increases in field strength were specifically affected.

In the technique employed in the Nyrop patent, an inner rotating electrode comprising a metal cylinder was mounted in a narrow container of insulating material, adjacent to a semi-cylindrical fixed electrode. An AC field was then applied to the inner rotating electrode so that a positive potential difference of 1,000 volts was maintained for 1/80th of a second; in the reverse phase a potential difference of 100 volts was maintained for 1/4th of a second. By this method rubber paste was deposited on the central electrode and removed by a scraper attached to the fixed electrode. The resultant paste was found to be useful in operations requiring the transportation of concentrated latex of reasonable purity.

Electrodecantation

Latex has of course been subjected to pre-treatment, in order that purer rubber dispersions may ultimately be subjected *inter alia* to electrodecantation processes (5). The globulins, albumins, polypeptides and peptones are undesirable in the heating of rubber dispersions because being heat sensitive they tend to coagulate; during electrodecantation and methods using dialysis such proteids are not removed. Pretreatment of the latex is therefore imperative in order to remove the simpler and undesirable proteids. This requires a partial hydrolysis of the latex in such a way that the simpler proteids are decomposed and so removed. This may be brought about either by the use of alkali or proteolytic enzymes.

During the period of hydrolysis control tests are carried out, which involve treatment of samples with magnesium sulphate and a little alcohol to remove the rubber by coagulation, and the addition of ammonia to disperse the proteid. The resulting serum is then subjected to dialysis until no further test for sulphate is observed. Appropriate portions of the resulting sol are then treated with (i) a solution of ammonium sulphate to 20 per cent saturation, and (ii) a solution of ammonium sulphate to 100 per cent saturation at 30° C.

The elimination of the simpler proteids is regarded as satisfactory when the amount of proteid determined in the 20 per cent solution, ranges between five to 25 per cent of the amount precipitated by the 100 per cent solution. Assuming that the decomposition

products of the proteids are mainly amino acids, it is possible that such a pre-treatment may benefit from the use of ion exchange resins, the agitated latex being passed through suitably arranged beds of ion exchange resins, before effecting either electrodecantation or dialysis.

Rubber latex may be dried by the application of radiofrequency potentials (6), this depending upon the dielectric constants of the materials subjected to the alternating potentials. Water, having a high dielectric constant, is appreciably affected by alternating potentials, the heat generated by the internal friction of the impact of the constantly re-orientating water molecules on the more sluggish rubber macro-molecules, contributing to the ultimate evaporation of the water *in situ*.

It appears that the utilisation of continuous radio frequency potentials is less satisfactory than the utilisation of intermittent potentials. The latter in operation appears both economic and efficient. Thus, for example, a gelled latex foam placed between two plate electrodes and subjected to 6,000 volts at a frequency of 15 megacycles lost only 50 per cent of the quantity of moisture that had been lost in an identical sample which had been subjected to intermittent potential applied at periods of ten seconds on and off for a period of three minutes. In the continuous process it is possible that the cloud of steam exerts a heat dielectric affect and prevents the easy evaporation of the steam locked *in situ*; if this is true the use of hot air to remove the steam cloud in the continuous process may improve the drying operation of the latter.

REFERENCES

- (1) BP 368718
- (2) BP 458130
- (3) BP 375270
- (4) BP 696813
- (5) BP 548726
- (6) BP 614434

Still Going Strong

An 89-year-old man who still goes to work each day is reported to have said that he was 'still young and active when he was 80'. He is now in what he describes as 'semi-retirement', working from 10 a.m. to 3.30 p.m. five days a week at a chemical works. states an item in the current issue of *Information Service*, published by the Ministry of Labour and National Service.

German Chemical Sales Up

But US Competition Felt

SALES by chemical manufacturers in the German Federal Republic amounted to DM.6,700,000,000 in the first six months of this year, a 14 per cent increase compared with the same period last year; the volume increase was of a similar order, prices having on an average remained unchanged. Chemical exports from the Federal Republic amounted to DM.1,630,000,000 in the first half of this year, an increase of 18 per cent over the corresponding period of 1954.

While the advance in domestic and export sales of chemical products reflected by these figures is substantially above the rate recorded by most other countries, it was in line with the general expansion of industrial production and exports in the Federal Republic. Although full use continued to be made of available plant and demand in important sectors frequently exceeded production capacity, business activity proceeded smoothly. The German chemical industry has so far escaped the unrest created by higher wage demands in some other German industries, and leaders of the industry expect the general level of chemical prices to remain stable.

At the same time it is pointed out that the pressure on prices emanating from the world market has if anything grown stronger. While foreign demand for organic and inorganic industrial chemicals and for plastics materials remains keen, export proceeds of other products, especially those directly entering consumption, left much to be desired. US competition was felt more keenly by German chemical exporters, in particular in the important Latin American market, and Japanese competition may be more noticeable in the near future in some Eastern markets.

Dyestuffs Sales Reduced

German dyestuffs exporters had to reduce their sales in some Asiatic and Latin American countries; shipments to Pakistan and Argentina were halved. Exports of nitrogenous fertilisers experienced an above-average increase and together with industrial chemicals and plastics largely accounted for the big increase in total chemical exports. New products account for an

increasing share of the export as well as domestic sales of leading German manufacturers. The percentage share in the world market of the Federal Republic however is still only three-quarters of what manufacturers in this part of Germany supplied before the war—13½ per cent compared with 17-18 per cent.

Höchst Heavy Water

Farbwerke Höchst AG have officially announced that they will start the production of heavy water in the foreseeable future. Erection of the necessary plant is expected to take at least 18 months. About DM.10,000,000 are to be spent on the plant which will have an output capacity of six tons a year. It will make use of the hydrogen and electrolytic chlorine supplies available at Höchst. It is learnt that experience gathered in the field of heavy water production by IG Farbenindustrie will be utilised at the new plant. The final decision to proceed with the project appears to have been taken upon the return to Höchst of Professor Winnacker, the member of the board who attended the Geneva atomic conference.

An atomic power bill will shortly be submitted to the Federal Government to provide a legal foundation for work in the atomic field. The Ministry of the Interior will be responsible for basic research and the Ministry of Economic Affairs for the utilisation of atomic power. DM.5,000,000 have been made available for preparatory work on the reactor at Karlsruhe which will be available chiefly for industrial experiments and maintained largely by private industry. The projected reactor at Munich will serve purely scientific purposes and will probably be maintained by the Bavarian Land Government.

The Federal Government is now negotiating with the US Administration on the supply of reactors to the Federal Republic under arrangements analogous to those concluded by the US with other countries. Once such an agreement has been concluded, it is hoped to buy from US companies the equipment and materials for work in the atomic field which cannot be obtained

freely in the world market. The German authorities will also try to make arrangements with the US concerning co-operation including the supply of reactors for industrial purposes. A Federal Government spokesman stated that it is also hoped to establish contact with the British authorities and to arrange co-operation with them. It now appears that the large financial expenditure is not regarded as the principal obstacle to progress in the atomic field in Germany; the lack of trained personnel is now thought to be more serious, and the Federal authorities therefore attach special importance to arrangements with foreign countries which will enable Germany to make up the leeway.

In the meantime several truckloads of discarded rock from Sophienhalde, near Wittichen in the Black Forest, have been removed to Leverkusen for experiments on the extraction of the uranium which it contains.

Cytisine Synthesised

TWO University of Wisconsin chemists, Professor E. E. Van Tamelin and Mr. John Baran, a graduate student, have succeeded in synthesising cytisine, an extremely poisonous alkaloid. An announcement by the University of Wisconsin claims that this is the first time it has been done.

Chemists have been trying since 1930 to synthesise cytisine, which, because it is so poisonous, is of little practical value. The result of Professor Van Tamelin and Mr. Baran's discovery is important because a barrier in the synthesis of certain types of compounds can now be overcome. In their synthesis the two chemists began with a cheap simple coal-tar product called α -picoline.

Cytisine is a member of a family of alkaloids known as lupinanes, and in most lupinanes there exists molecules of a unique, unsymmetrical, bridged structural type. Until now chemists have been unable to synthesise this system and build the molecule in a test tube. While other alkaloids have been synthesised, it has not previously been accomplished with a member of this type.

In the early 1930's two groups of chemists, in England and in Austria, simultaneously worked out the chemical structure of cytisine, showing it to be one of the complex lupinanes.

Boiler Feed Water

Amine Treatment Reduces Costs

THE PROBLEM of scale formation in high pressure water tube boilers installed on board modern ships has largely been solved by the use of chemical treatment. However, difficulties are still experienced which arise from the presence of traces of iron and copper in the boiler feed water.

During 1954 trouble was experienced on board tankers of the Esso fleet and investigations carried out by the Alfloc Water Treatment Service of Imperial Chemical Industries suggested that the failure was connected with corrosion of steel cargo heating coils and pick-up of copper in the ships' feed systems.

It was recommended that the boiler feed water should be treated with a volatile amine which would pass over with the steam to ensure that the condensate remains slightly alkaline so that corrosion in the steam, condensate and feed systems, including the cargo heating coils, would be stopped.

Cyclohexylamine was selected for application and it is essential that the pH value of the condensate should be measured at frequent intervals and the treatment varied according to the test results obtained.

Methods of determining pH using indicators and colour standards were considered unsuitable and it was finally decided to use a continuously recording pH meter of the industrial type. The pH meter selected was Model 28 supplied by Electronic Instruments Ltd., of Richmond, Surrey, and this instrument together with ancillary equipment formed the monitoring system by which the amine treatment was controlled.

Following the successful outcome of this trial it has been decided to extend similar treatment to other tankers of the Esso fleet, and in fact, EIL pH equipment has already been installed in the *Esso Oxford*, *Esso Cambridge*, *Esso Canterbury*, *Esso York*, *Esso Westminster* and *Esso Exeter*.

An important feature of this new treatment is the considerable saving anticipated in costs of repairs and maintenance.

US Asphalt Sales Up

Asphalt and asphaltic products sales in the US last year increased by 5 per cent reports the US Bureau of Mines.

Engineering Exhibition

Many Chemical & Allied Firms on Show

AUTOMATION is far past the drawing board stage' said Mr. H. S. Broom, M.B.E., at the inaugural luncheon of the Engineering, Marine and Welding Exhibition and the Foundry Trades Exhibition which is at Olympia till 15 September. He said that with the present shortage of labour its development was certain to follow rapidly in many branches of industry. Electronics were utilised not only in the factory and for accounting, but also for applications such as the control of refineries and the production of cement.

Mr. Broom warned those present that Britain must not price herself out of world markets. Efforts must be made to keep production costs down as similar efforts would be made by our competitors abroad.

The present exhibition occupies 250,000 square feet, compared with the figure of 60,000 square feet at the first exhibition, held in 1906.

Bakelite are showing resins for shell moulding, resins for pre-coating sands, core binders, parting agents, wetting agents and glues for the assembly of shell moulds. Also on the stand is a variety of actual shell moulds and cores together with examples of castings.

A mixture of dry sand and powdered resin are the starting materials for the process. Moulds are built up by dropping the mixture on to heated metal patterns. These shells can be hardened by heat in a matter of minutes. Hollow cores are produced by suitable variations of this technique.

Economy

Economy of operation is claimed for the process since the amount of sand bonded to produce satisfactory moulds and cores is small in relation to the weight of metal poured. Furthermore the quantity of resin used is never more than 10 per cent of the weight of sand, and in most cases five per cent is adequate.

The procedure is to 'dump' the resin/sand mixture on to a metal pattern previously heated to 365-500°F. and lubricated with a suitable parting agent. After 10-40 seconds the pattern can be removed and the shell placed in an oven for final hardening. This

is carried out at a temperature of 550-700°F. and usually takes from one to five minutes according to thickness.

The shell moulds remain sufficiently rigid for accurate casting during the pouring of metals, but their breakdown is rapid enough to make knock-out virtually unnecessary. The mould is porous and all gases generated can escape easily.

An important safety device is incorporated in Safety Switch Valves type LG/MS made by Black Automatic Controls Ltd. With valves controlling an industrial gas line shut off in the closed position is imperative for safety, but it sometimes happens that a solenoid valve remains partly open even though the solenoid is de-energised. The type LG/MS embodies a safety switch actuated by the physical movement of the valve disc. This switch can be adjusted to very fine limits in such a way that the switch is actuated only when the valve seat and port are known to be in contact.

Thermometers

A wide range of temperature measuring instruments is being shown by the British Rototherm Company Ltd. Included in the exhibit are bi-metallic temperature gauges, dial type mercury in steel distance reading and rigid stem temperature gauges, and Talligraph batch temperature and vacuum recorders.

The Carbon Dioxide Company, part of the industrial group of the Distillers Company, is exhibiting a wide range of equipment for the supply of liquid carbon dioxide.

A recent development in the foundry industry has been the introduction of the carbon dioxide process for the rapid production of accurately dimensioned and highly finished sand cores and moulds. This process is being demonstrated by Foundry Services Ltd. and by the Harborough Construction Company Ltd. Another application of carbon dioxide is the CeDeCut coolant technique which is being demonstrated by the Stanton Machine Tool Company Ltd.

The Carbon Dioxide Company was closely associated with the development of the foundry process and claim actually

to have introduced the CeDeCut technique.

Cathodic Corrosion Control Ltd. claim to provide a corrosion prevention service to industry as a whole. Their technical staff are available to discuss any phase of cathodic control—shipping, harbour, marine installations, pipelines and many others.

Fully automatic control of practically all oil and gas-fired appliances is claimed to be possible using the control unit type FS9M made by Elcontrol Ltd. The following safety features are contained in this unit: safe automatic ignition on lighting up, immediate fuel cut-off on flame failure, automatic lock-out on fuel supply failure.

Conductivity

The conductivity of water passing through an industrial type flow cell can be monitored using the CC4 Conductivity Controller. The alarm point at which the control relay de-energises can be set on a dial which is calibrated in conductivity units. Should the conductivity of the fluid rise above this set figure the relay de-energises and alarm circuits can be powered. The unit is also fitted with red and green signal lights. The green light is lit when the conductivity is below the set figure. When the alarm point is reached the red light comes on.

An innovation by Elcontrol is flameproof housings for their equipment. These are not yet in use, but another new development, standard detachable units, is being supplied. A complete control unit or other device is mounted on a panel which can be removed as one piece from the housing, thus facilitating maintenance and repairs.

Two divisions of I.C.I. are exhibiting. The metals division is showing non-ferrous tubes for condensers, coolers and other special plant in land and marine power stations, together with a range of titanium and titanium alloy strip, sheet, tubes, wire rods, sections, forging stock and ingots.

Silicones are being shown by the Nobel Division. Demonstrations are being given of the temperature-resistant properties of these materials. Special purpose silicone rubbers are displayed as gaskets, seals and other mouldings.

Illustrations of the properties of SG Iron, the physical properties of the nickel-iron alloys and the low-temperature properties of nickel alloy steel are the features of the Mond Nickel Company's stand.

Demonstrations are being given of magnetostriction, temperature control and resistance to creep. The high modulus of elasticity of SG Iron is also being demonstrated. It is claimed that this metal can be bent, twisted or struck without failure.

Other exhibits will show protective finishes and the welding of nickel alloys. There is also a new device that assists in the choice of materials for a given combination of properties.

What is claimed to be the first industrial X-ray equipment to employ gas insulation for both X-ray tube and transformer is being shown by Newton Victor Ltd., a subsidiary of Metropolitan-Vickers. This, the Raymax 150, can be used to examine welded joints up to 1½ in. thick on open constructional sites.

The high voltage transformer and the transformer for heating the filament are both contained in a cylindrical steel tank 18 in. in diameter. The X-ray tube is connected directly to the high voltage transformer in the same tank, but the target is at the end of a small diameter pipe projecting 18 in. from the main tank. Sulphur hexafluoride is used for the insulation of both transformer and X-ray tube, thus helping to keep the weight at a minimum. This equipment can be easily adapted for laboratory use.

Soft Radiation

Newton Victor are also showing new equipment for low voltage radiography applicable to specimens of very low density. With the very soft radiation from this equipment radiographs of such thin specimens as postage stamps clearly show the franking marks.

Rozalex Ltd. claim that they are the only company in the world solely devoted to the manufacture of anti-dermatitis barrier creams for domestic and industrial use. Over 25 years of research and development, they say, have produced a range of creams to protect the skin against almost all known irritants.

Protection against dusts, dry irritants and oils is provided by Rozalex No. 1, which was the first cream to be developed and is still the most widely used. It leaves a dry invisible and flexible film on the skin which does not stain paper or fabrics.

Rozalex No. 2 is a water-repelling cream

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Proprietary Medicines

Meeting Hears Manufacturer's Point of View

THE manufacturer's point of view of proprietary medicines was put by Mr. H. Treves Brown, B.Sc., F.P.S., at a meeting of branch representatives of the Pharmaceutical Society, held as part of the British Pharmaceutical Conference (Aberdeen, 29 August to 2 September).

Mr. Treves Brown said he was concerned almost entirely with the proprietaries, commonly called 'ethical', which in general reached the ultimate consumer as the result of having been prescribed by a doctor and were not advertised to the public.

National Health Service prescriptions of proprietary preparations in England and Wales had risen, he said, from 18 per cent of all prescriptions in 1950, to 23 per cent in 1951; 27 per cent in 1953; and 31.75 per cent last year. These figures reflected the results of research work, most of which had been conducted by the pharmaceutical industry in this and other countries. Manufacturers knew perfectly well that the pace of progress was now so great that, unless new products were forthcoming from their research departments, their continued existence would be imperilled by a gradual cessation of interest in existing products as they became superseded.

It must therefore be accepted as quite inevitable that the number of useful proprietaries would continue to grow and those concerned must learn how to adjust themselves to the situation.

Main Grievances

The pharmacist's antipathy to proprietary medicines appeared to arise from three main grievances, whether real or imaginary: (1) he might have to keep in stock a multiplicity of brands of, say, tablets of the same chemical compound, which made his financial investment larger than it need be; (2) he might find himself with useless stock, perhaps because a doctor had changed to a different brand, or given up using the particular substance or combination; (3) he might find it impracticable to keep in stock all available brands of a preparation, and, if he required to dispense a brand he did not carry in stock, this caused delay to the patient and trouble to himself.

Manufacturers recognised that there was some substance in such grievances, but although irritating, were they really as serious as sometimes suggested? There was nothing unusual in a chemist finding he needed to keep in stock more than one brand of an article—say photographic films or cosmetic preparations. Why not for medicinal items? There could be no doubt whatever that more products in total were becoming available, but the existence of several brands of the same pharmaceutical product was probably less prevalent today than it was during and soon after the 1939-45 war.

Lowered Profitability

Dealing with the supply of proprietaries under the National Health Service, Mr. Treves Brown remarked that there seemed to be rather a vague feeling abroad that the pharmaceutical industry was doing exceptionally well out of the NHS. Nothing, he commented, could be further from the truth. Such evidence as was available clearly suggested that the profitability of the pharmaceutical industry was very much lower than that of industry in general. The average annual profit over three years for 2,500 industrial companies was between 18 and 20 per cent of their capital of £6,000,000,000. The average annual proportion of profit to capital of 18 companies with a substantial sale of proprietaries was only 13.6 per cent for the same period, or only about two-thirds of that of industry in general.

Again, the cost of the National Health Service in the year 1954-5 was about £512,000,000, while sales of the industry's products for use in the NHS amounted to £37,400,000, of which proprietaries accounted for £17,400,000, about 8d. in the pound. If they assumed that as much as half of this was profit, an extremely improbable assumption, and that proprietary manufacturers made in future no profit at all, the saving in cost of the National Health Service would be a mere 4d. in the pound. As taxpayers they would all want the Ministry to take every opportunity of reducing the cost of the NHS, but

it did not seem to be generally realised that the scope for saving by reducing the price of proprietaries was quite small.

Parallel with the attention given to the prices of proprietaries by the Health Departments was the continual pressure on doctors to reduce the extent to which they prescribe proprietaries on NHS prescriptions. Officially, direct pressure was exerted only where the average cost of a doctor's prescription was relatively high, and it was accompanied by assurances to the doctor that he could order any medicine he considered necessary for his patient, so that the principle of freedom in prescribing was, in theory at least, preserved. In practice, the doctor who remained uninfluenced by the verbal warnings—or should he say 'advice'?—of the Regional Medical Officer in regard to the prescribing of proprietaries must be a very rare bird indeed.

Freedom for Doctors

This continual pressure, much of it indirect, obviously antagonised the manufacturers, and pharmacists in retail practice should not overlook its influence when wondering why Dr. Blank had ceased to prescribe what had hitherto been his favourite proprietary. If, as the industry believed, the prices of the great majority of proprietaries were reasonable, the doctor should be allowed the practical as well as the theoretical freedom to prescribe them.

The acceptance by the Health Departments of the Cohen Committee's recommendation that products advertised direct to the public should not be prescribed under the NHS seemed to him to be quite an illogical ban. He supposed that one object was to prevent a patient from putting pressure on his doctor to prescribe something that the patient wanted and the doctor did not think he ought to have.

He found it difficult to believe that patients would attend their doctors' surgeries, be persuaded in this way against their better judgment, and then pay their shillings to the pharmacist on any significant scale. Self-medication for simple ailments was something the public would not give up. If a manufacturer truthfully asserted that his product was of value in relieving a certain condition and published that assertion to the public, who had gained by a rule which banned a supply of that

product on an NHS prescription? If the ban was aimed at the alleged pernicious practice of self-medication, could it not be said that it had the effect of stopping people from going to their doctor when the patient would at least place himself under medical supervision?

One way of overcoming the ban was to pack the same product under two names and advertise only one of them. This made it necessary for the chemist to duplicate his stock, and, of course, it had the disadvantage for the manufacturer that it meant shorter runs in the packaging plant. He doubted very much if the public was deceived by the manœuvre, but apparently all concerned were satisfied with this solution.

What were they to tell John Citizen to help the creation of an informed public opinion on proprietary medicines? That, without the right to sell proprietary medicines, the pharmaceutical industry of this country would rapidly disappear. We should be dependent on foreign countries for all essential drugs and a notable contribution to the country's export trade would be entirely lost.

Constant Light

ILLUMINATION of substantially the same spectral composition as natural daylight from a clear northern sky at noon on a March day is claimed from a newly developed lighting unit made by Philips Electrical.

One of these units has recently been supplied to a firm of colour printers.

It is often found that the colour constancy of natural daylight is insufficient to permit of accurate colour matching. This is due to the varying distances that light rays have to travel through the earth's atmosphere at different times of the day.

The Philips unit consists of a number of fluorescent lamps housed in a reflector casing of grey hammer-scale stove enamel. The apparent colour temperature of the combined source is said to be 10,000° K.

Philips believe that this instrument will be of use in a wide range of industries, e.g. textiles, paper, dyeing, leather, paint, in the chemical industries, wherever it is essential to limit colour gradations to a minimum.

The Nature of Plastics

Symposium at Pharmaceutical Conference

AT a symposium held as part of the British Pharmaceutical Conference at Aberdeen (29 August to 2 September), C. L. Child, B.Sc., Ph.D., of the Plastics Division of I.C.I., discussed the 'Nature and Properties of Plastics.' A shortened version of Dr. Child's address follows:—

The group of materials known as 'plastics' is hard to define unambiguously and yet comprehensively, but easier to describe. It is a group of new materials of construction, numbering several hundreds described in the literature and in patents, but of which only about a score are as yet of commercial importance.

A member of this group may have some properties which differ, not only in degree, but in kind from those of another, but in certain respects each member differs from the others only in a small degree. It is this essential similarity which enables us to group them together under the description 'Plastics'.

Important Similarities

These are their important similarities: 1. Plastics are synthetic, of high molecular weight and with complex molecules; 2. Plastics are usually organic chemicals; 3. Plastics are sensitive to temperature, and at some period in their history there is a temperature at which they can be made to flow in a controlled manner under applied pressure. Some retain this property throughout their history, others, having reached this temperature, undergo a chemical change and become infusible; 4. Plastics have limited temperature ranges of usefulness, becoming more brittle as the temperature decreases, softer as it rises; 5. Plastics are of low specific gravity—generally in the range of 0.9 to 2.5; 6. Plastics have mechanical strengths approaching those of metals measured on a strength to weight basis, but much lower stiffness; 7. Plastics are electrical insulators; 8. Plastics have low thermal conductivity; 9. Plastics are generally resistant to inorganic chemicals, but in general are attacked or dissolved by organic chemicals.

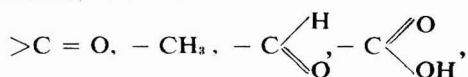
It will be seen from 1 and 2 that there are no clear cut dividing lines between plastics

on the one hand, and fibres and textiles, or rubbers, or paints and varnishes on the other.

It is sometimes said that plastics can now be 'tailor-made' by the chemist to meet a particular application. It is true that modern physico-chemical theories enable us to correlate some of the properties of a plastics material and specific features of its molecular 'make-up' and from this knowledge we can forecast to some extent the kind of molecule and molecular arrangements which must be obtained in order to give a product with certain properties. This can be illustrated by a consideration of the problems encountered with the (chemically) simplest plastic, polythene.

This plastic is made by polymerising ethylene of high purity at high temperature and pressure. The polymer chains so formed can be of any desired length—hundreds or thousands of ethylene units long. By assuming this kind of picture for a polythene molecule, we can account for some of the properties of the polymer. The material behaves chemically as we expect, and it is an outstandingly good electrical insulator. It has a crystalline structure—but only in part; partly it is amorphous. It therefore has a sharp melting point, and also a wide softening temperature range. Furthermore, it is flexible and remarkably tough, becoming brittle only at low temperatures, sometimes lower than -100°C .

It is apparent that our simple picture of a molecule, $-(\text{CH}_2)_m-$ is incomplete. Some of the factors which we have not considered—but must—are (1) the value of m , that is, the length of the chain, (2) the terminal groups of each chain, (3) the possibility of chain-branching, its frequency and the lengths of any side chains, and (4) the presence of groups, even in minute quantities, such as



and so on, arising from the presence of the catalyst or traces of impurities. It is unnecessary here to pursue these complexities further, so long as their existence is remem-

bered, and it is appreciated that these and many related difficulties severely limit our ability to forecast, or fully understand, the properties of plastics.

With this qualification we can make some generalisations. Thus we can safely say that plastics owe their importance to the fact that they consist of macro-molecules—long chains which are entangled with one another. If the chains are flexible and have little attraction for one another, then, under the influence of heat the chains can easily slide over one another, and this is manifested in a low softening point. If we want to raise the softening point, we can (i) increase the interchain attractions, for example, by introducing polar groups into the molecules; or (ii) we can stiffen the chains, for example, by introducing large groups which impede free rotation about C—C links in the molecule, or (iii), we can do both. Finally, we can modify the properties of the material drastically by chemical substitution and by linking chains together by strong 'chemical' bonds, so giving a vast irregular network which is in effect a super giant molecule, weighing perhaps several pounds. If the links are numerous as well as strong, and the chains stiff, we can raise the softening point to such an extent that the material becomes infusible, decomposing before it can soften.

Control of Softening Point

On the other hand, it is possible to lower the softening temperature of a given polymer by what may be called external chemical means. This is the process of 'plasticisation', in which polymer molecules are partly 'solvated' by a poor solvent for the material. The effect of the solvation is to reduce interchain attraction directly, and also (indirectly) by increasing interchain distances. As a result, the polymer molecules can more easily slide over one another, and this is shown by increased flexibility, lower strength, lower softening temperature and retention of flexibility to much lower temperatures. Most polymers can be plasticised, and the choice of plasticiser in any instance is governed primarily by the chemical nature of the polymer. The application of these general principles will be illustrated in the consideration of individual materials later.

Much of the importance of plastics lies in the fact that their behaviour towards heat

makes possible mass production to close tolerances at relatively low cost. Thus, with plastics such as polythene, consisting essentially of long entangled chains with no strong forces between them, heating to a moderate temperature produces a soft mass which flows very easily under pressure and which hardens again on cooling. If the material is cooled while it is held in an impressed shape, then that shape is retained when the plastic is cold. Materials behaving in this way are 'thermoplastic'. There is a second group of plastics which behave differently when heated, in that again they first soften and flow under pressure, but they then undergo a chemical reaction which leads to the linking of one molecular chain to another giving a rigid infusible material. Such materials are 'thermo-hardening' or 'thermosetting'.

Eighteen major types of plastics have been selected for further discussion and it will be most convenient to make a somewhat arbitrary division of these into the following five classes.

1. *Semi-synthetic Thermoplastics.*

Cellulose nitrate, cellulose acetate, cellulose aceto-butyrate, ethyl cellulose, and regenerated cellulose.

2. *Synthetic Thermoplastics.*

Polythene, PVC and copolymers, polymethyl methacrylate, nylon, polytetrafluoroethylene, polystyrene, and polyvinyl pyrrolidone.

3. *Synthetic Thermosets.*

Phenol formaldehyde, aniline formaldehyde, urea formaldehyde, and melamine formaldehyde.

4. *Polyesters.*

5. *Silicones.*

SEMI-SYNTHETIC THERMOPLASTICS

The important members of this class are all based upon cellulose which is chemically modified to form either esters or ethers.

Cellulose nitrate. Cellulose nitrate, conventionally plasticised with camphor and castor oil, is the oldest of the plastics of present-day industry, having been discovered independently in England and America in the middle of the 19th century. It is best known under one of its trade names, 'Celluloid', and is variously described as 'cellulose nitrate', 'nitro-cellulose', 'NC' and 'pyroxylin'. Its uses for dress ornaments

and toilet accessories, such as combs, brush backs, spectacle frames, etc., are well known, and it is probably the most widely used material for knife handles.

Cellulose acetate. The first attempt to overcome the inflammability hazard of cellulose nitrate was to modify the cellulose with acetic acid instead of nitric acid. The product retains many of the advantages of nitro-cellulose, and overcomes its extreme inflammability, but cellulose acetate suffers from being much more sensitive to water and water vapour, so that its dimensional stability is inferior to that of nitro cellulose. Cellulose acetate is plasticised with organic esters such as phthalates and because of its non-inflammability, its attractive colours, its stiffness and its toughness, it has found a major application in the manufacture of toys, and in transparent foil form for packaging. Cellulose acetate is used as the basis of 'non-flam' photographic film.

Cellulose acetobutyrate. The mixed ester of acetic and butyric acids was prepared in an attempt to overcome the moisture sensitivity and consequent dimensional instability of cellulose acetate. It suffers from the drawback that in certain circumstances the odour of butyric derivatives is perceptible.

Ethyl cellulose. Ethyl cellulose is characterised by having a very high strength and general toughness. It is employed mainly in industrial applications, but has been used for the manufacture of hammer heads.

SYNTHETIC THERMOPLASTICS

It is in this branch of the plastics industry that the greatest advance has been made in the last 25 years. In fact, it is only during this period that the synthetic thermoplastics have become of commercial importance. They are made either by polymerisation of compounds containing an ethylenic double bond, or by condensation of bi-functional molecules, e.g. the condensation of di-acids and di-amines, di-acids and di-alcohols, or the self-condensation of amino-carboxylic acids.

Polythene. Reference has been made earlier to the chemistry of this polymer. Its most important fields of use are in the insulation of low and medium voltage power cables (up to 11 kilovolts); in the insulation of high frequency communication cables (radar, television, submarine telegraph and sub-

marine telephone); in sheathing underground cables operating in corrosive soils; in tubing for chemical plant and domestic, industrial and agricultural cold water supplies, and industrial effluent drains; in packaging films, for individual packs and drum liners; in surface coating papers for packaging; in domestic ware (bowls, baths, brush holders, racks, etc.); and in flexible and unbreakable containers, ranging from very small to 55 gallon capacity.

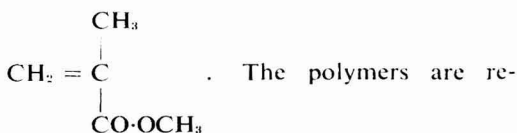
Polyvinyl chloride (or PVC). This plastic is chemically very closely akin to polythene, differing from it in having one hydrogen on every second carbon atom replaced by a chlorine atom. This modification, however, has profound effects on the properties, and hence the uses, of the polymer. The effects of the chlorine atoms in the molecule are to hinder regular packing of the chains, thus preventing crystallite formation, to increase the stiffness of the chains, to increase the interchain attraction, to make the molecules electrically unsymmetrical, and to make the product non-inflammable. Thus PVC is generally wholly amorphous, and it has a wide softening range with no sharp melting point. The product is hard, tough and horny, less flexible and 'waxy' than polythene. The electrical unbalance of the molecules leads to a high electrical loss factor at high frequencies, and other factors reduce the insulation properties of PVC in comparison with those of polythene.

Most commercial grades of polymer do not flow easily under pressure at temperatures less than about 160°C., and at this temperature it is difficult to prevent decomposition, with evolution of hydrochloric acid, discolouration and loss of strength. Grades of lower molecular weight are now available which, correctly stabilised, can be processed in sheet form by pressing, blowing or vacuum techniques at temperatures of 100°C. to 130°C., and these sheets are used for trays, refrigerator parts, drawer linings, signs and fluorescent lighting fitting reflectors.

Its high loss characteristics at high frequencies allow it to be welded by the high frequency or RF or electronic technique. Plasticised PVC calendered sheets and films are welded in this way to make rain-coats, babies' pants, sponge bags, racquet covers, quilted card table tops, pouches and shampoo packs. Protective clothing is often made from textile fabric coated with PVC.

either by calendering or by spreading a paste made by cold mixing polymer and plasticiser and which is subsequently gelled by heating. The pastes are also used to make toys, stethoscopes, etc., by moulding and dipping techniques. The plasticised compounds are used for a variety of extrusions—traps, belts, braces, draught excluders upholstery beading, and so on.

Polymethyl methacrylate. Chemically, methyl methacrylate can be regarded as derived from ethylene by substitution of both hydrogens on one carbon atom.



markable for their clarity and colourlessness, and for retaining these properties on exposure. They can be prepared in an unlimited range of colours, in the physical forms of powders, sheets, rods and tubes. They have a low specific gravity and are rigid and strong. Electrically, they are moderate insulators, and chemically are resistant to inorganic and some classes of organic materials. The sheets are used for glazing of aircraft, and, in corrugated forms, for glazing of buildings; for instrument panels, dials and scales; for lightweight crockery; for sinks, baths and wash basins; for lighting fittings (reflectors, refractors and diffusers) used with filament, fluorescent, mercury and sodium lamps; for signs, advertisements and display stands; for machine guards and goggles and visors. Polymethyl methacrylate moulding powder is used principally for motor car rear light covers and reflectors, for car horn buttons and insignia, refrigerator name plates, combs, brush backs and other toilet accessories, and for coloured telephones. Fine powders of polymethyl methacrylate are used, either by injection moulding, or by making a partial solution in catalysed methyl methacrylate monomer, for the manufacture of dental plates and false teeth and eyes.

Nylon. There are four basic grades of nylon in commercial production at the present time, and intermediate and special combinations of properties can be obtained by mixing polymers, co-condensing mixtures of primary reactants, and by plasticisation. Chemically, nylons can be regarded as poly-

thene in which, at regular intervals in each molecular chain, the peptide group $-\text{C}-\text{N}-$
 $\begin{array}{c} || \quad | \\ \text{O} \quad \text{H} \end{array}$ has been inserted. As a con-

sequence of the regularity of the structure the molecules can easily pack into orderly arrangements, and the four basic nylon polymers are indeed highly crystalline. The most notable effect of the introduction of the peptide group is to increase the inter-chain attraction considerably (probably by hydrogen bonding), so that the melting point is considerably increased, and (nylon 66 melts at 264°C) the material is stiffer and stronger than polythene. In fact, if the orderliness of the molecules is increased by orientation, that is by making most of the crystallites lie in a given direction, tensile strengths of over 50,000 pounds per square inch can be obtained, compared with 2,000 to 3,000 pounds per square inch for polythene.

Triumphant Achievement

Nylon plastics resulted from a research designed to produce a protein-like fibre—an object triumphantly achieved. It followed, naturally, that the first use of nylon outside the textile industry was in the form of thicker filaments. The success achieved by nylon monofil in domestic, toilet and industrial brushes is well known.

The first development of nylon in forms other than monofil was as an injection moulding material, and in this form it is proving to be a competitor to light metals. In light engineering equipment, such as for example, calculating machines, meters, and textile machines, there are many bearings and gears now made from nylon. Nylon is silent in use, it generally requires no lubrication, and where a lubricant is necessary, water can be used, so that contamination of foods and textiles with oil can be eliminated, and it will outlast metal parts.

Whereas the four basic types of nylon have entered fields previously the preserve of light metals, the newer co-polymers and plasticised compositions have leathery characteristics, and one of the most recent applications for nylon is in moulding bicycle saddles. More recently, nylon grades suitable for extrusion have been produced. Tubing, such as for blood transfusion and car pressure lubrication, and sheathing, as on wire ropes and army communication

cables, demand toughness, abrasion resistance and resistance to chemicals and temperatures above 100°C and these are provided by nylon. Nylon type 66 can be chemically modified by methoxy methylation so as to render it soluble in alcohol and water mixtures, and from the solutions water vapour permeable films can be cast.

Polytetrafluoroethylene. This high-priced material is of great interest because of its unique properties which are unexpected in an organic compound, and it illustrates dramatically the effect of substituting all the hydrogen atoms in polythene by fluorine atoms.

First of all, it has the highest density of any organic polymer (2.2 *cf.* polythene 0.92). Secondly it is unaffected by any chemical at temperatures up to 280°C except molten alkali metals and sometimes fluorine. Thirdly, it can be used continuously at temperatures of 280°C for months, without decomposition, and, in fact, must be heated to above 327°C in processing. Fourthly, it has the lowest reported coefficient of friction—less than that of wet ice on wet ice. The facts that it is in the same class as polythene as an electrical insulator, and that it exhibits remarkable non-sticking properties may be expected from, respectively, its chemical constitution and its chemical inertness.

The chief uses of PTFE are in high frequency electrical insulation in situations where high temperatures and corrosive chemicals are met; in chemical plant (tank linings, gaskets); in bearings where low coefficient of friction is required, and loads and speeds of rotation are fairly low; and in food processing plant (bakeries) where surfaces to which doughs and other mixes will not stick are required.

Polystyrene. This material is again a hydrocarbon, and can be regarded as derived from polythene by substitution of one hydrogen atom in each ethylene unit by the phenyl radicle. Its electrical insulation properties are of the same order of magnitude as those of polythene, and again, as with polythene, the softening point is low, indicating low interchain attraction and low stiffness of the chains. The presence of the phenyl group in the molecule hinders crystallisation, and the polymer is glassy in type. It is colourless, rigid and brittle. Its important properties are, firstly its low cost, and secondly the

ease with which it is injection moulded so that, although it has come into industrial production only recently, it has become the most important injection moulding material on a tonnage basis. It is of low cost.

SYNTHETIC THERMOSETS

The important products of this group are made by the condensation reaction of formaldehyde with a compound which can react chemically in at least two places. Examples are, aniline, phenols, urea, and melamine.

Phenol-formaldehyde. The term 'phenol formaldehyde plastics' covers resins and moulding powders made not only with phenol, but also any cresol or mixture of them. The reaction can be typified in two stages—the first stage produces moderately long thermoplastic chains which, in the second stage, react with further formaldehyde to form methylene links from one chain to another. As this process occurs in all directions a vast network is formed, rendering the product rigid and infusible.

The resins are dark coloured powders or liquids, and are used as adhesives for many purposes. They are unaffected by moulds or bacteria, or by moisture, and phenolic bonded plywood will withstand years of exposure even in the tropics. Because of their water resistance, phenolic glues are also used for marine work. Besides wood glues, phenolic resins are used to bond layers of paper or fabric together to make the so-called laminates for industrial and electrical work. These are employed in building as wall panels and corrugated corrosion-proof roofing sheets, and in special hollow forms and sandwich structures as partitions and bulk-heads on ships and where strength and insulation are required combined with light weight.

The best known use of the resins is as the binder for a variety of fillers to make moulding powders of the type generally referred to as 'Bakelite' (a trade name derived from that of Dr. Baekeland, who first controlled the reaction of formaldehyde with phenols). The uses of these powders require no elaboration, being so widespread in the home and all branches of industry.

Amino-plastics. This group includes the condensation products of formaldehyde with aniline, urea and melamine. Aniline

formaldehyde resins are used to make paper and fabric laminates for the electrical industry. The laminates have very good insulation properties and high strength.

Urea resins are used in the same applications as phenolic resins, but differ in several ways from them. The urea resins are pale straw coloured to colourless, and hence permit laminates and powders to be produced in a complete range of colours, whereas phenolic products, because of the basic colour of the resins, are perforce restricted to dark colours such as black and brown. The urea resins are cheaper, but more sensitive to moisture than their phenolic counterparts. On the other hand, they are odourless and tasteless and can be used in contact with foodstuffs and drinks.

Urea moulding powders are used for lighting fittings, closures, domestic and toilet ware, electrical fittings and cosmetic containers, and the laminates are used for decorative purposes.

POLYESTERS

Polyesters, derived in effect from polyhydric alcohols and polycarboxylic acids, are yielding a rich harvest of new polymers. Not all are plastics—indeed the most famous of them all is a textile, 'Terylene', but even this one, polyethyleneterephthalate, can be made into a film with unusual properties of electrical insulation, resistance to water and water vapour, and strength. Indeed, films as thin as .00025 in. thick are stronger than many films from other materials in thickness 10 times greater. It is a new product, and its possibilities remain largely unexplored, but it is certain that much will be heard of it in future years. Other classes of polyesters containing conjugated double bonds yield resins which cross-link—that is, thermoset—by polymerisation, and this process can be carried out often at pressures and temperatures near atmospheric.

These resins have found particular application in making glass fibre laminates, which are gaining prominence as structural materials for small boats, yachts and motor car bodies. Some polyesters yield foams which are of value in insulation against heat and sound, and for upholstery and vibration damping.

SILICONES

In one sense, the silicones are the odd man out of the plastics family, in so far

as their molecular chain is not composed of a carbon backbone, but of silicone and oxygen. The different members of the family are formed by attaching different organic radicals to the silicon atoms of the backbone. Although these organic pendant groups place some limitation on the thermal resistance of the silicones, the main silicon-oxygen chain proves to confer more heat resistance on the product than the carbon-carbon chain of other plastics except PTFE.

The presence of the organic side groups adds water-repellency, flexibility and solubility in organic solvents to the properties of mineral silicate—chemical inertness, resistance to heat and resistance to oxidation. An important property of the silicones is that their viscosity changes but little with temperature, so that their temperature range of usefulness is very wide—in some instances from -85°C to $+285^{\circ}\text{C}$.

Their uses lie in water repellent finishes for masonry, textiles, etc.; in providing anti-sticking surfaces in the food and confectionery industries, and in organic plastics moulding; in chemical and heat resistant rubbery tubes and mouldings; in electrical insulation of wires; in foam suppressors; in polishes; and in medical and surgical applications.

They are available in the forms of oils, greases and rubber and can be either thermoplastics or thermosetting in type.

Azote Fertiliser Agreement

UNITED Steel Corp. of America has signed a contract with Montecatini (Societa Generale per l'Industria Mineraria e Chimica), Italy's leading chemical corporation, to permit the United Steel to manufacture azote fertilisers at Geneva, 30 miles from Salt Lake City, Utah, by a new method discovered by Professor Giacomo Fauzer, the Italian firm's vice-president.

Production will be carried out at the USC's new factory now being built where ammonia will be collected from the gases given off during the manufacture of coke.

This is the fourth contract to be signed for the overseas production of azote fertilisers by the new process. The Montecatini organisation recently reached agreements with the governments of India, Colombia and Venezuela.

Du Pont's Big Three

Important Chemicals of the Future

THREE chemicals have been picked by Du Pont's Polychemicals Department as most likely to make big gains in the next few years, says the August-September issue of the *Du Pont Magazine*. They are adipic acid, 'Hexalin' (cyclohexanol), and Hytrol' O (cyclohexanone).

These three coal tar derivatives have been known for years but they only came into prominence with the discovery of nylon, in the manufacture of which they are all intermediates.

Nearly every major enterprise has some use for adipic acid, say Du Pont. In the field of plastics it is used for making plasticisers for vinyls and other synthetic resins. It is used by the chemical industry for synthesising such compounds as salts, esters, amides, nitriles, diamines, glycols and ketones. Another use is as an intermediate for electrical insulation resins.

Plasticiser & Stabiliser

'Hexalin' has also been used as a plasticiser, as well as a stabiliser for soap and detergent emulsions. It is a solvent for a large number of products including oils and waxes, dyes, lacquers, shellacs and varnishes. Other uses are, an intermediate for petroleum additives and an ingredient in dry cleaning fluids.

First and foremost 'Hytrol' O is a strong solvent. It has a high boiling point and is invaluable in making adhesives and as a thinner for finishes, especially those containing nitrocellulose or PVC and its copolymers.

When a chemical is used steadily in a few major ways, say Du Pont, lesser known applications are sometimes sidetracked. The properties of adipic acid make it useful for many other jobs. It is, for example, an intermediate for lubricating oil additives. 'Hexalin' would appear to be a good degreasing agent for a variety of substances, metals, leather and furs, and as a solvent in polishes. 'Hytrol' O has possibilities as a solvent which have hardly been touched on.

Du Pont say that they will gladly send technical data to anyone who is interested in the use of these chemicals.

Borough Polytechnic

EMPLOYERS in the chemical and allied industries are invited to visit the Borough Polytechnic, London S.E.1, to see the facilities available in the Chemistry and Food Technology Department, and to meet members of the teaching staff.

A wide variety of courses in chemistry, applied chemistry, biology and food technology are held in the Polytechnic says the head of the department, Dr. Francis Aylward, in a letter to directors and managers of chemical firms. 'We are anxious to do everything possible to provide a service to industry and to meet the requirements of chemical and allied firms.

Members of the teaching staff will be available Monday, 12 September to Thursday, 15 September, 9.30 a.m. to 12.30 p.m. and 2 to 5 p.m., to meet employers and give them information regarding the full time, part time day release and evening courses arranged for the new session. Those who cannot pay a visit during the above periods are invited to make an appointment for a later date in September.

Over 60 years ago the Borough Polytechnic inaugurated evening courses in paint technology. It is hoped now that it will be possible to start a full time course in the near future. The course is expected to be of two to three years' duration.

In addition to intermediate and degree courses in chemistry and related subjects the Borough Polytechnic offers full time courses for the Diploma and the Associateship of the Plastics Institute.

Ceramic Society Meetings

THE British Ceramic Society reports that the annual general meeting of the pottery section will be held on 19 September at the North Staffordshire Technical College, and the autumn meeting of the refractory materials section on 24 and 25 November in London at the Royal Sanitary Institute, 90 Buckingham Palace Road.

A technical session of the building materials section will be held at Olympia, London, during the building exhibition, on 24 November. Several papers are to be presented, and arrangements have been made to visit the Newdigate Brickworks, near Dorking, Surrey, on the preceding afternoon.

BIM National Conference

To Discuss Impact of Science

THEME of the British Institute of Management's National Conference at Harrogate from 2 to 4 November is The Impact of Science on Management in the Future. Intended to serve as a platform on which those concerned with the application of science to industry, commerce, and local government can give news of up-to-date developments it also enables an exchange of information between management executives.

It is expected that more than 1,000 representatives of industry will attend the Conference, and of the 24 sectional meetings to be held, one-third of them will take the form of panel discussions.

Among the speakers at the Conference will be Professor M. B. Donald, Ramsay Memorial Professor of Chemical Engineering at University College, London. He will speak on training science and engineering graduates for industry. Dr. W. L. Francis, of the Department of Scientific and Industrial Research, will speak about the research association and its link between science and management.

Four speakers will discuss the revolutionary developments in materials and processes; Dr. M. A. Matthews, of Shell Petroleum Ltd., petroleum chemicals; Dr. H. A. Thomas, of Courtaulds Ltd., man-made fibres; Mr. D. A. Oliver, director of research, B.S.A., engineering; and Dr. V. E. Yarsley, Director of Dr. V. E. Yarsley Research Laboratories Ltd, chemicals.

Bakelite Stand at Farnborough

FEATURED on Bakelite Ltd.'s stand in the static exhibition at the Society of British Aircraft Constructors flying display which ends at Farnborough, Hampshire, tomorrow, Sunday, 11 September, is a variety of aircraft components made from glass fibre material and Bakelite polyester resin SR. 17449.

The company is also displaying jigs and tools made from Bakelite paper-based laminated and Bakelite laminated densified wood, and Vybak PVC materials for cable sheathing, flexible conduit and 'cocoon' packaging.

Pakistan Tariff Modifications

THE United Kingdom trade commissioner in Karachi has forwarded copies of Pakistan Customs Notification No. 27-C and No. 28-C giving information about the reduction of import duty on drugs and medicines.

The preferential rates of duty applicable to the produce or manufacture of the United Kingdom, a British colony and Ceylon are, *ad valorem*:

| | | |
|--|----|-------------|
| caustic soda and sodium nitrate | .. | 26 per cent |
| organo-arsenical compounds | .. | 10 per cent |
| ammonium chloride (muriate) | .. | 26 per cent |
| disinfectants, insecticides, weed killers, sheep and cattle dips, etc. | | 26 per cent |

Engineering Exhibition

continued from page 520

intended primarily for the food industry, although it can also be used against cutting emulsions, soluble oils and normal machine shop coolants.

Of use where a large number of irritants occur together is Rozalex No. 8. It can be used when handling acids, alkalis, photographic chemicals and certain organic solvents, or where a high water resistance is necessary.

Rozalex also produce two after work creams. No. 3 is a water in oil emulsion which is recommended where there is low dehydration of the skin but excessive fat removal, or where a high surface fat content is required. In contrast No. 4 is an oil in water emulsion to be used when the skin is chafed, chapped or generally irritated.

Brickseal refractory products, which are used for bonding, coating and patching refractory bricks are being shown by Xzit (GB) Ltd. These products are for use in all types of boilers and furnaces with fire-clay, grog or high alumina content bricks, as well as many special bricks, provided the silica content is below 75 per cent. They can be divided into two groups—air setting and vitrifying.

Serviron dampcoat, which is also being exhibited, is an anti-corrosive material that will remain permanently plastic, thus preventing, it is claimed, the spreading of corrosion which inevitably occurs with non-flexible paints and coatings. A number of shipping companies have used Serviron Dampcoat for the protection of drinking, fresh and salt water tanks on board ship. In this application it has lasted five to six years without any renewal of the first coat.

Synthesis Gas

Heating Value Increased

GAS with a high heating value and most of the characteristics of natural gas has been produced on a laboratory scale by passing synthesis gas over a nickel-alloy catalyst, according to a US Bureau of Mines report released by the Secretary of the Interior, Mr. Douglas McKay.

Synthesis gas, obtained from the gasification of coal, is a mixture of carbon monoxide and hydrogen with a relatively low heating value. During a series of experiments in the Bureau's Bruceton, Pa., laboratories extending over several years, it was found that passing synthesis gas over a partly leached nickel-alloy catalyst in a fluidised bed permits high throughput provided that the heat of reaction can be controlled.

Bench-Scale Tests

In the bench-scale tests reported, this was done by injecting the gas into the reactor at several points instead of only one. This method of operation served to distribute the heat throughout the reaction zone instead of concentrating it at one place. The product gas is methane, the principal component of natural gas. It could be used in appliances designed for natural gas, as most of those now used in America are.

The report says that when the catalyst lost its strength, additional leaching restored it to full activity. The same catalyst was treated in this manner several times.

The tests were conducted as part of the Bureau of Mines research programme on synthetic fuels, and the report says that they yielded enough data to provide a basis for larger-scale experimentation at some future time. They were designed to supplement the Bureau's studies on direct gasification of coal. This work is being done because of a growing demand for gaseous fuels and a realisation that the supply of natural gas, like that of other mineral resources, is not inexhaustible.

A copy of R.I. 5137, 'Synthesis of Methane', by Murray Greyson, J. J. Demeter, M. D. Schlesinger, G. E. Johnson, James Jonakin, and James W. Myers, can be obtained from the Bureau of Mines, Publications Distribution Section, 4800 Forbes Street, Pittsburgh 13, Pa. It should be identified by number and title.

SCI & RIC Plan Joint Meeting

ON 30 September the Stirlingshire sections of the food group of the Society of Chemical Industry and the Royal Institute of Chemistry will hold a joint meeting at the Golden Lion Hotel, Stirling, to hear a paper read by Mr. E. O. Morris, B.Sc., Ph.D., M.I.Biol., of the Brewing Industry Research Foundation, on 'The Characterisation and Properties of Wild Yeasts of Importance to the Food Industry'.

Before this meeting it has been arranged for a limited visit to the Yeast Research Outstation of the Distillers Co. Ltd., at Glenochil, Menstrie, Clackmannanshire, at 2.30 p.m., where three general research problems are being carried out; the study of yeast propagation, chemistry of dough fermentation, and study concerned with the enzymes of malt and the composition and fermentation of distillery wort.

Transport from Stirling will be arranged, and members wishing to take part should contact Dr. S. D. Forrester at 15 Hugh Street, Falkirk, Stirlingshire. Application forms should be returned not later than 17 September.

Thermoplastic Sheet Agreement

AUSTRALIA will soon be producing Campeco-type thermoplastic sheet, including the well-known GM high gloss modified styrene, under license from the Campeco division of Chicago Moulded Products Corp. This was announced by Mr. John J. Bachner, Chicago Moulded Products Corp. executive vice-president. Moldex Ltd., of Melbourne, Australia, will manufacture the sheet, which will be marketed through Mulford & Co. Pty. Ltd., of Sydney and Melbourne.

The licensing arrangement include the interchange of technical information on methods, processes and machinery as well as the training in the US of Australian representatives in Campeco manufacturing methods and merchandising. During the span of the agreement, Chicago Moulded's Campeco division will exchange technical data with Moldex Ltd. on producing other types of thermoplastic sheet in development at Campeco. The agreement is one of several now being negotiated throughout the world.

American Potash Earnings

Reflect Increased Deliveries & Demand

SALES and earnings of American Potash & Chemical Corp. last year were higher than in 1953. Net sales for the year ended 31 December, 1954, totalled \$23,631,032, compared with \$22,461,056 in 1953. This higher sales volume reflected increased deliveries of potash, and demand for boron products, salt cake and lithium carbonate.

After all charges, including provision for Federal taxes, net income amounted to \$2,510,909. After deducting preferred dividends, earnings were equal to \$4.38 per share on the 486,984 shares of Class A and Class B stock outstanding on 31 December. Net income for 1953 was \$2,116,082, equal, after preferred dividend payments to \$4.01 per share on the 431,227 shares then outstanding.

If the company's proportionate interest in the earnings of Western Electrochemical Co. for the full year were included, earnings on the Class A and Class B stock would be \$4.69 a share. American Potash acquired 48.2 per cent of the outstanding common stock of Western Electrochemical last October through an exchange of its Class B stock. The company is a principal supplier of material used in the manufacture of jet-assisted take-off units and guided missiles.

American Potash's shareholders were told that the new lithium plant near San Antonio, Texas, is expected to begin operations by the end of next year. It will be owned by American Lithium Chemicals Inc., 50.1 per cent of whose stock is held by American Potash and the balance by Bikita Minerals (Private) Ltd, who will supply the lithium ores for the plant from its large deposits in Southern Rhodesia. American Potash holds 21.25 per cent interest in Bikita Minerals.

New TI Research Station

TUBE Investments Ltd. is to establish an applied research station at Walsall to supplement facilities available at its research laboratories at Cambridge and Birmingham. The new station will be opened early in October and it will initially house three sections of the group's technological department which acts as a bridge between fundamental scientific work and its practical

application in the group's operating companies.

The irradiated materials section at Walsall will be directed by Dr. A. Charlesby, D.Sc., Ph.D., formerly of the Atomic Energy Research Establishment, Harwell. Its development work will cover a wide field, but will be particularly concerned with irradiated plastics. The materials will be irradiated in the first instance at the Tube Investments Research Laboratories, at Hinxton Hall, Cambridge, where an electron accelerator is now being installed.

The plastics development section will be directed by Mr. J. E. Gordon, B.Sc., formerly head of the plastics development organisation at the Royal Aircraft Establishment at Farnborough. This section will be concerned with the development of processes and the necessary machines to be used in the plastics industry to take advantage of chemical advances, stream-lining of production techniques and its impact upon end-product design.

Another team at Walsall will operate under the direction of Mr. C. A. Cochrane, M.A., and will be concerned with control engineering, including the application of electronic techniques to industrial processes.

The Immedium Filter

MANY readers of THE CHEMICAL AGE will have discovered an error which crept into the article 'The Immedium Filter' which appeared on page 175 of our issue of 23 July and which described a new filter method developed by a Dutch firm, Industrieel Maatschappij Activat NV, of Amsterdam.

In this article, in the first column on page 177, a table appeared which showed the results of filtration of surface water. The units mentioned, of course, should not have been litres and minutes but cubic metres and hours. The corrected table is as follows:—

| No. of test | Quantity of effluent | Duration of run hours | Turbidity removed per cent | |
|-------------|----------------------|-----------------------|----------------------------|-------|
| 1 | Ordinary filter .. | 16 m ³ | 2.00 | 80-82 |
| | Immedium filter .. | 455 m ³ | 59.00 | 78-83 |
| 2 | Ordinary filter .. | 20 m ³ | 5.50 | 80 |
| | Immedium filter .. | 500 m ³ | 52.00 | 80 |
| 3 | Ordinary filter .. | 14 m ³ | 1.25 | 78-80 |
| | Immedium filter .. | 453 m ³ | 29.00 | 78-80 |
| | Ordinary filter .. | 13 m ³ | 1.05 | — |
| 4 | Immedium filter .. | 425 m ³ | 29.00 | — |

• HOME •

New Offices

The British Laboratory Ware Association has taken new offices at 6-7 Queen Street, London E.C.4. Telephone: CITY 1197.

Ardil Products on Tour

I.C.I. have sent a £2,000 collection of Ardil products to Portugal. They will be shown throughout the country in a travelling exhibition to publicise I.C.I.'s man-made fibres. The collection comprises 350 articles and includes Ardil blends with wool, cotton, rayon and nylon.

Fibre Microscopy

On 16 November at the rooms of the British Pharmaceutical Society, Bloomsbury Square, London, the industrial section of the Royal Microscopical Society will hold a symposium and exhibition entitled Fibre Microscopy.

Oil & Colour Chemists' Meeting

Next meeting of the London section of the Oil & Colour Chemists' Association will be on 20 September at 7 p.m. at the Headquarters of the Royal Society of Tropical Medicine & Hygiene, 26 Portland Place, London W.1. It will be the chairman's evening, and his address—'The Next Generation'.

Best British Oil Well

An official of the D'Arcy Exploration Co., a subsidiary of the British Petroleum Co., said that the oil well drilled recently at Plungar, Notts, 'is the best so far'. The well is the 13th sunk in the field.

Burroughs Wellcome Expansion

Burroughs Wellcome are to build a factory in Brazil. A manufacturing subsidiary of the Wellcome Foundation, it will trade as Laboratories Burroughs Wellcome do Brazil SA. Chief products will be chemotherapeutics. The Wellcome Foundation is also building a factory in Pakistan on the Sind Industrial Trading Estate, Karachi.

I.C.I. to Build School for Apprentices

Imperial Chemical Industries Ltd., Billingham-on-Tees, have placed a contract with Leslie & Co. Ltd., London and Darlington, for the construction of an apprentices' training school at Billingham. It is understood that the building will cost about £100,000.

Terylene Rope Order

Hawkins & Tipson, of London, have been given a Norwegian order for Terylene ropes to the value of £12,000.

Railways Research Laboratory

As part of its modernisation plan, British Railways are to establish a new chemical research laboratory in the London area to undertake investigations on chemical corrosion and building problems. This was announced following recent advertisements by British Railways for scientific staff.

British Firm Gets Argentine Order

Wilkinson Rubber Linatex Ltd., of Camberley, Surrey, have been given an order by the Instituto Argentino de Promocion Intercambio to supply 144 Linatex rubber-lined centrifugal pumps for handling abrasive slurries in the mining industry.

Dunlop Pension Scheme

Pensions of Dunlop operatives in this country will be doubled. Those agreeing to double their contributions as from 1 January, 1956, will, depending on length of service, receive, in the case of men, up to £2 per week at 60, and up to about £2 15s. if they remain until 65. Women will receive up to £1 3s. 4d. at 55 and up to £1 11s. at 60. The company will match the new contributions and, in addition, will fund the amount required to double the pension for service prior to 1956, thus ensuring that pensions to operatives retiring after 1 January will be doubled.

Industrial Health Survey

Halifax, Yorkshire, has been chosen as the medium for the first of two industrial health surveys to be conducted by the Ministry of Labour. The object of the survey, which begins next week is to promote the health and well-being of factory workers.

Polythene Production

By the end of next year British production of polythene is expected to be nearly double the present yearly output of 30,000 tons. World production of polythene totals 150,000 tons per year, of which the greater part is manufactured in the US under licence from Imperial Chemical Industries Ltd. This was announced on Tuesday by the Petroleum Information Bureau.

. OVERSEAS .

Oil Rises

World oil production last year rose by 4 per cent to 685,000,000 tons.

Norway to Increase Aluminium Output

The Norwegian Ministry of Industry plans to step-up the aluminium output at the State-owned plant at Ardal to 60,000 tons a year. Output now is 24,000 tons a year.

Atomic Plant in Mountain

Construction of the atomic power plant the Norwegian Atomic Energy Institute plans to build 160 feet inside a mountain at Halden may be started this autumn if Parliament votes the necessary outlay. The reactor will provide steam for timber processing.

Shawinigan Plan Development

Shawinigan Resins Corp., of Springfield, Massachusetts, one of the companies associated with Shawinigan Chemicals, have announced plans for two new plants they intend building. One, to be built at Trenton, Michigan, will produce Butvar, a vinyl resin used in the manufacture of safety glass; the other is to be constructed at Springfield for producing Gelvatol polyvinyl alcohol by a new process developed at Shawinigan's plants at Shawinigan Falls.

Dow Chemical Laboratory

Dow Chemical of Canada will start construction of a new research and control laboratory at its Sarnia, Ontario, plant this month. The new laboratory will provide expanded facilities for a stepped-up research programme in adapting products specifically for Canadian markets as well as expanded customer service work. With the future in mind, the building has been designed for a two-way expansion. Completion date is set for early 1956.

British Columbia Land Deal

The British Columbia Government has sold 444,206 acres of land in the Peace River district to the Hudson's Bay Oil & Gas Co. for \$432,629. The land is adjacent to Fort St. John, British Columbia's largest gas field. Hudson's Bay Oil & Gas Co., a subsidiary of Hudson's Bay Co. and the Continental Oil Co., outbid six competitors for the land.

Abandon Laboratory Plan

The proposed plan of Unilever NV to acquire the laboratory of the Rubber Foundation of Delft has been abandoned as the Indonesian Government refused to make a decision by 1 September.

Olin Mathieson Grant

The Department of Entomology of Texas A. & M. College has undertaken studies to evaluate new formulations of insecticides. The evaluations, if successful, will provide more effective control of cotton insects. The work is being done under a grant of aid provided by Olin Mathieson Chemical Corp.

Uranium Extraction Process

Israel has developed a process for extracting uranium from rock phosphates by experimenting with the use of solar energy. A method for the enrichment of heavy water by a process that does not require the use of electrical power has also been evolved. These advances were revealed at Geneva when Israel's ten-man delegation to the international conference on peaceful uses of atomic energy presented a report dealing with the country's energy requirements for the next ten years.

India's Fertiliser Expansion Plans

India's fertiliser factory at Alwaye (Travancore-Cochin) is to be expanded at an estimated cost of Rs.23,500,000. Annual production of ammonium sulphate is 45,000 tons; when expanded, the factory will produce 75,000 tons, as well as 30,000 tons of ammonium phosphate. India plans to establish three new fertiliser plants.

Two Chemical Plants for Quebec

Two chemical plants are to be built at Valleyfield, Quebec. One, to produce synthetic fluid cracking catalysts for the oil refinery industry, will be financed by the US firm, W. R. Grace of Baltimore; the other, to produce sodium silicates, by National Silicates (Toronto).

No Sign of Gas or Oil

Frome Lakes Proprietary of Australia announce they are plugging and abandoning the Darriman No. 1 well in Gippsland, having found no indication of oil or gas.

PERSONAL

DR. KENNETH BULLOCK, professor of pharmacy at Manchester University, has been appointed chairman of the British Pharmaceutical Conference in succession to PROFESSOR JAMES P. TODD, of Glasgow. The appointment was made at the recent British Pharmaceutical Conference at Aberdeen. Next year's conference will be held in Dublin.

MR. E. J. FOX has been appointed assistant works manager of Carbide & Carbon Chemicals Co., a division of Union Carbide & Carbon Corp.

DR. E. T. MURDOCK, M.A., B.Sc., quality-control manager of T. Wall & Sons (Meat Products), Ltd., of London and Manchester, has been appointed assistant refinery manager in the London area for the British Oil and Cake Mills Ltd. He will be based at BOCM's Erith, Kent, refinery. Dr. Murdock took his Ph.D. degree in biochemical subjects at Trinity College, Dublin, later carrying out research work under the Medical Research Council of Ireland. He joined Wall's in 1949 as bakery-products' development chemist. Dr. Murdock is an associate of the Royal Institute of Chemistry, a member of the Society of Chemical Industry and of the Nutrition Society.

MR. E. BARNARD, C.B., C.B.E., D.S.O., who has been a deputy secretary in the Department of Scientific & Industrial Research since 1945, retired on 31 August.

MR. GEORGE A. DONALDSON has resigned from the board of the Bradford Dyers' Association.

United Lubricants has appointed MR. JOHN L. CALLAGHAN to the board of directors.

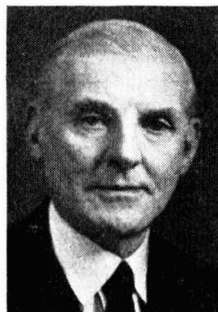
MR. G. A. RICKARDS has resigned from the board of British Emulsifiers.

SIR LEONARD SINCLAIR, a director of the Cleveland Petroleum Co. since 1943, has been elected chairman in succession to SIR THOMAS NICOL who has resigned from the board of the company.

MR. WILLIAM G. OLIVER, M.A., has left Thomas Hedley & Co. Ltd. to join Hickson & Welch Ltd. as sales manager.

MR. H. V. POTTER, chairman and managing director of Bakelite Ltd. has told the board that he wishes to be relieved as managing director as from 31 October, 1955. He will continue as chairman of the board. It is also announced that MR. F. J. ROBINSON will vacate his position of deputy managing director on the same date. The board has appointed MR. G. W. HODDS as managing director as from 1 November.

DR. THOMAS GIRTIN has retired from the chairmanship of Johnson & Sons Smelting Works Ltd. Dr. Girtin joined the board of the parent company, Johnson & Matthey & Co., in 1921 from Raphael's Refinery where he had been general manager. He was appointed to the chair of the board of Johnson & Sons Smelting Works Ltd. in 1930 after being actively concerned in the amalgamation of the two companies. In May 1953 Dr.



Dr. Girtin

Girtin had the honorary degree of D. Litt. conferred on him by Leeds University for his services to education—particularly in the field of fine arts and industrial science.

MR. S. COLLIER, M.C., F.I.G.M., managing director, Cleveland Petroleum Co. Ltd., has been appointed to the council of The Institute of General Managers, 86 Eccleston Square, London S.W.1.

DR. J. T. MCCOMBIE, B.Sc., A.R.I.C., A.R.C.S., has been appointed general sales manager of the British Industrial Solvents division of The Distillers Co. Ltd., as from 1 October.

MR. J. W. LENNOX, director and general manager of Sintered Products Ltd., has been appointed general manager of Sheepbridge Alloy Castings Ltd., of Sutton-in-Ashfield, Notts, in addition to the appointment he already holds. MR. DUTTON-FORSHAW, a director of the Burtonwood Engineering Co.

Ltd., and Burtonwood Brewery Co. (Forsshaws) Ltd., has been appointed to the board of Sheepbridge Engineering Ltd.

MR. P. R. V. WHEELER, MR. J. R. SORSBIE, MR. C. W. CLARK and MR. D. D. MATHIE-SON have joined the board of Modern Machine Tools and its subsidiary, Precision Machinery Services, following the acquisition of the parent company by Gas Purification & Chemical Co.

MR. JOHN HANCOCK, for some years manager of the technical service department of Imperial Chemical Industries Ltd. (Nobel Division) has retired. Born in the US and trained in the English Midlands, he graduated at Birmingham in 1921, joining I.C.I. in 1930. DR. ROBERT WESTWATER has been appointed manager of the technical services department where he has been assistant manager since 1948. He is a member of the Institute of Mining Engineers, holds the Colliery Managers' Certificate, First Class, and in 1952 gained the McPherson Gold Medal of the Institute of Quarrying of which he is a member. The new assistant manager is MR. R. HASLAM who joined I.C.I. in 1947 after graduating in Birmingham and gaining mining experience with Manchester Collieries Ltd. and the NCB.

Birlec Ltd., furnace and dryer manufacturers, announce the appointment of MR. ROY BURGESS as publicity manager in succession to MR. J. C. MANTELL, M.B.E., with effect from 19 September. Mr. Burgess, who read physics at St. Peter's Hall, Oxford, was formerly with Langley Alloys, Slough. Mr. Mantell remains within the AEI group of companies and is to take a two years' training course at The British Thomson-Houston Co. Ltd., Rugby, Warwicks.

MR. STUART ROWLEY, a chemist at the Dunlop Rubber Research Centre at Birmingham, was married at St. Paul's Church, Starcross, Devon, on Saturday, 27 August, to MISS MARGARET ELIZABETH CHANDOS-POLE, daughter of MRS. CHANDOS-POLE, of The Strand, Starcross, and the late CAPTAIN PETER CHANDOS-POLE, of the Merchant Navy. The bride, a former student at Cheltenham Ladies' College, has just finished her training at the Gloucester Training College of Domestic Science.

MR. GORDON G. GOODWIN has resigned from his post as publicity manager with The Sheepbridge Engineering group to take up

an appointment as marketing manager with Tecalemit Ltd. of Plymouth. MR. D. EMERSON of the Tecalemit marketing department is appointed assistant marketing manager.

Wills

MR. LOUIS NICHOLAS, of Bidston, Birkenhead, a chartered accountant, chairman of Taylor's Cash Chemists Trust Ltd., Timothy Whites & Taylors Ltd., and other companies, left £279,651 (£221,047 net—duty £165,001).

MR. GEORGE REDVERS PEEKE, of 175 Church Road, Sheldon, Birmingham, Midlands representative for industrial and scientific products of Sunvic Controls Ltd., who died intestate, left £3,713 (£2,462 net).

Obituary

MR. BARRINGTON CAMPBELL GAIN, chairman of Calor Gas Holding Co., has died, aged 49. Mr. Gain was also chairman of Brown, Stewart & Co., and deputy chairman of Associated Paper Mills.

Oxygen for Aviation

BRITISH Oxygen's stand at the Farnborough air display which ends to-morrow, Sunday, 11 September, is devoted mainly to equipment for making, storing, transporting and dispensing liquid oxygen. There is a model of a large static producing plant, and models of a small, mobile liquid oxygen generator for use on airfields. The exhibits will demonstrate the way in which liquid oxygen is made and handled in large or small quantities for rockets and aircrew breathing. One section of the display stand will show liquid oxygen converters which are being developed for use in aircraft.

Next Week's Events

MONDAY 12 SEPTEMBER

Institute of Metal Finishing

London: Northampton Polytechnic, St. John Street, W.C.2, 6.15 p.m. 'Fluorobates in Plating' by F. Wild, A.I.M.

TUESDAY 13 SEPTEMBER

Incorporated Plant Engineers

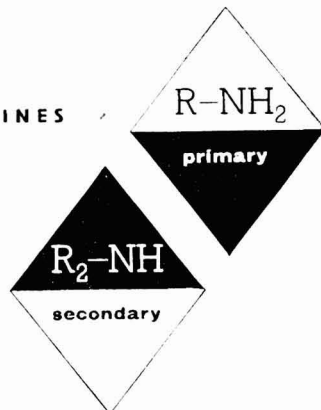
Manchester: Engineers' Club, Albert Square, 7.15 p.m. Chairman's 'At Home'.

HIGH MOLECULAR WEIGHT ALIPHATIC AMINES

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AND AMINE ACETATES

armacs



The Chemical Division of Armour & Co. Ltd. have detailed technical information on applying their ARMEENS and ARMACS in many industries. We may have a ready-to-use formula to fit your case.

ARMEENS are a range of primary aliphatic amines RNH_2 or secondary aliphatic amines R_2NH in which R represents pure or mixed fatty acid radicals. *Armeens* are strongly cationic and water repellent, and dissolve in oils and most solvents. They are substantive to metals, pigments, fibres, paper, glass, masonry, stones, plants, synthetic resins, etc. They are capable of additive and other chemical reactions.

ARMACS are the acetate salts of the ARMEENS and are water soluble. In all other respects they resemble the Armeens.

ARMEENS and ARMACS will shortly be produced together with other ARMOUR CHEMICALS in the United Kingdom. Samples and experimental lots are available now. Write to us on your business paper.



ARMOUR & COMPANY LTD., Chemical Division, Lindsey St., London, E.C.1

Publications & Announcements

A POCKET-BOOK sized 12-page reference and information chart for stainless steels has been issued by London Metal Warehouses Ltd., of Summer Road, Thames Ditton, Surrey, who will send a copy free of charge to applicants. Information as to the effect of most acids and chemicals on different qualities of stainless steel is also available from the same address.

* * *

GUIDANCE to buyers of British arc welding electrodes is provided by a booklet published by the British Electrical and Allied Manufacturers' Association, 36 Kingsway, London W.C.2. This guide is the work of the BEAMA arc welding electrode section which includes almost all the British manufacturers of arc welding electrodes and equipment. A brief description is given of the British classification of electrodes as contained in BS 1719:1951, together with a comparison of British and American code numbers and notes on the American classification of electrodes. Much useful information is also given about the nature of electrodes and the processes used in their manufacture. The majority of electrodes are made by extrusion. The use of dipping as a method has declined considerably, but the process is still used for the manufacture of certain kinds of electrode that cannot be made by any other method.

* * *

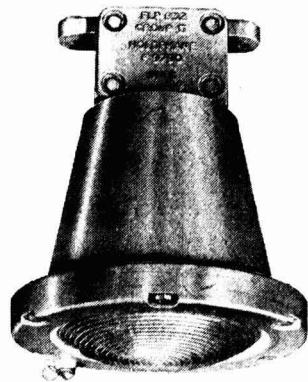
THE DEVELOPMENT of seamless stainless steel flexible tube is announced by Accles & Pollock Ltd., the Oldbury, Birmingham, firm of precision steel tube makers. The announcement follows months of development work and discussions with the leading aircraft companies, which have led to an agreed size range. The flexible tube is made by producing helical convolutions in thin-walled stainless steel tube. The plain tube for subsequent manufacture of flexible hose can be made from any of the popular types of austenitic stainless steel, Accles & Pollock report, and after convoluting the material is in the slightly cold-worked condition. During the convoluting operation the wall thickness is not reduced and the finished length is slightly less than half the original plain tubing, which means that lengths of con-

vuluted tubing are limited to approximately half the maximum lengths for cold drawn seamless tubes. To assist economic production, state Accles & Pollock, they are for the present limiting the sizes they propose to manufacture to a representative range decided in consultation with other interested industries. This range will be extended however. The first list gives seven sizes with nominal bores ranging from 3/16 in. to 1/4 in. Outside diameters range from 0.320 in. to 1.000 in. in the same range, and wall thicknesses are between 0.006 in. and 0.014 in. Some of the tools for the manufacture of these sizes will not be available until early next year.

* * *

ON 25 October the Kwinana oil refinery in Western Australia will be officially opened by the British Petroleum Co. A description of the flameproof lighting equipment installed there is given in a pamphlet recently issued by Holophane Ltd., of London, who have supplied hundreds of special prismatic lighting fittings at Kwinana. Holophane flameproof lanterns, primarily designed for use in oil refineries to give

**Holo-
phane
Flame-
proof
Pendant
Unit—
F.9790**



symmetrical and two-way non-axial light distributions are employed for illuminating trunkways leading to the oil jetty heads and plant access roads. A point of interest is that recessed flameproof fittings in the main control rooms of the distillation plant at Kwinana have prismatic lens plates which distribute the light asymmetrically and provide a vertical illumination of 18-20 lumens per sq. ft. on the control panels.

Spectroscopic Solvents

2:2:4-Trimethyl-pentane has been added to the series of specially prepared spectroscopic solvents which the B.D.H. catalogue has included for many years. These are already being issued under the new B.D.H. "specification" labels, in which the transmission minima shown are as under :

| SOLVENT | Minimum percentage transmission in a 1 cm. cell at | |
|--|--|-------------|
| | 220 m μ | 250 m μ |
| Cyclohexane | 45 | 95 |
| Ether | 25 | 80 |
| Ethyl alcohol 95% | 50 | 95 |
| Ethyl alcohol, absolute | 50 | 95 |
| Hexane, fraction from petroleum | 70 | 95 |
| iso-Propyl alcohol | 60 | 95 |
| 2:2:4-Trimethyl-pentane ("iso-octane") | 50 | 95 |

Prices for B.D.H. solvents for spectroscopy, in small or large quantities, will be quoted on request.

THE BRITISH DRUG HOUSES LTD.
B.D.H. LABORATORY CHEMICALS GROUP
POOLE

DORSET

SS/LC/551b

BDH

Board of Trade Duty Notice

THE Board of Trade are to consider applications for drawback on import duty on coated aluminium foil, solid potassium hydroxide and sodium monochloroacetate:

Under section nine of the Finance Act, 1932: Aluminium foil not exceeding a thickness of 0.006 in. and coated both sides with cellulose acetate butyrate, imported in sheets of a width not less than 18 in., used in the manufacture for export of metallic yarn in the form of coated aluminium strip of a width not exceeding 0.125 in., whether or not doubled or twisted with other fibres.

Under the second schedule to the Imports Duty Act, 1932:— Solid potassium hydroxide of a purity not less than 88 per cent nor more than 92 per cent, imported for re-exportation either in the same state or after subjection to a process which has not changed the form or character.

Under section nine of the Finance Act, 1932, as amended by section seven of the Act, 1940: Sodium monochloroacetate of a purity not less than 94 per cent or more than 96 per cent by weight, used in the manufacture for export of glycine of a purity of not less than 98 per cent by weight.

Representations in regard to these applications should be addressed in writing to the Board of Trade, Tariff Division, Horse Guards Avenue, London S.W.1, not later than 1 October.

British Stand at US Exhibition

THE Solartron Electronic Group Ltd., of Thames Ditton, Surrey, believe their stand at the Instruments' Society of America's 10th Annual Instrument-Automation Conference and Exhibit to be held in the Shrine Exposition Hall, Los Angeles, from 12 to 16 September, will be the only British display.

Instruments the company will show include the new transfer function analyser, an instrument for the design and development of all types of Servo mechanisms.

A team of six will man the stand at the exhibition and will include Mr. E. R. Ponsford, managing director of Solartron Laboratory Instruments Ltd., Mr. H. D. Binyon, instrument sales manager of the Solartron Electronic Group Ltd., and Mr. I. H. Lynas, the group's senior technical service engineer.

Aluminium Coatings

COMMERCIAL production of aluminium coated steel wire will shortly be started by the Page Steel and Wire Division of the American Chain and Cable Company.

Aluminium coated steel is extremely resistant to industrial and rural atmospheres, and as production increases it is believed that the new product will compete in price with galvanised wire.

Basically the process consists of dipping steel wire in molten aluminium. However, it is essential that the steel be thoroughly cleaned first and protected from oxidation until the aluminium has been applied.

The wire is first heated to remove residual drawing lubricant and is then immersed in hot hydrochloric acid solution. Washing with hot water then follows to remove iron salts and any dirt that might still be sticking to the metal.

The next stage is a flux bath containing a hot solution of zirconium or titanium fluorides. The temperature of the flux bath is kept high enough to dry the wire as it passes through the air after leaving the tank.

The process is so arranged that the wire leaves the molten aluminium bath vertically to ensure an even coating. The furnace is of the low frequency induction type lined with alumina brick.

'Nuclear Power Premature'

ADDRESSING the Bristol Rotary Club on Monday, 5 September, Sir Robert Robinson, president of the British Association, attacked the Government's £300,000,000 programme to build 12 nuclear power stations in the next 10 years. 'Coal and Oil', he said, 'should be used to meet the country's immediate needs.

'The large sums of money involved could not be expended without affecting other more urgent needs. By comparison, the amounts devoted to some aspects of medical research were "miserable". There was a tendency to write-off coal and oil too soon'.

Sir Robert said he believed that the multiplication of nuclear power stations at present was premature 'unless in some undisclosed way they are necessary for defence'.

'There are lots of other ways of getting power, like coal and oil or the underground gasification of coal'.

PERMUTIT

ION EXCHANGE

MATERIALS

At their South Wales factory, Permutit manufactures a wide range of ion exchange materials in granular, bead and membrane form. Some of these materials are used in large quantities for water softening and water demineralising: others are employed to a growing extent for many purposes outside the field of water treatment. A few of these applications are listed below:—

Purifying solutions from electrolytes, such as sugar, glucose, fruit juices, pectin, gelatine, lactic acid, etc.

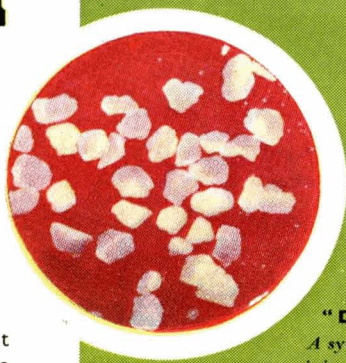
Removal of required products from solutions, such as antibiotics, amino acids, alkaloids, vitamins, rare earths, etc.

Purifying effluents to remove obnoxious or valuable constituents, such as cuproammonium effluent, coke oven liquor, chromic acid swill water, phosphoric acid pickling liquor, fixing baths, chromium and cadmium plating baths, etc.

Chemical analysis, such as the removal of interfering ions, the preparation of very pure solutions, the rapid determination of metals, etc.

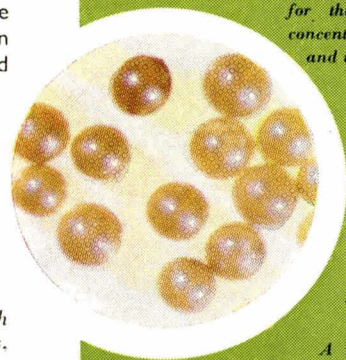
Permutit ion exchange materials may supply the answer to many of your process problems. We shall be happy to advise you if you will consult us.

The PERMUTIT COMPANY LIMITED
Dept. V.A., 224, Permutit House
Gunnersbury Avenue, London, W.4
Telephone: CH1swick 6431



"DECALSO" (x 7)

A synthetic sodium aluminium silicate suitable for the separation and concentration of hormones and vitamins.



"ZEO-KARB 225" (x 10)

A unifunctional cross-linked sulphonated polystyrene resin in bead form of high capacity and exceptional chemical and physical stability.



"ZEO-KARB 215" (x 15)

A nuclear sulphonated phenol resin containing also hydroxyl groups.

Whatever you call them

Optiska vitmedel

Optical whitening agents

Optiske hvitningsmidler

Optische bleichmittel

Optische bleekmiddelen

Agent de blanchiment optique

Brighteners

Agentes de branqueio óptico

Agentes de blanqueo óptico

you come to

Phōtine

O.W.A.'s.

in the end

Hickson & Welch Ltd.

CASTLEFORD, YORKSHIRE

Law & Company News

Commercial Intelligence

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

Mortgages & Charges

(Note.—The Companies Consolidation Act of 1908 provides that every Mortgage or Charge, as described herein, shall be registered within 21 days after its creation, otherwise it shall be void against the liquidator and any creditor. The Act also provides that every company shall, in making its Annual Summary, specify the total amount of debt due from the company in respect of all Mortgages or Charges. The following Mortgages or Charges have been so registered. In each case the total debt, as specified in the last available Annual Summary, is also given—marked with an *—followed by the date of the Summary but such total may have been reduced.)

HOWARDS OF ILFORD LTD., manufacturing chemists.—2 August, deed of substitution securing debenture stock of Howard & Sons Ltd., secured by a trust deed dated 31 July, 1952, etc.; charged on specified properties at Barking and Ilford. *£346,400. 15 July, 1954.

J. M. COLLETT & CO. LTD., Gloucester, chemical manufacturers.—4 August, mortgage and charge, to Midland Bank, securing all moneys due or due to become due to the bank; charged on land with factory buildings, etc., at Bristol Road, Gloucester, with machinery, fixtures, etc., also a general charge. *Nil. 31 December, 1953.

SALFORD PAINT & VARNISH CO. LTD.—26 July, mortgage and charge (supplemental to two mortgages dated 11 November, 1954), to National Provincial Bank Ltd., securing all moneys due or to become due to the bank; general charge.

ROCKS PLASTIC FOAM CO. LTD., East Grinstead, Sussex.—23 July, series of £400 debentures, present issue £200; general charge. *Nil. 17 May, 1955.

Satisfactions

BRITISH CELANESE LTD., London.—Satisfaction, 30 July, of trust deed registered 2 October, 1943, and supplemental deed registered 8 November, 1944, to the extent of £6,806.

HOLOPLAST LTD., New Hythe, near Maidstone, Kent, manufacturers of synthetic resins.—30 July, of debenture registered 31 January, 1951, to the extent of £30,000 (the property or undertaking charged being released from the charge).

PETROLEUM ROYALTIES TRUST LTD., London E.C.—27 July, of series of unit certificates registered 15 November, 1940.

SILVER FOUNTAIN PRODUCTS LTD., Smethwick, manufacturers of bleach preparations, etc., 30 July, of charge registered 28 June, 1954.

Increases of Capital

NEATEX PRODUCTS LTD., manufacturers of toilet paper and toilet products, chemicals, dealers in motor car accessories, etc., Wern Mills, Nannerch, Mold, Flintshire, Wales, by £18,000, in £1 ordinary shares, beyond the registered capital of £2,000.

New Registrations

Vitamins (Export) Ltd.

Private company (553,477.) Capital £100. To carry on the business of manufacturers of and dealers in animal foods and ingredients therefor, veterinary medicines, pharmaceutical preparations, chemicals and all kinds of food for human consumption and ingredients therefor, particularly in the embryo of cereals, flour millers and manufacturers, corn factors, etc. Subscribers (each with one share) are: Vitamins Ltd., and Bemax Sales Ltd. So long as this company is a wholly owned subsidiary of Vitamins Ltd., they shall be entitled to appoint and remove directors. Directors: Henry C. H. Graves, Arnold R. Dawson, John A. Hemsley, Jas. L. Henton and Margaret D. Wright. Solicitors: Linklaters & Paines, 6 Austin Friars, London E.C.2. Reg. office: Upper Mall, W.6.

Fleet Chemical Co. Ltd.

Private company (553,742). Registered 24 August. Capital £10,000. To carry on the business of manufacturers and merchants of chemical, pharmaceutical and industrial products of all kinds, etc. Subscribers: Patricia A. Wilson and Derek V. Prestwich. The first directors are not named. Solicitors: Stone & Stone, 69/71, Moorgate, E.C.2.

U.S.A.C. Pension Trust Ltd.

Private company (553,803). Capital £100. The directors shall be appointed by the United Sulphuric Acid Corp.; the first directors: Arthur Davenhill, director of British Enka Ltd.; Tyrrell M. Willcox, director of Clayton Aniline Ltd.; and Robert C.

Brown. Registered office: Green Oak Works, Tan House Lane, Widnes, Lancashire.

Edwin P. Watson Ltd.

Private company (554,071.) Capital £100. To carry on the business of agents for the sale of, dealers in and manufacturers of degreasing, dispersants, solvents, etc. Subscribers (each with one share): Edwin P. Watson, Jas. B. Dibbs. Edwin P. Watson is permanent managing director. Reg. office: 69 Albion Street, Leeds.

Dagropharm Ltd.

Private company. (553,824.) Capital £100. To carry on the business of manufacturers of and dealers in chemical, pharmaceutical and cosmeceutical products, etc. Directors: Emil Wiegand, Amsterdam, Holland, director of Dagra N.V., and Willem Brunsen. Registered office: 1 Golden Square, London W.1.

Repton Textile Developments Ltd.

Private company. (553,948.) Capital £100. To carry out all kinds of chemical and scientific research work calculated or intended to result in improvements in the processes of dyeing and finishing textiles, etc. Directors: Claud A. Harrison, Percy C. Hunt, and Archibald J. Hall. Solicitors: Ingram & Co., Leicester.

D. Frame (Springfield) Ltd.

Private company (553,994.) Capital £200. To carry on the business of electricians, electrical, mechanical, metallurgical and chemical engineers, etc. Directors: Douglas Frame and Doris Frame. Reg. office: 25 Roebuck Lane, Sale, Manchester.

Company News

Celanese Corp. of America

The directors of Celanese Corp. of America declared on 23 August a dividend of 12½ cents a share on the common stock, payable 23 September to holders on record 2 September, 1955. The board also voted regular quarterly dividends of \$1.12½ on the 4½ per cent preferred stock, series A, and \$1.75 on the 7 per cent second preferred stock. Both preferred stock dividends are payable 1 October, 1955, to holders on record 2 September, 1955.

Cellactite & British Uralite

The net consolidated profit of Cellactite & British Uralite for the year ended 26

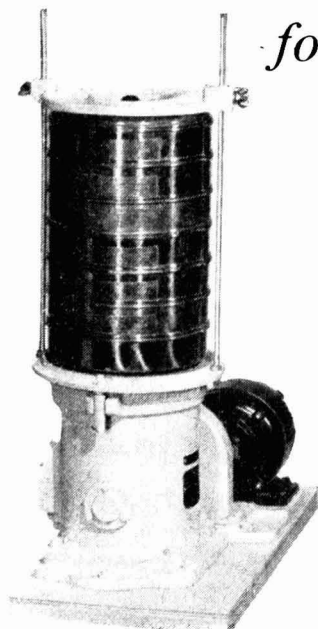
March, 1955, was £31,850, of which £7,983 has been written off, being expenditure brought forward from previous year in the accounts of a subsidiary company, Uralite Sales Ltd. After providing for the dividend and taxation reserve, there remains £70,822 to be carried forward against £52,768 brought in. The directors have recommended a dividend at the rate of 5 per cent.

Market Reports

LONDON.—Business in the industrial chemicals market during the past week has been on a fairly steady scale with a good volume of export inquiry in circulation. Buying for home account is almost up to the pre-holiday level and good quantities are being called for against contracts. Firm price conditions have been reported on most sections of the market but actual changes have been confined to the quotations for the non-ferrous metal compounds. The continued upward trend in the price of the metal has raised the quotation for copper sulphate quite substantially. The demand for the coal tar products remains good and there are no changes in conditions or prices to record.

MANCHESTER.—A fair call for a wide range of chemicals for the textile and allied industries has been experienced on the Manchester market during the past week, with contract deliveries to most of the other leading outlets on steady lines. A fair number of fresh inquiries have been dealt with. Prices are on a firm basis pretty well throughout the market. A further stiffening has occurred in the case of sulphate of copper and quotations for borax and boric acid are to be advanced from the beginning of next month. Most classes of fertilisers are quiet still, but the call for the light and heavy by-products has mostly been on steady lines.

GLASGOW.—Little or no change has to be reported from the Scottish heavy chemical market. The week opened rather quieter but towards the end a reasonably better position prevailed. Prices generally have remained steady. Numerous inquiries are still being received for export and prospects seem fairly promising.



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of powders, etc., it is essential to obtain a perfect segregation of the particles. The machine for the purpose is the Inclyno Test Sieve Vibrator.

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A TECHNICAL SALES REPRESENTATIVE having a chemical background and knowledge of chemical application in surface coatings, etc., is required for the London area. Contributory Pension Scheme operating. Apply, in strictest confidence, giving full particulars, qualifications, etc., to **STAFF MANAGER, GUEST INDUSTRIALS, LIMITED, RAW MATERIALS DIVISION, 81, GRACECHURCH STREET, E.C.3.**

IMPERIAL SMELTING CORPORATION, LIMITED, has a vacancy in Development Department for a **GROUP LEADER, Instruments (Investigations).** This is a new appointment and will involve visiting all works in the Organisation to examine the possibility of the extension and introduction of instrumentation on different plants and processes, and in addition supervising a team carrying out special measurements on the Avonmouth site. Candidates should possess a degree, preferably in Electrical Engineering, Physics or Chemical Engineering, or an equivalent professional qualification, and should have had at least two years' experience of work in either instrument development or instrument manufacture. Details to Personnel Manager, Imperial Smelting Corporation, Limited, St. Andrew's Road, Avonmouth, Bristol, quoting reference **SEW/CA.**

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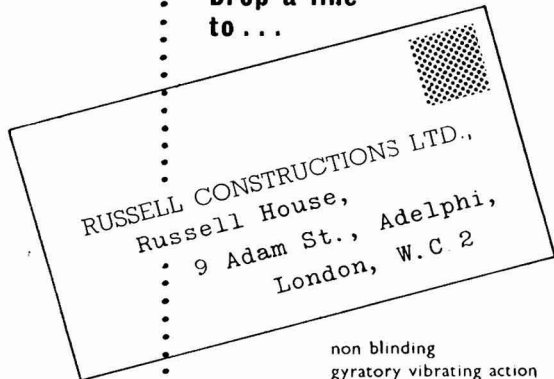
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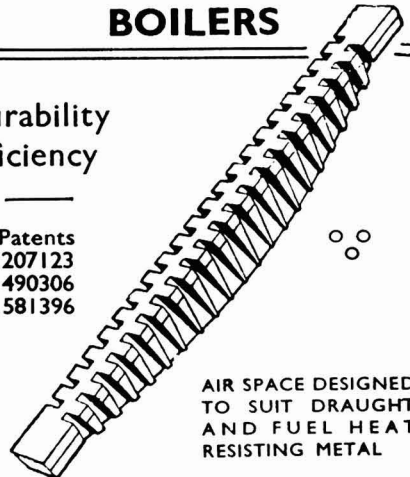
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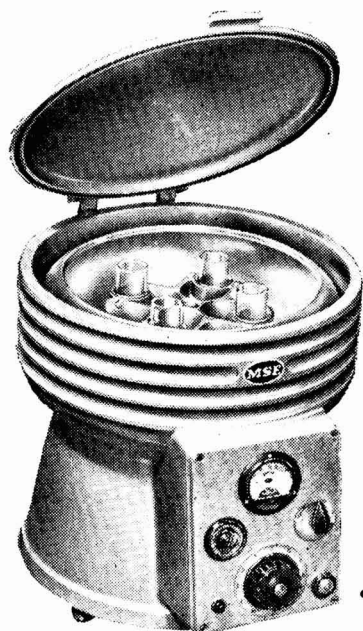
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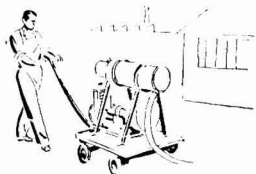
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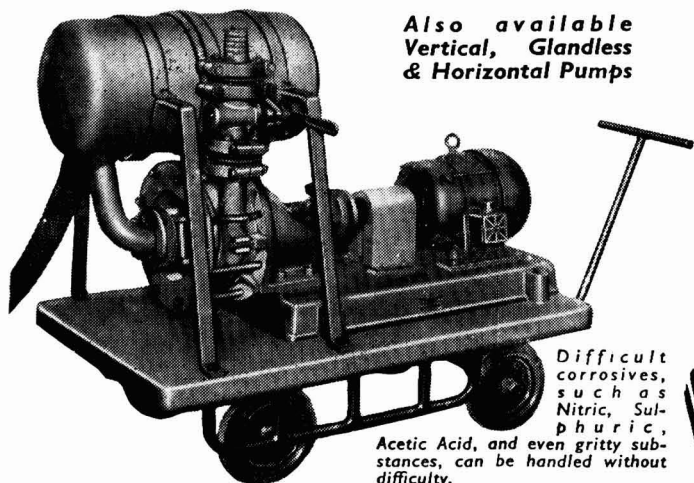
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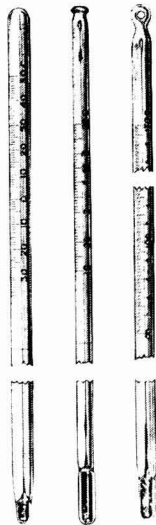
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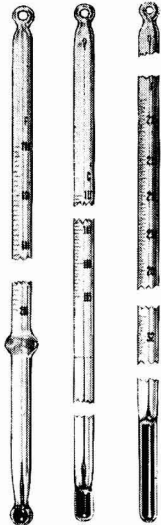
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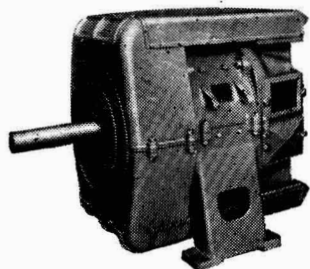
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