THE Chemical Age

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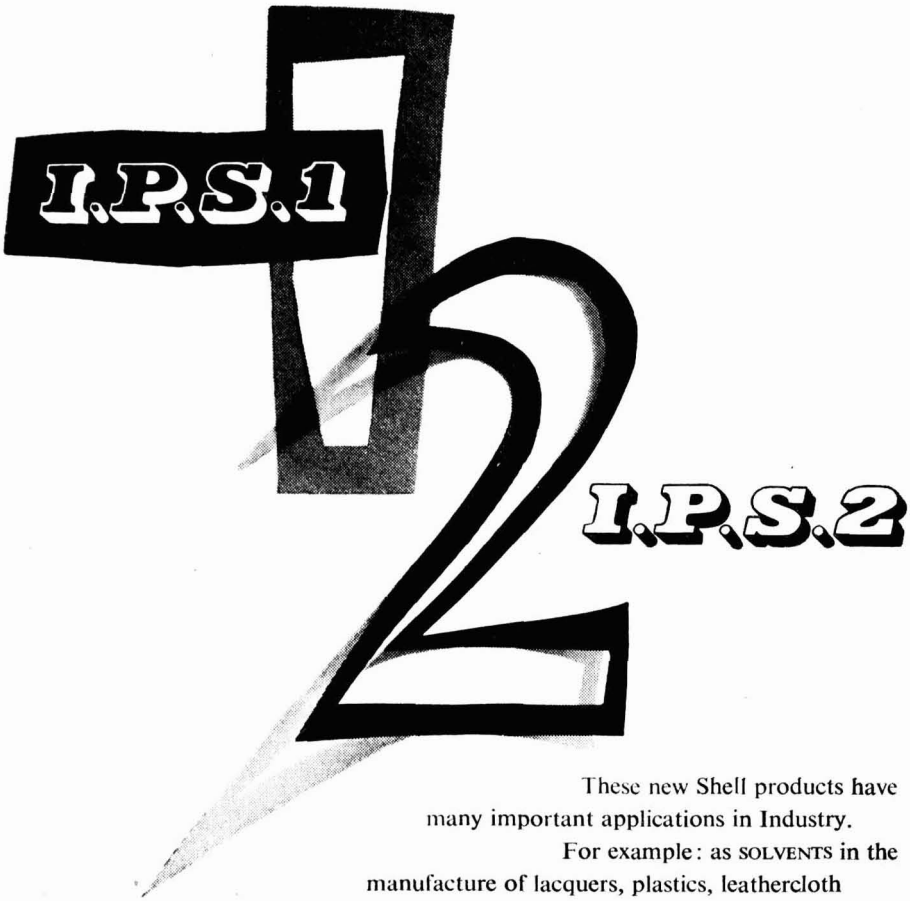

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Editor : E. A. Running *Publisher & Manager : John Vestey*

MIDLANDS OFFICE : Daimler House, Paradise Street, Birmingham
Phone : Midland 0784/5

SCOTTISH OFFICE : 116, Hope Street, Glasgow, C.2.
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The First Scientist

IN a century wherein a mere twenty-five years has provided DDT, penicillin, cortisone, selective weedkillers, systemic insecticides, nylon and the rest, to say nothing (tactfully) of the hydrogen bomb, science during the reigns of the third and fourth Georges seems far more distant than it is by date. There can be little space in modern timetables of chemistry students for the history of their subject; even thirty years ago, there was all too little. Perhaps the genuine study of chemical history will tend to become the pastime of middle-aged and elderly chemists as (and if) they draw back from the competitive race of youth to acquire a little leisure.

These thoughts, possibly imprudent, are stimulated by an excellent new biography of one of the foremost pioneers of British science, Humphry Davy, the Cornishman. Professor James Kendall, his biographer, has written a delightful book, not too lengthy, not too scientific, not over 'popular' ('Humphry Davy,' by James Kendall, 1954, Faber & Faber, London. Pp. 165. 10s. 6d.). The man, his work and his age are presented in a balance that is rare in all biography and especially rare in scientific biography.

Davy's name is inevitably coupled with Faraday's, and the contrast in their personalities often gives an impression that Davy's career was the more easily achieved. But an indolent boyhood and the early death of a father leaving little income and much debt hardly gave the great Humphry an influential beginning; nor was a village near Penzance a particularly well-placed starting-point. However, a love for angling and an interest in minerals, the latter gained from active and disused mines alike, were Cornish endowments, and before Davy had received any scientific education he had developed a capacity for detailed observation. In his own time this was probably far more valuable than formal education based upon the mainly erroneous theories of eighteenth century chemistry.

Personality often attracts good fortune and there is little doubt that the young Humphry's likeability was at the root of his success. After his father's death a local surgeon, Dr. Tonkin, guided his plans and eventually had him apprenticed to a surgeon-apothecary in Penzance. Then, by sheer chance, he became friendly with James Watt's son who was wintering in Cornwall after illness; more by merit than chance, however, he acquired a second contact of importance, with Gilbert, a wealthy man with interests in science. It was Gilbert who, much to the annoyance of Dr. Tonkin, engineered Davy's appointment as Superintendent of the Pneumatic Institution then being founded by Dr. Beddoes at Clifton, Bristol.

In these days of operational planning the paradoxical whims of chance seldom affect the pace of progress. The Pneumatic Institution at Clifton was undeniably based on fallacy and fashion and Dr. Beddoes was a man of subjective enthusiasms rather than a scientist. But its creation was amply justified by the opportunity it gave to Davy, 20 years old and virtually self-taught in science. Here he became his own laboratory animal for the most precarious experiments in breathing gases. Not content with his reactions from a mixture of water-gas and air, he narrowly escaped death with pure water-gas. He discovered the remarkable effects of nitrous oxide, and the Pneumatic Institution, also a centre of intellectual life in Bristol, was

visited not infrequently by Coleridge and Southey for the exhilaration of nitrous oxide trances. All this was diligently observed by Davy, and it is clear that only his youthful ignorance of surgical problems prevented him from realising the anaesthetic value of 'laughing gas.' Even in 1800 he casually suggested its possible use during operations; but this was to be re-discovered by an American dentist almost half a century later.

From Clifton, Davy went to the Royal Institution as Director of the Laboratory and Assistant Lecturer. Here, too, fortune had been with him for he had attracted the interest of Professor Hope of Edinburgh, discoverer of strontium, by writing to him to point out that the West Country had deposits of strontium sulphate. When Rumford badly needed someone to raise the flagging prospects of the newly founded Royal Institution, Hope's recommendation secured the post for Davy. He was then 23. Had such matters been settled by interview rather than by letter, Davy would not have been appointed, for Rumford was shocked into regret by his uncouth appearance when he arrived in London. Better means of travel in the England of 1800/01 might well have lost us both Davy and Faraday!

Uncouth or not, Davy was soon to overcome all prejudices in fashionable London. In a remarkably brief period he achieved fame as a lecturer, and with it the adulation of society. His interest in the Voltaic cell, an interest that had just begun when he left Bristol, quickly paid handsome research dividends in London.

No reputation today could advance as swiftly as Davy's then. The Royal Institution had commendably practical aims. The application of science to industry was one of the foremost. Davy was required to give courses of lectures upon such technological subjects as tanning and agriculture, and to prepare these he was allowed leave to study leather making and farming. There was, too, the isolation of the alkali metals and alkaline earths, the electro-chemical theory; the proof that chlorine was an element. All this in a few years of achievement, and all presented in papers that never used 'chemical formulæ.'

There was no assistant Faraday during this peak period, a fact that seems underappreciated by those who have so consistently lauded the apprentice and devalued the master. Even Professor Kendall favours the epigrammatic and none-too-logical verdict that Davy's greatest discovery was M. Faraday, the bookbinder's apprentice whose accurate notes on his farewell lecture led to the appointment as laboratory assistant.

There is little doubt that Davy was over-talented. He was essentially the inspired worker, never the plodding servant of method. His papers are strewn with far-seeing suggestions, and he was often within a few pen strokes of great theories and discoveries not in fact to be made in his lifetime. His European tour, including a visit to France during the Napoleonic war, 'fitted in' two or three weeks of experimental work with a strange product of sea-weed—then called *ione*—which he showed to be almost certainly an element of the chlorine family and which he re-christened iodine, all this to the discomfiture of Gay-Lussac who was at the same time working more ponderously towards the same result.

He returned to England at a time of growing anxiety about coal-mine disasters and responded to the appeal for scientific help by inventing the famous gauze-screened lamp. But it was the beginning of the period of decline. The greatness had been established, but the springs of greatness had lost their vigour. Ill-health and vanity, both products of his peak period of work and fame, combined to tinge this last phase with petty incidents that history might far more kindly have dismissed as insignificant. He died in his fifty-first year, 'burnt-out' by the fire of his own greatness.

Professor Kendall's new biography should force a revaluation of Sir Humphry Davy's place in the records of science. He was indeed Europe's 'First Scientist' when in 1812, three days before his wedding, he was knighted by 'The First Gentleman.'

Notes & Comments

Fertiliser Surprise

THIS spring, moving now towards its agricultural close, has been a surprising season for British fertiliser manufacturers. It has been a spring without the customary peak period of demand. For this the weather must take priority of responsibility. Nor for many years has March been such a hostile month to ploughs and seed-drills, and this came after a winter notable for the lateness of its snow and frost. The time-table of fertiliser application seems to have shifted at least a month ahead in all southern districts. That this did not merely mean an April peak in place of the usual March peak is due probably to two factors, (1) most manufacturers had offered high rebates for early deliveries in November and December, so that a fair proportion of farmers were already usefully advance-stocked, and (2) many farmers who had booked deliveries for March did not postpone these orders when the weather retarded farming plans. For the first time for many years works managers have not been harrassed by excessive demand during a three to four weeks period. Instead, the demand has expressed itself with unbelievable evenness over at least eight weeks.

Level Probably Maintained

IT is still too early to assess whether the volume of demand has been greater. With most farming operations delayed, applications of fertiliser may run into the early summer when usually the demand is quite small. From present evidence, however, it would seem that last year's tonnage will be comfortably maintained, perhaps with a small increase in some areas. The absence of peak period distribution problems, always a cause of economic wastage and plant overstrain, will possibly reveal itself in a favourable light when accountants later on draw up the industry's balance sheets. There are few in the industry, nevertheless, who will expect another peakless spring in years to come, for the growing tendency of farmers today is to demand delivery at the time of use; only the most extraordinary weather could have neutralised this peak-producing influence.

Merchandise Marks

THE new Merchandise Marks Act (1953) has been in operation since February this year, and no doubt most companies have been carefully reconsidering their greater responsibilities in the description of products. Formerly, under the 1887 Act, a false description was limited to mistatements about number, weight, size, or measure of goods, materials of which goods were made, place of origin, mode of manufacture, and matters relating to patents or similar rights. There was a limit, therefore, to what the law could construe as being misleading. The new extension of the law defines a 'trade description' as any indication or statement 'as to the standard of quality of any goods according to a classification commonly used or recognised in the trade, or as to fitness for purpose, strength, performance or behaviour of any goods.' This stretches the net far more widely, especially in regard to claims of purpose and performance. In addition, it has now become an offence to apply 'misleading' trade descriptions; previously it was necessary under the 1887 Act for the prosecution to prove that a description was 'false in a material respect.' A pictorial indication that does not involve a single word could be interpreted as a misleading trade description; thus, a picture of a cow suggesting natural origin could be construed as an illegally misleading indication of margarine. This hypothetical example is obvious enough, but there may be many less obvious parallels in the ever-widening market range of synthetic goods. However, there is one exception; any trade-mark in use before July 31, 1953, can remain in use even though its pictorial or verbal indications could be classified as misleading under the new Act. This is an important concession for there are probably many trade-marks whose very age confers high value upon them.

although the passage of time and technology has out-dated their indications. However, the design of new trade-marks requires much closer thought. They may indicate 1954 product standards fairly enough, but by 1964 they may become less accurate; as the principal force of a trade-mark is found in its repetitive effects, it is obvious that no new trade-mark should be introduced without the most careful consideration of its long-term implications.

A Welcome Advance

WHAT is not clear is whether a misleading description will be construed as applying to goods if it appears in advertisements, leaflets, and so on, but not on the label or package or other matter directly associated with the sale or delivery of the goods. It is wise to assume that the new Act covers all such ventures in goods description. However, it will require court judgments to determine this aspect of the new Act's interpretation. Grave risks will certainly be run if advertising matter is over-bold in claims, especially as to 'fitness for purpose', a somewhat broad phrase when applied to goods that are used under highly varying conditions, e.g. agricultural or horticultural chemicals. On the whole, the new Act must be regarded as a welcome advance. It has blocked serious loopholes in the 1887 Act, and this is no less valuable to the reputable and conscientious manufacturer than to the buyer. For the honest producer there is nothing to fear provided that he ensures that he is not offending against the 1953 Act through sheer carelessness.

Radioactivation Analysis

AMONG the unclassified reports prepared by AERE, Harwell, and published by HMSO, a recent issue is 'The determination of dysprosium in holmium oxide by radioactivation analysis' by G. Phillips and F. W. Cornish (Pp. 9, 1s. 9d.).

The dysprosium content of 'Specpure' holmium oxide has been determined by radioactivation analysis without chemical separation. The composite decay curve for the sample after neutron irradiation has been resolved by calculation from the experimental points. Dilution of the sample by grinding with sucrose in the solid state has been shown to lead to an inhomogeneous mix compared with aqueous dilution. Two series of experiments have been carried out using aqueous dilutions; liquid counting gave 11.71 ± 0.09 per cent Dy in Ho_2O_3 while solid counting gave 11.66 ± 0.16 per cent Dy in Ho_2O_3. The error limits refer to standard deviation of the mean.

Sir Henry Dale, O.M., F.R.S., seals a bottle containing radioactive phosphorus at the opening of the new buildings of the Radiochemical Centre, Amersham. The bottle was flown to Brussels for the treatment of a patient suffering from a blood disease. In the picture are left to right: Sir Henry Dale, Sir John Cockcroft, Sir Charles Harington, Sir Ernest Rock Carling and Major G. Boyce

'Fluon' Polytetrafluoroethylene

Chemical Uses of a New Material

POLYTETRAFLUOROETHYLENE has been called 'the noble metal of plastics.' The justification for this title lies in the properties of the material which, in many respects, are very much superior to those of any other of the plastics.

Polytetrafluoroethylene (PTFE) is made in Great Britain by I.C.I. under the trade name 'Fluon.' Production on a pilot plant scale began in 1947, was suspended for a while, and has now recommenced, greater quantities of the polymer now being produced than before. Because of its remarkable chemical resistance, its excellent dielectric properties and the very wide range of temperature over which it can be used, 'Fluon' is a material of outstanding interest to the chemical and electrical industries.

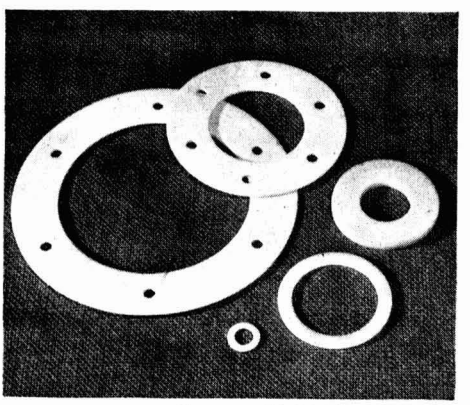
PTFE is manufactured by polymerising the inert, non-toxic gas tetrafluoroethylene under pressure in stainless steel autoclaves. The reaction is exothermic and must be carefully controlled. The polymer so produced is a white, granular solid of (for plastics) high specific gravity (about 2.2 compared to 0.91 for polythene, and 1.19 for 'Perspex').

Although a thermoplastic, 'Fluon' does not exhibit the normal flow characteristics of thermoplastics and cannot be processed by standard methods. Special techniques, not unlike those used in powder metallurgy, have been worked out, however. Essentially, these techniques consist of compressing the powder into a cold preform (which can be easily handled) and then heating it to above 327°, at which temperature sintering occurs, converting the friable preform into an homogeneous whole.

By this method (and extensions of it) block, rod, tube and other stock, and simple shaped components can be made. Fortunately, moulded 'Fluon' is very easy to machine, and complex shapes that cannot be moulded are turned from stock. Film and tape are made by veneering from rod or slicing from sheet. There are several fabricators in Great Britain who specialise in the manufacture of 'Fluon' components.

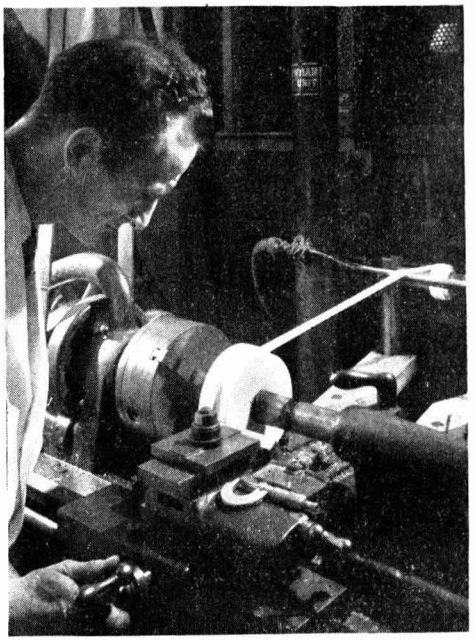
The working temperature range of components made from 'Fluon' is remarkably wide—from 80° to 250° and in some circumstances 300°—and within that temperature range the material exhibits outstanding properties. Its dielectric properties, for example, are equal to those of polythene. It is insoluble in any known solvent and is unattacked by any reagent except the molten alkali metals (and, in certain circumstances, by fluorine and chlorine trifluoride); its water absorption is nil, it is not wetted by water, and is not subject to oxidation. 'Fluon' is also remarkable in that there are hardly any substances that will stick to it. The reason for this is not yet fully understood, although it is certain that the chemical resistance of the material, the fact that it is not wetted by water and its very low coefficient of friction—which is about the same as that of wet ice on wet ice—all contribute to the resistance of 'Fluon' to the effect of adhesives and sticky substances.

It will at once be apparent that, because of its properties, 'Fluon' is of interest to the chemical industry not only as a contribution of that industry to the development of others, but also as a material of very wide use within the chemical industry itself. Many important applications for 'Fluon' in chemical plant have already been developed —for example, gaskets, packings and diaphragms—and these employ the remarkable



Courtesy of I.C.I. Plastics Division]

Gaskets and packing rings moulded by Crane Packings Ltd. from 'Fluon.' Simple and inexpensive moulding techniques produce these highly inert packings



Courtesy of Edison Swan Electric Co. Ltd.

Veneering 'Fluon' PTFE tape from a block of the material

resistance of the material to solvents and corrosive chemicals. Other important applications make use of the resistance of 'Fluon' to adhesion; these include many lining and coating applications in food-processing and other plant handling sticky substances. These two types of application are best considered separately and best illustrated by reference to specific applications.

Chemical plant applications in which the resistance of PTFE to corrosives and solvents is employed include its use as gaskets in plant handling mixtures of nitric and sulphuric acid at very high temperatures, as pump packings in strong caustic soda and diacetone pumps and as packing in valves handling dry chlorine gas. These are typical examples of the corrosion and solvent resistance of 'Fluon' and the list could be extended to include very many other substances, the handling of which normally produces difficulties.

Many different types of gaskets and packings are made from 'Fluon.' The first type to be made were solid gaskets, cut from moulded stock or moulded from powder. This type is still widely used and there are suitable designs both for low pressures of from 150-300 psi. and for very high pressures. Another type of gasket commonly used is the envelope gasket, used with glass, porcelain and glass-lined equipment (and in other circumstances where solid gaskets are impracticable). In this type of gasket an outer jacket of 'Fluon' covers a soft filler —often fabric-reinforced rubber or, where high-temperature service is required, soft asbestos sheet.

The advantage of envelope gaskets is that they can be seated with lower bolting pressures than solid 'Fluon' gaskets would need, but, at the same time they possess the chemical resistance of the solid material. In spiral-wound metal gaskets for very high-pressure service—up to 30,000 psi.—PTFE has largely replaced all other fillers. Choice of metal depends, of course, on the chemicals to which the gaskets are exposed, and when 'Fluon' is used as the filler the limit on the effective life of the gasket is imposed by the chemical resistance of the metal, not, as formerly, of the filler.

The use of 'Fluon' for packings in chemical plant is affected by its thermal properties. Because of the low coefficient of friction of 'Fluon,' it tends to develop very little frictional heat in the absence of a lubricant. This, of course, is an advantage, but, on the other hand, the low thermal conductivity of the material means that what frictional heat is developed dissipates only very slowly. Moreover, since 'Fluon' has a high coefficient of thermal expansion, clearance is reduced as temperature increases. These factors have to be taken into account when 'Fluon' packings are designed, and have led to the development of several different types.

Where only low rubbing speeds are encountered—as in reciprocating pumps, valve stems and agitators—a 'Fluon' packing can be allowed to rub directly on the shaft, since the low coefficient of friction of the material results in very small resistance, even at high gland pressures. An additional—and very important—advantage of PTFE for packings is that there is no volatile or heat-sensitive binder and hence uniform performance over very long periods is assured.

There are several types of 'Fluon' packings for use with valves or slow moving shafts. Typical of these are solid packings of rectangular cross-section, moulded from powder or machined from cylindrical stock; wedge rings, which are also moulded or machined from stock and which can be seated with lower gland pressure than solid packings of

rectangular cross-section; and V-ring packings, designed to produce a seal with the minimum of gland pressure between parts which have relatively little motion. Braided 'Fluon' packings have also been used, and these usually, though not invariably, incorporate an asbestos core. Their utility is limited to valves and low-speed shafts, but their advantage lies in their convenience of application and the ease with which they can be adapted to various sizes of stuffing box. An even more convenient—and equally efficient—method of packing some stuffing boxes is simply to use 'Fluon' swarf, fed loose into the box and lightly rammed with any suitable instrument.

In high-speed packing applications intimate contact between the packing and shaft is undesirable, since the high-speed motion would ruin the packing or the shaft (or both). That a clearance must be provided—that is, a 'glove fit' achieved—is recognised, and that this clearance will be filled by the liquid in the system with, ultimately, some leakage, is accepted. The most suitable type of 'Fluon' packing for high-speed applications has been found to be that consisting of rings moulded from shredded 'Fluon', usually with about 5 per cent of a filler such as asbestos or graphite. With these rings, thin solid annular 'Fluon' spacers are usually employed. The system is run in at low speed and low temperature until a small uniform clearance between shaft and packing is achieved. Packings of this type have been widely and successfully used in pumps handling corrosive chemicals and operating at speeds up to 3,600 rpm.

Other applications in chemical plant in which 'Fluon' is successfully used include seating discs and diaphragms—the Sanders valve diaphragms being particularly noteworthy—valves and nozzles, pumps, bellows, back-up rings, small vessels and flexible couplings. 'Fluon' sheet and tape are used for the protective lining of vessels and for manufacturing bags to hold corrosive liquids. Extruded pipe and tubing is used for conveying chemicals, and 'Fluon' has also been used for anti-bumping pellets with boiling acids.

The economics of the use of 'Fluon' for chemical plant are fairly straightforward. Initially, because of the high cost of the raw material and the specialised techniques for its conversion, 'Fluon' components are expensive. The initial expense is quickly offset, however—first because a 'Fluon' gasket, packing or other component will outlast by many times a similar article in which other materials are used (indeed, cases have been reported of PTFE packings outlasting the pumps they were used in) and second, because in any conditions of service the effective life of a 'Fluon' component is greater than that of one in any other material. As a result, replacement is not so frequently necessary and hence there are fewer shutdowns and less valuable production time is lost.

A few examples serve to illustrate this. For instance, in a certain plant-handling fuming sulphuric acid, conventional packings had to be replaced every two days; with PTFE packings no replacement has been necessary after two years' operation. In

Courtesy of I.C.I. Plastics Division

'Fluon' tape as used in the chemical and electrical industries; the tape is cut from a block as shown opposite

another plant, one handling a lachrimator, conventional gaskets deteriorated within a few weeks; PTFE gaskets were still leak-proof after a year. Many similar instances could be cited.

Much the same economic considerations apply to the use of 'Fluon' for coating and covering machine parts handling sticky substances. By the use of 'Fluon' the build-up of sticky substances on machine parts is prevented and shut-downs for cleaning and maintenance are considerably reduced. Waste of raw materials is minimised, operating efficiency is increased and the need for additives to reduce stickiness is reduced.

Non-stick Applications

Typical of the non-stick applications of 'Fluon' is the covering of sheeting rolls and other machine parts handling wet, sticky dough in bakeries. Normally, the sheeting rolls are made from highly-polished stainless steel and are fitted with accurately ground scrapers, which must be frequently reground to maintain their efficiency. The use of 'Fluon' on the rolls eliminates the need for accurately ground scrapers and, therefore, the shut down time formerly necessary for re-grinding. There is also a saving in raw material because no raw dough is lost.

This example has been chosen from many because it suitably illustrates the principal involved in the use of 'Fluon' for its resistance to adhesion. Similar applications include covering sizing rollers in the textile industry, covering rollers in paper-making and carbdoard-making machinery and in veneering, plywood, and carton-making plant. Machine parts, guides and feed hoppers which are in contact with paints, printing inks, ceramic clays, chemical mixtures, detergents and soap products have all been successfully and advantageously lined or covered with 'Fluon'. With non free-flowing powders handled on automatic machinery, the use of 'Fluon' to prevent the powders building up on and clogging the feed mechanism is particularly valuable. 'Fluon' is also used for end plates for calender and paint mill rollers, for covering press platens in the rubber and plastics industries, and as a mould separating agent in laminating with epoxy resins.

A kindred application is the use of 'Fluon' tape as a barrier material for the heat sealer plates of wrapping and bag making machinery handling plastic films and wax papers. The packaging films become sticky at sealing temperatures but the 'Fluon' barrier prevents sticking to the sealer jaws and building up deposits of carbon and foreign matter which could prevent adequate sealing.

Although this article has dealt only with the applications of 'Fluon' in chemical plant, it should be noted that the material is equally valuable and has as wide a range of important applications in the electrical industry, particularly as a high frequency de-electric in applications where resistance to very high or very low temperatures is also required. It will be apparent, therefore, that with 'Fluon' the plastics industry is making an important contribution to the solution of the technical problems of other industries.

Nylon Yarn Cheaper

SUBSTANTIAL reductions in the prices of British nylon yarn and staple fibre for both home and export delivery were made by British Nylon Spinners Ltd. with effect from 15 April.

The prices of all fine denier nylon yarns have been reduced by approximately 15 per cent and the prices of nylon staple fibre by approximately 10 per cent. For example, the new price per lb. for 15 denier nylon yarn is 39s. 9d. (former price 46s. 9d.); for 30 denier, the new price is 17s. 9d. (formerly 20s. 10d.); and nylon staple, 3 and 6 denier, is now 10s. 3d. instead of 11s. 3d.

These new prices make British nylon textile yarns the cheapest in the world, being well below those charged by American, European and Japanese producers. The reductions have been made in anticipation of increased production.

By July next, British Nylon Spinners Ltd. expect to begin production in the extensions built at their factory near Pontypool, Monmouthshire, designed to treble the original annual production rate of 10,000,000 lb. of nylon yarns and staple fibre. By the end of this year production should have reached an annual rate of 25,000,000 lb. The full rate, of the order of 30,000,000 lb., should be reached towards the end of 1955. The new B.N.S. plant at Doncaster, now being re-built and re-equipped, should be ready for production in about 18 months and will in time provide a considerable increase in total production.

38th Physical Society Exhibition

Smaller Space but Stimulating Display

THIS year, the Exhibition of Scientific Instruments organised by the Physical Society was a smaller and more compact display than on previous occasions. The organisations which, owing to lack of space, were unable to exhibit, have contributed descriptions of their products to the handbook and these have been added at the end of the stand catalogue. Despite the limitation of space there was a stimulating display of new techniques and a great variety of instruments at all stages of development from the laboratory 'mock-up' to the production model.

Many stands were occupied by the research establishments of Government departments and there were also contributions from the universities.

High Speed Photography

High-speed photography has proved itself to be a valuable research tool and there were three different systems on show. The first of these was the now familiar Kerr cell camera exhibited by the Atomic Weapons Research Establishment and used in the photography of the atomic weapon tests.

The principle of the Kerr cell shutter, which uses a high voltage pulse to rotate the plane of polarisation of a column of liquid placed between crossed polaroids, has been applied to a range of cameras including a single shot model capable of exposures down to the incredibly short time interval of 20 mμsec. This camera is designed for use at a working distance of 17 inches and has the comparatively large aperture of *f*8. On the same stand was a high-speed streak camera with a writing speed of 20 mm. per μsec. It utilises a rotating mirror driven at a speed of 240,000 r.p.m. in an atmosphere of helium by means of a small compressed air turbine. Control and monitoring is achieved by the use of photomultipliers and an electro-magnetic brake.

An entirely new method of taking photographs at high speed, first described in 1953, appeared on the stand of the Physical Chemistry Department of University of Cambridge. Only very simple apparatus is involved and the method has the supreme virtue of being very economical of photographic material—a virtue shared by few high-speed cameras.

In this new system the image on a photographic plate is dissected into dots by means of a plastic plate embossed with a large number of tiny lenses. The plate will accommodate a number of these dot images interlaced with each other, the position of each being determined by the angle at which the incident light strikes the lenticular plate. Variation in the angle is achieved by spinning a Nipkov disc between the elements of the camera lens, and this permits the recording of 200 pictures at the rate of 50,000 per sec. on a single plate.

The technique is extremely versatile and may be used to take shadow or profile pictures with igniting lead azide as the light source, or for photomicrography at high speed magnification. The photographic records may be played back in slow motion or individual pictures selected for printing by reversing the light path through the camera.

Xeroradiography Demonstrated

Another photographic technique which has been developed recently and which has many possible applications was demonstrated on the stand of Ferranti Ltd., under the name of xeroradiography. This is an electrostatic method of obtaining X-ray pictures at low cost and with only a short time interval between the taking of the picture and the inspection of the developed image. The photographic element consists of a conducting plate covered with a thin film of selenium. When the selenium layer is charged to a high potential it becomes sensitive to X-rays, becoming conducting where they strike, so that charge leaks away in proportion to the intensity of the incident radiation. The charge pattern is made visible by the application of a small quantity of charged powder.

If a permanent record is required this image may be copied by conventional photographic means and the plate may be wiped clean, when it is ready for re-use. The exposure required is greater than that with X-ray film so that the use of xeroradiography in medical practice is at present limited, although it can be of the greatest

value in following the course of a bone operation. The lengthened exposure is, however, no disadvantage in industrial radiography and the shortened processing time of about one minute more than makes up for the increased exposure time.

The counting of particles in a microscopic field, particularly those of sub-sieve proportions, is an exhausting and laborious procedure but one which it is frequently necessary to carry out. This is the case with samples of dust from mines, and on the stand of Mullard Ltd. was an instrument developed in conjunction with the National Coal Board for carrying out this task automatically.

Scanning Duplicated

The particles which the apparatus was designed to count are those occurring in the thermally precipitable dust from coal mines, but it can count any particles in the size range of 1 to 20 mμ provided that there is good separation in the field selected. This field is scanned by the flying spot of a cathode ray tube via a reducing optical system and the scanning is duplicated by a beam-splitting device so as to provide an interlacing second scan. This behaves as a guard and prevents the counting of each particle more than once. A possible development of this instrument is its adaptation to classify the particles which it counts into size ranges by altering the width of scan.

The counting of red cells is another tedious operation which has to be carried out very often and two instruments were on show which reduce the pathologist's work to the preparation of the slide. That of Unicam Instruments Ltd. uses mechanical scanning of the field, allowing the light passing through the cells to fall upon a photomultiplier detector. The pulses from the detector are fed to a five decade Dekatron scale via a discriminating circuit. Edge effects are eliminated automatically by making two scans, one forward and one in reverse with a bar inserted in the scanning slit so as to double the edges. The second figure is electronically halved and subtracted from the first to give a corrected count.

One of the most constant sources of danger in pits has always been the presence of fire damp or methane in the workings. The National Coal Board are developing instruments to measure and control this danger and displayed two examples. The first of these was an acoustic instrument based upon the difference in the speed of sound in methane and in air.

A fixed frequency source transmits a signal through a column of the sampled air drained from the workings to a detector. The transmitted and received signals are out of phase by an amount depending upon the concentration of methane in the sample and their disparity may be displayed upon a cathode ray screen. The screen may be calibrated to measure the percentage of methane and there is provision for the sounding of an alarm when this percentage passes a recognised limit. An alternative portable alarm utilises the rise in temperature which occurs when a standard flame is burned in an atmosphere containing a combustible gas to provide the signal.

Another atmospheric hazard is the presence of beryllium and its compounds in the air of factories where they are made or used. An instrument shown by the Atomic Energy Research Establishment passes the air sample through an electric discharge maintained between copper electrodes. The light emitted passes through a monochromator and falls upon a photomultiplier. The output from the photomultiplier is fed to a suitable recording device but owing to the difference in the size of the airborne particles this output is not strictly proportional to the concentration of beryllium.—J.R.M.

Power Gas Extensions

FURTHER extensions are being planned to the south works of the Power-Gas Corporation, Stockton-on-Tees, which, when the enlargement now proceeding is completed in the autumn, will have cost about £1,200,000. Fifty per cent more floor area will then be available in the construction shop and there will be a new machine shop. These improvements will do much to help cut delivery times and costs.

In the new machine shop will be two 50-ton cranes, a 23 ft. diameter lathe—designed and built by the firm and constituting one of the biggest in the country—and boring, drilling and planing machines. Work in hand in the construction shop includes an order for the second largest blast furnace in the world. Equipment for the I.C.I. Terylene plant at Wilton is also being manufactured.

Happy Time at Cambridge

Royal Institute's Full Programme

THE Royal Institute of Chemistry anniversary meeting was held in Cambridge 8-10 April. This was the fourth of the anniversary meetings to be held out of London, the others being at Birmingham (1948), Glasgow (1950), and Dublin (1952). The hosts on this occasion were the London and the East Anglia Sections of the Institute. The attendance was about 450, including members and their wives and other personal guests, most of whom were accommodated in Magdalene, Trinity and Girton Colleges.

The University Large Examination Hall was used as the Institute Reception Hall throughout the period of the meetings. It was comfortably furnished and beautifully decorated with flowers, while 55 paintings and drawings by members were exhibited there and formed an attractive and interesting background.

In the afternoon of 8 April visits were arranged to the establishments of the Cambridge Instrument Co. Ltd., Chivers and Sons Ltd., and Pest Control Ltd., after which Alderman G. F. Hickson, M.A., instructively entertained the visitors by a lecture on the town and University of Cambridge. In the evening a civic reception and dance took place in the Large Room of the Guildhall by invitation of the Mayor, Councillor T. H. Amey, J.P., guests being received by the Mayor and Mayoress, Sir Harry Jephcott (President) and Lady Jephcott.

Another very full programme followed on Friday, 9 April. The annual general meeting took place in a crowded lecture theatre in the Chemistry Department in the morning. Sir Harry Jephcott then delivered the Presidential Address entitled 'Biosynthesis and the Chemist,' in which he outlined developments in the use of biosynthetic processes for the commercial production of a number of products, including antibiotics, and discussed the possible future role of biosynthesis as a complement to chemical synthesis, which would involve the combined efforts of biologists and chemists. He concluded with observations on the training of chemists so that they could give the most effective service in a democratic community.

Luncheons followed in the Halls of King's College and Magdalene College, at which the chair was taken, respectively, by Mr. G. H. Whyatt (Chairman of the East

Members of the Royal Institute of Chemistry visiting Chesterford Research Station as guests of Pest Control Ltd., during their recent anniversary meeting at Cambridge. As well as a wide selection of spraying machines, the party also saw special displays illustrating the use of selective weedkillers and systemic insecticides

Anglia Section) and Dr. B. C. Saunders (Fellow of Magdalene College). Visits to colleges took place in the afternoon, some sixteen guides accompanying the very large number who took advantage of this opportunity. Further similar visits were arranged on the Saturday morning.

On the Friday afternoon Professor A. R. Todd, F.R.S., lectured to a crowded audience on 'New Developments in Nucleic Acid and Co-Enzyme Chemistry,' which took the form of a masterly survey of some of the Department's work in organic chemistry over the past 15 years.

Owing to the very large number attending the meetings, it was necessary to hold the annual dinner in two parts—the President's Dinner in Trinity and the dinner of the Past President (Mr. H. W. Cremer, C.B.E.), in St. John's. At the former the toast of the Institute was proposed by Professor W. Wardlaw, C.B.E. (President of the Chemical Society), and replied to by Sir Harry Jephcott, after which the toast of the Guests was proposed by Dr. Norman Booth (Chairman of the London Section), to which Dr. F. G. Mann, F.R.S. (Fellow of Trinity College) responded. At St. John's Professor Todd proposed the toast of the Institute, to which Mr. Cremer responded, and Dr. H. Baines (retiring Vice-President) that of the Guests, replied to by Miss Mamie Olliver.

Lecture at an Early Hour

Despite the comparatively early hour, a large audience attended the lecture by Professor R. G. W. Norrish, F.R.S., on 'Light as a Tool in the Study of Reaction Mechanisms,' held on the morning of 10 April. This took the audience through the work of the Department of Physical Chemistry over a number of years and presented an interesting account of the present state of work in this field.

The remainder of the morning was occupied by some in visiting colleges, but the major outings consisted of a coach tour to the ancient Suffolk wool town of Lavenham and, in the early afternoon, an alternative tour to Ely, which included a visit to the cathedral. In the early evening twilight an organ recital was given in the architectural splendour of King's College Chapel by Mr. Hugh J. McLean, A.R.C.M., F.R.C.O., Dr. Mann Organ Scholar.

The last event on the formal programme was the reception given by kind invitation of the Vice-Chancellor, the Rt. Hon. H. U. Willink, M.C., M.A., Q.C. To the Vice-Chancellor, the Mayor, the various college authorities, the firms visited, and, among those mainly concerned with organisation of the programme in Cambridge, to Dr. Saunders, Miss Olliver and Dr. Mann, the Institute is indebted for one of the happiest and most inspiring gatherings in its history.

Patent Office Library

IMMEDIATE open access to over 3,500 scientific and technical periodicals in all languages has been provided by a new extension to the Patent Office Library which is now open to the public in the basement of the headquarters building in Chancery Lane, London.

All of this periodical material, which ranges over the whole field of technical invention from agriculture to zinc, will now be conveniently arranged on open shelves. It will cover items published since 1920. Hitherto much of it has only been available on request. Earlier volumes will continue to be supplied on demand. Another important addition will be the provision of a special section for bibliographies and abstracts.

The extension has been made possible by a general rearrangement of the library and by overhauling the wartime accumulation of unbound volumes. These arrears have been reduced from 22,000 to 14,000 in the past three years and will be further reduced to 10,000 by the end of this year.

Gunpowder Mills Closing

ONE of the oldest gunpowder mills in Great Britain, the I.C.I. factory at Roslin, Midlothian—it was built in 1790 by Hay, Merricks & Co. Ltd.—is to be closed down because of the effect of mineworking in the area. The employees, numbering about 60, will, it is hoped, be absorbed in other branches of the I.C.I. organisation.

In an official announcement of the decision to cease using the factory for the manufacture of black powder, the Nobel Division of I.C.I. stated that full consideration had been given to the possibility of mitigating the effect of the subsidence by, for example, floating the building on concrete rafts, but in view of the magnitude of the subsidence it was considered that the requisite degree of safety could not be sustained.

Improvement at Home : Stable Abroad

Plant Manufacturers' Busy Year

THE 34th annual general meeting of the British Chemical Plant Manufacturers' Association was held in London on 13 April, when Mr. W. J. Hooton, of S. H. Johnson and Co. Ltd., was elected chairman. Mr. H. W. Fender (Prodorite Ltd.), Mr. I. M. O. Hutchison (Henry Balfour Ltd.), and Mr. R. F. Stewart (Dorr-Oliver Co. Ltd.) were elected vice-chairmen, and Mr. P. W. Seligman (The A.P.V. Co., Ltd.) was re-elected hon. treasurer.

Those elected to the council were: *Mr. W. R. Beswick (Ashmore, Benson, Pease & Co.); *Mr. B. L. Broadbent (Thomas Broadbent & Sons Ltd.); *Dr. G. E. Foxwell (Clayton, Son & Co. Ltd.); Mr. E. S. Franklin (Torrance & Sons Ltd.); *Mr. K. Fraser (W. J. Fraser & Co. Ltd.); *Major V. F. Gloag, M.C. (Simon-Carves Ltd.); *Mr. A. G. Grant (Whessoe Ltd.); Mr. J. C. Haithwaite (John Thompson (Dudley) Ltd.); Mr. G. N. Hodson (Hathernware Ltd.); Mr. A. M. Hutcheson (Thompson Bros. Ltd.); Dr. R. Lessing (The Hydronyl Syndicate Ltd.); *Mr. J. Arthur Reavell (Kestner Evaporator & Eng. Co. Ltd.); Mr. G. W. Riley (George Scott & Son Ltd.); Mr. R. W. Rutherford (The Power-Gas Corporation Ltd.); *Dr. R. Seligman (The A.P.V. Co. Ltd.); Mr. E. Smyth (Peter Brotherhood Ltd.); *Mr. J. W. Wright (Cannon CP Ltd.); Mr. Mark Wyndham and *Mr. H. V. Yorke (Bennett, Sons & Shears Ltd.).

*Past chairmen who are *ex officio* members of Council.

Private Dinner Discussion

The meeting was followed by a private dinner discussion meeting when the subject was 'The Threat to British Engineering Exports.' The discussion was opened by Sir Percy Lister, chairman of R. A. Lister & Co., Ltd., and a member of the Dollar Exports Council; Mr. W. R. Beswick, director of the Power-Gas Corporation, Ltd., and a member of the UK mission to the Middle East; and Mr. R. Ewart Williams, economic adviser to the Credit Insurance Association, Ltd.

The annual report of the Association for 1953 says that at the start of the year the effect of the recession, happily only temporary, in the chemical and allied industries on the demand for capital equipment was being felt. The results of the return to full production became increasingly noticeable during the year and the Association welcomed the announcement, made at the annual dinner of the Association of British Chemical Manufacturers in October, of the chemical industry's plans for further expansion. By the end of the year, due to increased capacity and the marked improvement in supplies of raw materials and bought-out components, members were able to offer better deliveries and were in a stronger position than ever before to meet the demands made upon them.

Difficulties Not Ended

During the early part of the year the Association continued to take up with the Ministry of Supply cases of difficulty arising from the iron and steel rationing scheme. By May, however, supplies had improved to such an extent that it was possible to end rationing except for a few items of minor importance.

Notwithstanding the ending of rationing the steel industry still found difficulty in meeting the demand for plate and arrangements were made by the Ministry of Supply for consultation between production departments and the plate makers to ascertain industry's requirements and to ensure fair distribution of supplies. At the end of the year the situation had improved but was still not wholly satisfactory.

The Association appointed representatives to a further six technical committees of the British Standards Institution. Work begun during the year included the preparation of a code for glass-lined pressure vessels; of standards for bursting discs, dimensions and qualities of chemically resistant bricks and tiles, manhole doors and cover plates; and of a standard for sizes of trade and technical literature.

To implement a recommendation of an *ad hoc* committee of BCPMA and the Association of British Chemical Manufacturers which examined the OEEC report 'Chemical Apparatus in the USA', a joint committee was set up in April to investigate

the need for and possibilities of a greater measure of standardisation and simplification of chemical plant and equipment. The committee is discussing such problems as standard codes of performance and tests for plant, sizes of process vessels and the standardisation of fittings such as sight glasses, manholes and charging holes, with a view to making proposals to the British Standards Institution.

Represented on Educational Bodies

The technological progress of the chemical plant industry is dependent on its ability to recruit and train adequate numbers of chemical engineers. It is therefore fortunate that the Association is well placed to make known the industry's requirements and to keep members informed of the education facilities available. The director (Dr. E. H. T. Hoblyn) represents BCPMA on the Chemical Engineering Committee of the London and Home Counties Regional Advisory Council for Higher Technological Education and on the Chemical Engineering Advisory Committee of West Ham College of Technology; he is also, in his personal capacity, a member of the Education Committee of the Institution of Chemical Engineers and a governor of Battersea Polytechnic.

The returns which members are required to make for the Census of Production have long been a source of irritation and the Association therefore welcomed the opportunity of giving evidence to a departmental committee appointed by the President of the Board of Trade to advise him on future policy regarding the taking of censuses.

Information from members showed that they experienced great difficulty and inconvenience in completing their returns; that in many cases special analyses had to be made by senior staff to obtain the necessary information, which was of no use for management purposes; and that virtually no use was made of the census reports. A detailed memorandum embodying members' criticisms was submitted to the committee.

Throughout the year the export market presented many difficult features and the steady growth of foreign competition continued. It is therefore encouraging to record that the value of chemical plant shipments was slightly above that achieved in 1952.

The Council, the Executive Committee and staff have continued to give special attention to the problems of overseas trade and members have been helped in a number of ways. This work has included the circulating of plant inquiries, of which a very considerable number were again received; sponsoring export licence applications; answering members' questions on import licensing, tariff and exchange matters; helping members to find overseas agents, providing them with letters of introduction when travelling abroad and making their travel arrangements.

In last year's report it was mentioned that the Association supported the view of the Federation of British Industries that export incentive devices such as dollar retention and tax remission schemes should be abandoned. A vigorous campaign conducted by the Federation through the Council of European Industrial Federations resulted in agreement among the member associations in October to recommend to their respective governments that there should be a standstill period of three months during which no new schemes should be introduced and those in current use should be reviewed. A summary of the devices in operation was issued to members in October.

The volume of trade covered by bilateral agreements is now much reduced, but the countries still concerned are those whose foreign exchange difficulties are particularly acute and do not admit of any ready solution. The Association has continued to press for improved quotas for chemical plant.

Recommendations Accepted

The committee appointed by the Board of Trade in 1952 to review the procedure for consultation with industry regarding bilateral trade negotiations, to which the Association made representations through the Federation of British Industries, issued its report in August. Its recommendations were accepted by the President of the Board of Trade and the resultant improvements were noticeable in the last quarter of the year. In December a standing sub-committee on bilateral trade negotiations was set up by the President; the Federation of British Industries has two representatives on the sub-committee, through whom the Association will be able to make its views known.

The first post-war Chemical Plant Exhibition, sponsored by the Association, was held at Olympia, London, from 3 to 17 September in conjunction with the nineteenth

Engineering, Marine and Welding Exhibition. The sixty-seven exhibitors were all members of the Association; as the space available was limited to twenty thousand square feet a further twenty-five members who regularly show at the Engineering, Marine and Welding Exhibition retained their usual stands in that exhibition.

A dinner discussion meeting was held in October to consider when another exhibition should be held and what form it should take. Members were agreed that within the limits imposed by its restricted size the recent exhibition was a success and that there should be a regular and larger exhibition every three or four years, preferably in conjunction with the chemical manufacturers. Estimates of space likely to be required at the next exhibition were called for in November to assist the Executive Committee in formulating plans; at the end of the year these were still under discussion.

Distilleries Converted

To Make Glucose from Potatoes

THE industrial alcohol distilleries at Corroy, County Mayo, and Labbadish, County Donegal, are to be converted by Ceimici Teo (Chemicals, Ltd.) for the processing of potatoes for the production of glucose.

The following statement was issued by the Government Information Bureau in Dublin on behalf of the Minister for Industry and Commerce:

'Following the official announcement on 1 January about the future of the industrial alcohol factories, the Government gave further consideration to the possibility of utilising these factories for the development of another industry involving the use of potatoes as a raw material.

'The Government have now decided that the distilleries at Corroy and Labbadish, which will shortly cease the production of industrial alcohol, should be converted by Ceimici Teo for the processing of potatoes for the production of glucose. Ceimici Teo have been authorised to make the necessary arrangements for the purchase of potatoes in the factory districts concerned, and it is understood that the Company will make an announcement in this matter within the next few days.

'As already announced, the production of industrial alcohol will continue at the Cooley distillery. The future of the distilleries at Carndonagh and Carrickmacross will be determined at a later date'.

Last year Irish glucose imports totalled 230,000 cwt. value £566,400. The annual production of alcohol totalled roughly 1,500,000 gallons, valued at about £550,000.

1953 Steel Production

FIGURES appearing in the United Nations Economic Commission for Europe 'Quarterly Bulletin of Steel Statistics' which has just been published, indicate that steel production during January and February continued to rise in the United Kingdom, Italy and the Netherlands; whereas it continued roughly stationary and somewhat below the record levels of 1952 and early 1953 in Western Germany, France, Belgium, the Saar and Luxembourg.

European crude-steel production (excluding the USSR) at 75,000,000 tons in 1953 was a record, exceeding that of the previous record-year (1952) by the small margin of one per cent. The 75,000,000 tons figure breaks down as follows: European Coal and Steel Community (ECSC) 40,000,000 tons, a drop of 5 per cent from the 1952 record; other Western European countries, an all-time high of 23,000,000 tons, an increase of 8 per cent on the previous record-year (1952); Eastern Europe (Czechoslovakia, Eastern Germany, Hungary, Poland and Rumania) an all-time high of 12,000,000 tons, 13 per cent up on the previous record-year (1952).

This compares with record productions elsewhere during the year of 101,000,000 tons in the United States (20 per cent more than in 1952 or 6 per cent more than the previous record-year of 1951), 38,000,000 tons in the USSR (10 per cent more than 1952), and 7,700,000 tons in Japan (10 per cent more than 1952 or 0.2 per cent more than the previous record-year of 1943).

UK imports of synthetic rubber during 1953 were 2,962 tons from the US, 2,679 tons from Canada, 32 tons from Western Germany, eleven tons from Norway and one ton from the Irish Republic. These figures were given in the House of Commons recently by Mr. D. H. Amory, Minister of State, Board of Trade.

Midlands Analysts

Fourth Annual General Meeting

THE fourth annual general meeting of the Midlands Society for Analytical Chemistry was held recently at the University, Edmund Street, Birmingham. The reports of the hon. secretary and hon. treasurer were read and adopted. The hon. secretary, Mr. W. T. Edwards tendered his resignation owing to his taking up a new appointment out of Birmingham, and Mr. G. W. Cherry was elected to this office. The Society's chairman, Mr. J. R. Leech, J.P., expressed the grateful thanks of the members to Mr. Edwards for his hard work on behalf of the Society.

Officers Elected

The following officers were elected for the 1954-55 session:—*Chairman*: Mr. J. R. Leech, J.P.; *Hon. Secretary*: Mr. G. W. Cherry, B.Sc., A.R.I.C.; *Hon. Treasurer*: Mr. F. C. J. Poulton, A.R.I.C.; *Committee*: Mr. R. Adkins, B.Sc.; Dr. B. Bauminger, Ph.D., A.R.I.C.; Dr. R. Belcher, Ph.D., F.R.I.C., F.Inst.F.; Mr. F. P. Everett, A.R.I.C.; Dr. S. H. Jenkins, D.Sc., F.R.I.C.; Mr. W. E. Mew, B.Sc., A.R.I.C.; Dr. A. J. Nutten, Ph.D., A.R.I.C.; Mr. W. J. Rowlands, B.Sc.; Dr. H. C. Smith, Ph.D., F.R.I.C.; and Dr. T. S. West, Ph.D., A.R.I.C.

The hon secretary's report stated that eight ordinary meetings had been held during 1953-54 in addition to the annual general meeting at which a lecture had been given. All the meetings had been well attended. Plans for the 1954-55 session were almost complete and it was hoped that the printed programme would be ready a few months before the session started in September.

Mr. Edwards said that he wished to be placed on record the thanks of the Society to the Chemistry Department of the University for facilities granted during the year, and especially to Dr. R. Belcher and his staff. It was agreed that the Society join with other local scientific societies in publishing a joint programme of activities. The subscription would be maintained at six shillings for the coming session.

The hon. secretary of the symposium committee, Dr. J. W. Robinson, gave an account of the progress made with the arrangements for the symposium on analytical chemistry to be held at the University, Edgbaston, between 25 August and 1 September 1954. The programme was now complete and about 60 papers would be read describing original and specialised techniques. It was hoped that the four plenary lecturers would be Professors F. Feigl, M. Stacey, F.R.S., and M. K. Zacherl and Dr. G. F. Hodsman.

Dr. Robinson paid tribute to the generosity of local industry, which was providing lavish hospitality during the eight days of the symposium. The symposium committees had met several times and the sub-committee secretaries were to be congratulated for the immense amount of work they had done in organising. Registration forms giving fuller details had now been printed and could be obtained on application. Requests should be sent to Dr. J. W. Robinson, 139 Stourport Road, Kidderminster, Worcs.

In previous years it had been customary to follow the annual general meeting with a lecture but this year the experiment was tried of omitting the lecture. The response was so encouraging it was decided to adopt this as standard procedure in future years.

Milk Advisory Committee

THE Minister of Food, the Minister of Agriculture and Fisheries and the Secretary of State for Scotland have appointed a Milk and Milk Products Technical Advisory Committee with the following terms of reference: 'To keep under review the technical problems arising at all stages of the handling, processing and distribution of milk and the manufacture of milk products; to inform the Ministers of the problems requiring research and of desirable technical developments; and to advise on the best means of encouraging the adoption of such developments in the dairy industry.'

Among members of the committee are Professor H. D. Kay (director of the National Institute for Research in Dairying), chairman; Mr. W. G. Alexander (Agricultural Research Council), Professor E. L. Crossley (Society of Dairy Technology), Mr. H. S. Hall (National Institute for Research in Dairying), Dr. C. H. Lee (Low Temperature Research Station, DSIR), Dr. R. Waite (Hannah Dairy Research Institute) and Dr. Norman C. Wright (chief scientific adviser, Ministry of Food).

The World's Sulphur

Sulphur Exploration Syndicate's Fourth Bulletin

THE reputation of the quarterly bulletin of the Sulphur Exploration Syndicate is now well established, and with the publication of the fourth number it is announced that an air mail edition is now available. From this latest bulletin, dated March 1954, we take the following details of the sulphur position.

New Zealand, the Commonwealth country reviewed in this bulletin, is wholly dependent on imports for its sulphur requirements. The size of the sulphur industry is practically determined by the fertiliser industry, which because of phosphorus deficiency in the farming land, is of vital importance to the country's predominantly agricultural economy. Sulphur consumption in 1953 amounted to about 76,000 tons, and after 1954 it is expected that requirements will be 90,000-100,000 tons per annum of brimstone for sulphuric acid manufacture. In considering new projects the disadvantages of using alternatives to brimstone are being weighed against the uncertainty of long-term supplies. The use of Australian pyrites concentrates is receiving serious consideration for at least one project, and processes for the production of phosphatic fertiliser not requiring the use of sulphur are also envisaged.

Chilean Product Marginal

The sulphur industry of Chile holds a prominent place in world sulphur affairs, more on account of its large reserves than the output. Primitive mining methods and low refining efficiency are accentuated by adverse climatic conditions at the great altitudes at which deposits are situated, and by transport difficulties. As the country's domestic requirements are at present only about 17,000 tons per annum, the sulphur industry's expansion must depend on its ability to export, but high production costs making Chile a marginal producer have prevented this in the past two years, with the result that the output in 1953 was less than one-third of the installed production capacity of 120,000 tons per annum. By granting the industry special facilities, permitting sulphur export sales at competitive world prices, the Government are trying to encourage production.

In the US production of native and recovered sulphur during 1953 (5,492,000 tons) was about 50,000 tons (0.9 per cent) less than during 1952, as the increase of recovered sulphur production of about 90,000 tons was insufficient to make up for the reduction of native sulphur production of about 140,000 tons during the year. At the same time, apparent domestic consumption rose 8 per cent to 4,256,000 tons, while 1953 exports at 1,241,536 tons declined 5 per cent compared with 1952.

New Domes in Production

During the current year new production from two domes of the Freeport Sulphur Company, and one dome operated by Standard Sulphur Company, is expected to provide an additional sulphur tonnage of 600,000 tons, and although the decline of output at some existing domes may amount to 250,000 tons and new sulphur using capacity is expected to raise consumption by 200,000-300,000 tons, the US industry should be in a position to build up stocks to about nine months' domestic consumption, thus reversing the trend of declining stock which has been causing anxiety in recent years to Administration and producers.

The Jefferson Lake Sulphur Co., the third largest sulphur producer in the world, is extending its field of operation to the production of sulphur by recovery from sour gas. From autumn, 1954, the new plant at Worland, Wyoming, will add annually about 40,000 tons to the company's Frasch sulphur output which, in 1953, amounted to 375,883 tons, 7½ per cent less than during the preceding year.

In Italy further efforts are being made to place the industry on a sounder footing. Production during 1953, amounting to 227,750 metric tons raw sulphur, was the highest on record since the war, but as exports were negligible, unsold stocks accumulated.

In the UK consumption of sulphur in all forms in 1953 amounted to 735,000 tons, the highest on record and about 25 per cent greater than in 1952. Although consumption of brimstone totalling 347,600 tons for 'regular' and 'acid' use increased, the pro-

portion used in sulphuric acid manufacture dropped to 38¼ per cent, compared with 43 per cent in 1952. The completion of three-quarters of the new pyrites burning plants scheduled under the 1951 conversion programme raised pyrites consumption to 378,100 tons during the year. Sulphuric acid production during 1953 amounted to 1,875,200 tons, the highest on record. The high rate of sulphur consumption, of which only 57 per cent was met by imports and 7 per cent by indigenous production, resulted in a further reduction of stocks to a level, as forecast, of barely two months' requirements.

HCl Absorption

Powell Duffryn Carbon Tower

THE latest issue of the 'PD Review,' published by Powell Duffryn Ltd., describes some interesting variations of the 'Delanium' cubic heat exchanger and the 'Paragrid' tower, manufactured by their subsidiary, Powell Duffryn Carbon Products Ltd.

The French company of Potasse et Engrais Chimiques had for many years been producing hydrochloric acid from salt cake furnaces, and absorbing the HCl in two large absorbers, which were costly to maintain and unsuitable in operation, due to continuous leaking. They therefore approached Powell Duffryn Carbon Products to see whether an improved unit could be designed.

After detailed investigation of the problem, it was decided to install a pilot plant at Rouen, and the results of experimental work with this unit were so encouraging that a tower 3 ft. by 3 ft. by 20 ft. was erected. This contained a combination of graphite tubes for cooling and paragrid strips for efficient distribution, the hot gases from the furnaces being cooled initially by standard 'Delanium' cubic heat exchangers. This latter process itself took the place of a large and complicated ceramic cooling installation which occupied nearly 100 times the space of the new units.

Since the installation of the new plant the output has averaged over 65,000 tons a year of concentrated hydrochloric acid, with an absorption efficiency of 99.5 per cent. Considering the compactness of the new installation compared with the old, and bearing in mind that it is the largest capacity plant of its kind yet erected, the results achieved are excellent.

Refractory Materials

THE programme has been issued for the spring meeting of the Refractory Materials Section of the British Ceramic Society, which will be held at the Gleneagles Hotel, Perthshire, from 19-21 May.

The general business meeting of the section will be held at 6 p.m. on the first day and the following day will be devoted to visits to the Clydebridge Steel Works of Colvilles Ltd.; the works of the British Aluminium Co. Ltd., Kinlochleven; the works of James Dougall & Sons Ltd., Bonnybridge; and the Chapelhall works of Bonnybridge Silica & Fireclay Co. Ltd.

Two technical sessions will be held on the concluding day, the papers to be presented being as follow: 'Flow in Aluminous Refractories at High Temperatures,' by Y. Letort (director of the National Ceramic Research Centre, Paris); 'The Differentiation of Aluminous Materials by Contraction Tests,' by J. F. Hyslop (John G. Stein & Co. Ltd.); 'Refractory Materials for Glass Tank Furnaces,' by J. H. Partridge (General Electric Co. Ltd.); 'Some Studies in Mullite Formation,' by J. Shorter (Bonnybridge Silica & Fireclay Co. Ltd.); and 'The Specific Heat of Kyanite & Sillimanite,' by C. P. Taneja and L. R. Barrett.

Tungsten Ore Prices Rise Again

Yet further increases in the selling prices for tungsten ores of standard 65 per cent grade and ordinary quality have been announced by the Ministry of Materials, with effect from 17 April, as follows: wolframite from 200s. to 210s. and scheelite from 195s. to 205s., both per long ton unit delivered consumers' works.

Change of Address

On Thursday, 29 April, 1954, the offices of Chemical Engineering Wiltons Ltd. will be transferred to the following address: Chemical Engineering Wiltons Ltd., Cheadle Heath, Stockport, Cheshire. Telephone: Gatley 5231. Telegrams: Wiltonstil, Stockport. All business will be conducted from this address from the above date.

PROGRESS IN THE CHEMISTRY OF FATS AND OTHER LIPIDS. Vol. 2. Edited by R. T. Holman, W. O. Lundberg and T. Malkin. Pergamon Press Ltd., London. 1954. Pp. 347. 62s.

This second volume of the series contains a number of comprehensive reviews of various aspects of lipid chemistry, most of which were not dealt with in Volume I. The exception is the section on 'The Polymorphism of Glycerides' by T. Malkin, which describes the extension to the glycerides of the ideas and techniques already discussed in Volume I with regard to the fatty acids and their simple derivatives. Aspects of the physical chemistry of the lipids are dealt with in the chapters on 'The Surface Properties of Fatty Acids and Allied Substances' (D. G. Dervichian) and the 'Infra-red Absorption Spectroscopy in Fats and Oils.' (D. H. Wheeler). The latter article illustrates how this technique has found increasing application in research and industrial control in the field of lipid chemistry.

New methods for the separation of organic compounds are always of great interest to those working with lipoidal substances. In this respect the articles on 'Counter-current Fractionation of Lipids' by H. J. Dutton, and 'Urea Inclusion Compounds of Fatty Acids' by H. Schlenk are particularly valuable. They give a very useful account of the applications of these methods to the separation of the lipids and the limitations which are to be expected in their use. In addition, theoretical aspects of inclusion compounds and of counter-current fractionation are amply discussed.

The latest results and theories on the 'Autoxidation of Fats and Related Substances' are reviewed by R. T. Holman, and finally there is a very comprehensive chapter on the 'Nutritional Significance of the Fats' by H. J. Deuel, Jr. As the last-mentioned author points out, there was, until recently, a tendency for nutrition workers to consider fats as optional components of the diet. This review points out, however, that the fats may act not only as a source of energy, but also to supply certain essential fatty acids.

The volume as a whole is a worthy successor to the first of the series. It is well printed and contains a large number of clear diagrams and tables. All the articles contain numerous references to the relevant literature.—A. S. JONES.

THE DETERMINATION OF CRYSTAL STRUCTURES. By H. Lipson and W. Cochran. G. Bell & Sons Ltd., London. 1953. Pp. 345. 50s.

This book, which is Volume III of 'The Cystalline State,' edited by Sir Lawrence Bragg, deals with a particular stage of crystal structure determination which may be described as what happens between observation of the intensities of the various diffracted X-ray beams produced by a crystal and the listing of accurate co-ordinates for the atoms in its unit cell. All chemists want at least the bond lengths, bond angles, and other information summarised in the atomic co-ordinates, but only those who themselves apply X-ray diffraction methods are likely to need the detail of processes here described. The apparent complexities introduced into what may previously have seemed the fairly simple Bragg law and the defence offered for them may be unappreciated by the general reader who is not among the two main classes in the minds of the authors. But such a reader will find many useful sections, since the main aims and principles are set forth in a clear manner and may be understood without the detailed treatments which he may not wish to follow.

The two main classes of readers provided for are the beginners in research who are trying to understand and apply some of the many methods developed in this field, and more experienced workers who will here find a general survey of the possible approaches

to problems of crystal structure. Simple practical examples are provided to illustrate the principles of various procedures and are followed by more complex illustrations from completed structure determinations.

The first of the two main sections deals with routine processes such as determination of space-groups, calculation of structure factors and summation of Fourier series. Here the essential mathematical formulae used in crystal structure determination are brought out and their uses explained.

Crystal structure determination in general is still not direct because the diffraction pattern of a crystal gives the intensities but not the relative phases of the various diffracted beams. This incomplete experimental information as a rule suffices because it is used in conjunction with other general ideas. The crystal structure contains discrete atoms of approximately spherical symmetry and only one of the infinite number of electron distributions that would diffract X-rays in the way observed leads to the correct number of atoms in an arrangement that makes sense. Although we have gone a long way from the original 'trial and error' process by which this sensible arrangement may be discovered, and are perhaps nearing the time when the phase problem may be less bitter, it is still necessary to understand and apply trial methods. The procedure, which some practitioners regard as partly inspirational, varies from structure to structure and is not easily communicated to others. The authors proceed by a well-varied set of examples.

Patterson methods of getting the thin end of a wedge into a structure and Fourier refinements to break it right open are followed by the direct methods which have aroused great interest in recent years. Throughout it is emphasised that the principles used in the determination of crystal structures are essentially those of physical optics and illustrations are given of the use of light waves to replace some stages of calculation.

Pepinsky's costly electronic devices are illustrated only in broad outline, the methods described in detail being those likely to be used by the majority of research workers. Neutron diffraction, promising but as yet in difficulties on the experimental side, is mentioned, as is the method of electron diffraction in crystals which, in view of progress during the last few years, could perhaps have been accorded rather more space.

Volume I shows no sign of withering by age, and this newest companion will be widely used for a long time.—H. M. POWELL.

PRACTICAL CHROMATOGRAPHY. By R. C. Brimley and F. C. Barrett. Chapman and Hall, London. 1952. Pp. 128, Figs. 34. 15s.

This little book is intended to provide a practical introduction to the techniques used in that broad range of separations generally known as chromatographic analysis. Although in the earlier part of the work the authors tend to give the impression that they think it adequate to consider all such separations as partition phenomena, and that by far the most important mode of separation is on paper, there is a reasonable amount of space devoted later in the book to column separations based on all three of the recognised principles.

From time to time throughout the book fairly detailed accounts are given of selected procedures, although the basis of selection is not altogether clear. On the whole, however, the descriptions are in general terms supplemented by a useful range of literature references. In other words, the book is almost precisely an 'introduction' to the subject, and is not one which would enable much work to be done by the reader without following up the references given in the text.

This brevity is presumably the result of an attempt to deal adequately with the subject in a relatively small volume to be published at low cost. As already noted, quite full accounts are given of some special aspects; amino acid and gas-phase separations for example. Other equally extensive fields do not receive anything like the same attention. The detailed descriptions of several kinds of fraction collectors seem over-weighty in a book of this size and scope.

The account given is very readable. But the reader, if a newcomer to the field, should bear in mind that the emphasis laid on the various parts of the field is not necessarily an indication either of the extent or of the importance of these several parts. If he does this he will find that he can make as pleasant and ordered an acquaintance with methods and achievements of considerable interest and considerable value in this book as in any general account which has appeared up to the present.—CECIL L. WILSON.

• HOME •

At the BIF

Marchon Products Ltd. will be among those exhibiting on the Association of British Chemical Manufacturers' combined stand at the Castle Bromwich section of the British Industries Fair from 3-14 May, and not at Earls Court or Olympia.

Fabricated Aluminium Prices Rise

The British Aluminium Co. Ltd. have announced that the effect of the wage awards to the shipbuilding and engineering unions which became effective on 5 April must be reflected in the selling prices of the company's various products in relation approximately to the labour involved in fabrication. The increases range from ½d. to 2d. per lb.

1955 Physical Exhibition

The space which can be made available for the staging of the annual exhibition of the Physical Society at Imperial College is of necessity continually diminishing and at the last meeting of the Council of the Society it was regretfully decided that connections with the College would have to be severed. Arrangements are now being made to hold the 1955 Physical Society Exhibition at the Royal Horticultural Hall, London, some time towards the end of April.

Corrosion & Design

Following the annual general meeting of the Corrosion Group of the Society of Chemical Industry, which will be held in the Chemical Society lecture theatre at Burlington House, Piccadilly, London, on 4 May, at 6.30 p.m., there will be a discussion on 'Corrosion and Design.' Members are being invited to contribute accounts of their experience and their ideas for improved practice.

Iron & Steel Production

Statistics issued by the Iron and Steel Board show that steel production in the UK averaged 364,800 tons a week in March, thus exceeding the previous record of 363,000 tons a week (in November, 1953) and comparing with a weekly average of 351,400 tons for March last year. Pig iron production during March averaged 230,900 tons a week. This is 1,300 tons higher than January this year, which was the previous best month.

New Telephone Number

The telephone has now been installed at the new offices of the National Smoke Abatement Society, 30 Grosvenor Place, London, S.W.1. The number is Sloane 6301.

Lion's Share for Research

Out of every pound of levy collected by the Cotton Board from the industry in the last financial year, 10s. 10d. will go to support research work at the Shirley Institute, Manchester. This allocation is in accordance with the new arrangement for financing the Institute agreed to about a year ago, whereby the Council of the British Cotton Industry Research Association issued a 'call' for funds (subject to a ceiling figure of £250,000) and the board imposed a levy on the various sections of the industry, so as to produce within the total levy the proportion earmarked for research.

Basic Materials Dearer

The overall level of prices of basic materials used in British industry, as measured by the Board of Trade's index, rose by 1.4 points, or 1 per cent, during March, to 141.7 (30 June, 1949=100). Changes in price indices for principal commodities used in industry include the following, the first figure in each case being for March and the second for February: fertilisers, 172.7 (172.2); copper, 204.3 (197.3); lead, 107.8 (102.9); tin, 126.0 (116.0); zinc, 98.7 (96.2); rubber, 163.9 (163.6).[1] Aluminium remained at 173.3 and nickel at 215.6.

Western Section for Analysts

The Council of the Society for Analytical Chemistry has approved the formation of a Western Section following an application signed by many members resident in the West. The Inaugural Meeting will be held at 12 noon on Saturday, 8 May, in the Lecture Theatre of the Technical College, Newport (Mon). Following a short morning session, lunch will be taken at the Westgate Hotel, after which the meeting will continue at 2.30 p.m., at the Technical College to complete the business of the day. After the business session, Dr. D. W. Kent-Jones, President of the Society, will address the Section on 'Alcohol Determination and its Medico-Legal Aspects'.

• OVERSEAS •

Achema XI 1955

The eleventh Achema (German chemical apparatus exhibition) will be held from 14-22 May 1955 and not in 1954 as might be interpreted from the announcement which appeared in THE CHEMICAL AGE of 27 March. The exhibition is to be held in Frankfurt.

Closure of Refinery Ordered

The City Council of Durban, South Africa, has ordered the closure of a £6,000,000 oil refinery belonging to the Standard Vacuum Refinery Co. of South Africa at Wentworth, because of alleged air pollution.

Gas from Oil

Plant to produce gas from oil is to be erected for an Australian company in Sydney by the Melbourne subsidiary of the Power-Gas Corporation, of Stockton-on-Tees. It will take two years to provide the equipment, which will include gas cleaning and handling, liquid purification, tar removal and treatment units.

Coumarin Banned

American manufacturers of coumarin have reported that their research shows it to have toxic properties, and they will no longer sell it for use in foods. The Food and Drug Administration have therefore removed coumarin from their standards of identity for cocoa products, where it was listed as a permitted ingredient.

CIL Closing Plant

Canadian Industries Limited have announced that operations will not be resumed at their Windsor chemical plant. Work stopped when four buildings, including a storage warehouse containing valuable equipment, sank into the ground and a lake 27 ft. deep formed at the spot. A company statement said that the plant, which produced chlorine and caustic soda from raw material supplied by the nearby Canadian Salt Company, is at an increasing competitive disadvantage. 'It had been expected that the plant could be maintained in operation for a few years,' the statement said. 'However, the recent subsidence . . . has necessitated a decision at this time.'

Indian Oil Refineries

The Indian Petroleum Division expects that the supply position will improve when two of three proposed refineries with a total annual output of 3,000,000 tons go on stream in the next financial year. The recent discovery of oil in the Naharkatiya area of Upper Assam is also expected to improve the indigenous output of petroleum products in the near future.

Benzole from Brown Coal

To make Australia's first benzole from the Morwell brown coal resources, a benzole distillation and rectification plant is to be erected at Morwell for the Gas and Fuel Corporation, Melbourne, by Simon Carves (Aust.) Pty. Ltd. The plant, which will have a capacity of 3,500 gal. a day, is part of a plan to utilise the extensive deposits of brown coal in the Eastern part of the State.

Wool Textile Research

An international scientific conference on wool textile research is to be held in Australia next year under the auspices of the Australian Wool Bureau and the Commonwealth Scientific & Industrial Research Association. The aim of the conference, which is to last three weeks, is to stimulate wool research and bring about a wider understanding of the industry's research problems so that the application of science to its advancement in the industry may be encouraged.

Fertiliser from Sea Bitterns

A method for the preparation of nitrogenous fertiliser containing potash from sea bitterns, left over after the crystallisation of common salt, has been investigated at the National Chemical Laboratory, Poona. The process consists in precipitating the magnesium salts in the bittern as magnesium carbonate by treatment with ammonia and carbon dioxide. This treatment results in the formation of an equivalent amount of ammonium sulphate and chloride in solution and yields, on evaporation, nitrogenous fertilisers. The product obtained has an available nitrogen content of 22 per cent, and potash 4 per cent. Light basic magnesium carbonate and light magnesia are obtained as by-products.

PERSONAL

At the annual general meeting of the Royal Institute of Chemistry, held in Cambridge on 9 April, the following were elected to fill vacancies among officers and general members of the Council: *Vice-presidents*: MR. A. L. BACHARACH, MR. GEORGE TAYLOR, O.B.E., and PROFESSOR T. S. WHEELER; *Hon Treasurer*: PROFESSOR HAROLD BURTON (re-elected); *General Members of Council*: DR. J. W. BARRETT, DR. H. CORDINGLEY, PROFESSOR C. H. GRAY, PROFESSOR D. H. HEY, DR. H. H. HODGSON, DR. J. IDRIS JONES, and PROFESSOR R. G. W. NORRISH. It was reported that the following had been elected as new District Members of the Council: DR. M. BARAK, DR. W. A. CALDWELL, DR. W. CULE DAVIES, DR. SRI KRISHNA, C.I.E., MR. L. M. MIALL, DR. J. H. SKELLON, MR. H. D. THORNTON, MR. V. H. WILLIAMS and DR. C. L. WILSON. MR. E. Q. LAWS and DR. C. W. HERD were re-elected as Hon. Auditors for the ensuing year.

MR. FRANK O. ASHMORE has been appointed a director of William Blythe & Co. Ltd.

The British Welding Research Association has appointed MR. A. G. THOMPSON, B.Sc., A.M.I.C.E., to make an investigation into welding productivity. Mr. Thompson has been associated with the welding and metal fabricating industries for a number of years and has recently been engaged in investigations into product design and production problems with a group of companies in the heavy engineering industry.

SIR HARRY PILKINGTON, chairman of Pilkington Brothers Ltd., has been re-elected president of the Federation of British Industries. Sir Harry has made a special study of fuel efficiency and has played a leading part in the establishment of the new National Industrial Fuel Efficiency Service. He is a member of the National Production Advisory Council on Industry, of the British Productivity Council and of the Steering Committee of the Council of European Industrial Federations.

The work of DR. R. H. PETERS and MR. H. HADFIELD in their respective fields is recognised at I.C.I.'s Hexagon House, Manchester. Dr. Peters is to receive the Worshipful Company of Dyers' research medal as senior author of a paper on 'The Reduction Properties of Vat Dyes,' his co-author being MR. J. MARSHALL. Mr. Hadfield is to receive the bronze medal of the Society of Dyers and Colourists for his outstanding work as secretary of the Manchester Junior branch of the Society.

PROFESSOR C. J. BAKKER, at present Director of the Zeeman Laboratory in Amsterdam, is to become Assistant Director of the European Atomic Research Organisationn to be established at Geneva.

DR. HENIZ EKERT REDWOOD has been appointed a director of Genatosan Ltd., a member of the Fison group of companies. Dr. Redwood is engaged on the commercial side of the parent company.

MR. CHRISTOPHER W. GARNETT has joined the board of Non-Ferrous Metal Products Ltd.

DR. JAMES MAXWELL, who is employed by I.C.I. Ltd., was married at Wallasey on 17 April to Miss B. Powell, of Wallasey. He was educated at Wallasey Grammar School and Liverpool University, where he graduated as Ph.D.

DR. G. E. FRANCIS, senior lecturer at St. Bartholomew's Hospital Medical College, has been appointed to the University Readership in Biochemistry tenable at that college.

Obituary

The death occurred on 14 April of SIR HERBERT GEPP at the age of 76. He joined the Australian Explosive & Chemical Co. as a chemist after taking his degree at Melbourne, and became manager of the firm in 1902. About two years later he went to Broken Hill to build and operate the sulphuric acid plant of the Zinc Corporation, and in 1909 was appointed general manager of Amalgamated Zinc (De Bavay's) Ltd. During the first world war he was Australian

representative for metals and munitions in the USA.

In 1926 he was appointed chairman of the Development and Migration Commission and took part in an extensive survey of the mineral resources of Australia. He became managing director of Australian Paper Manufacturers Ltd., in 1936 and retired in 1948.

Analytical Chemistry

A COURSE of twelve lectures on 'Select Methods of Analytical Technique in Pure & Applied Chemistry' will be held in the Chemistry & Biology Department of Acton Technical College on Fridays, beginning 30 April. The course has been designed for industrial chemists, research workers and others interested in modern work in this field.

Details of the lectures are as follow: 'Paper Chromatography in Analytical Chemistry,' by I. Smith, 30 April, 7, 14 and 21 May; 'The Application of Ultra-Violet and Infra-Red Absorption Spectroscopy in Analytical Chemistry,' by N. H. E. Ahlers, 28 May, 4, 11 and 18 June; 'Some Instrumental Methods in Modern Analytical Chemistry,' by Dr. J. E. Page, 25 June and 2 July, and 'The Mass Spectrometer and Its Application in Analytical Chemistry,' by Dr. G. P. Barnard, 9 and 16 July.

The fee for the course is £1 10s. Further particulars and forms of registration can be obtained on application to the Principal, Acton Technical College, High Street, Acton, W.8.

Chilled Iron Shot & Grit

THE primary purpose of a new British Standard—Chilled Shot & Grit (BS. 2451: 1954) is to assist in overcoming the difficulties which have been experienced by users in obtaining uniform grades and sizes of chilled iron shot and grit for use in shot blasting and kindred applications. The main object in preparing the standard has, therefore, been concerned with the separation and sizing of the chilled shot and grit and designating grade and size numbers. It has also been considered desirable to include requirements for hardness.

The Institution points out that the term 'steel shot and grit,' which is commonly used in certain sections of the trade, is a misnomer and strongly recommends that its use be discontinued. The correct term is 'chilled iron shot and grit.' The grades and sizes of chilled iron shot and grit covered by this standard have been designated 7, 8, 9, 10, 12, 15, 18, 22, 30 and 40. Screen sizes and tolerances are given to determine the particle size. Copies of this standard (2s). may be obtained from the sales branch of the Institution, British Standards House, 2 Park Street, London, W.1.

Watford Developments

WATFORD Chemical Co. Ltd., who are one of the three British producers of pentaerythritol, publish a quarterly journal called *The Molecule*, and in the latest issue some improvements are announced in the quality of this important tetrahydric alcohol. A limited amount is available of a grade containing a low percentage of polymerised material and with a melting point in the region of 235-250°. It is claimed that crystal clear resins are obtained with phthalic anhydride. Work on anhydro-heptitol has continued, and the company can supply small quantities of a thick syrup containing about 95 per cent polyol.

Among quaternary ammonium compounds the company is at present only manufacturing Cationic 14, as a pale amber solid, or as an oily liquid containing 50 per cent active agent. In the field of anionic surface active agents, Watford Chemical Co. have been investigating the sulphation of various hydroxy esters and amides, and would be pleased to hear from any prospective user.

To Study Changes

When Manchester College of Technology is raised to University College level, it will have an independent board of 100 governors. A joint meeting of Manchester's General Parliamentary and Education Committee is to study the financial effect of the change on a report by the city treasurer.

Petroleum Search by I.C.I.

Darlington Rural District Council has given permission for I.C.I. Ltd. to make trial borings for petroleum and natural gas in the area of Great Stainton and Little Stainton.

Publications & Announcements

THE Recommendations Sub-Committee of the Weed Control Joint Committee was formed for the purpose of preparing recommendations concerning weed control for submission to the general meeting of the First Weed Control Conference last year. Their report has now been published and may be obtained, price 1s. post free, from the Association of British Insecticide Manufacturers, Cecil Chambers, 86 Strand, London, W.C.2. The response of agricultural and turf weeds to MCPA, 2,4-D, DNC and Dinoseb is described, and recommendations made for selective control.

* * *

DATED October, 1952, Volume II, No. 4, of *Vacuum* has just appeared. The articles within—on 'Thin Films of Titanium Dioxide'; 'The Distribution of Condensed Thin Films'; and 'Aluminium Reflecting Films Applied to Glass'—were received as recently as August, 1953, but the comprehensive abstracts which make up the latter half of the journal are all dated 1952 or earlier. *Vacuum* is published four times a year by W. Edwards & Co. Ltd., Crawley, Sussex; the annual subscription is £2 10s.

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FIRTH-VICKERS Stainless Steels Ltd., Sheffield, publish a periodical journal called 'Enchiridion.' No. 6, for March, 1954, deals with the many ways in which 'Staybrite' steel is used in pumps, beer engines, dyeing vats and winch machines, record-breaking aircraft, ships and cars, penicillin plant and countless other applications.

* * *

THE Cyclone Series 4D Fan, designed and patented by Matthews & Yates Ltd., Cyclone Works, Swinton, Manchester, is a new and improved design of paddle blade fan which has been evolved in order to overcome difficulties encountered hitherto with rotations and directions of discharge. A new leaflet published by the company—Leaflet 4DF/1—gives full details of the fan, together with illustrations.

* * *

THE 1954 Year Book of the National Smoke Abatement Society has now made its appearance. Besides a list of officers, the 24th annual report and divisional reports and other such information, there is a useful general reference section. The articles in this deal with such subjects as the law relating to smoke, recent local legislation and the Alkali, etc., Works Act. A selected list of recent papers and reports is given and there is a directory of organisations and a guide to publications. Copies of the book, costing 1s., are obtainable from the Society at its new address, 30 Grosvenor Place, London, S.W.1.

* * *

A NEW range of precipitated calcium carbonates (PCC) for industrial use has been introduced by John & E. Sturge Ltd. (Wheeleys Road, Birmingham). It includes Calofort, an ultrafine PCC, coated with 3 per cent stearic acid; Calopake, a high opacity, fine, calcitic PCC available in coated or uncoated grades; and the Calofil grades which have a low oil absorption and low relative viscosities, and are also available in coated or uncoated form. As an addition to the normal Sturge range a pharmaceutical grade, known as Sturcal-X, has also been introduced. The normal grades are processed so that 99.7 per cent passes through a 200-mesh sieve on a wet screen test, but with the new Sturcal-X this percentage is increased to 99.97 per cent.

* * *

INCREASED production and improved fabrication techniques have enabled E. C. Payter & Co. Ltd., Meeting Street, Great Bridge, Tipton, Staffs, to introduce a new range of 45 and 40 gal. light-alloy storage drums at a considerably lower price than previously possible. The drums are fabricated from sheets of 14 or 16 gauge magnesium-aluminium alloy, and automatically welded, without flux, using an inert gas shrouded arc. The weight is approximately one-third of a comparable steel drum. In addition to being rust-resistant the drums are unaffected by chemicals which attack conventional steel drums so that materials, including corrosive chemicals, oils, concentrated detergents and plastics, can now be transported and stored without the use of special glass or stainless steel containers, or the need to adopt anti-corrosion drum linings.

* * *

IT has been announced that Associated Fumigators Limited have available laboratory quantities of a number of fluorine com-

pounds and would be pleased to supply them for insecticidal, pesticidal and chemical research. The list includes fluoroacetamide, sodium fluoroacetate, fluoroacetanilide and fluoro-*o*-anisidide. This list is continually being added to and it is hoped to add fluoroacetic acid, fluoroacetonitrile, fluoroacetyl chloride and fluoroacetmethylamide shortly.

* * *

TITANIUM dioxide is a powerful, brilliant white, non-toxic pigment. Though it was first produced in this country only 20 years ago, it has already permeated throughout industry to such an extent that it is now everywhere unobtrusively fulfilling an essential function in common everyday things. The unique properties of titanium dioxide have made possible standards of performance hitherto unobtainable, and its efficiency as a pigment and opacifier is such that it is safe to assume, of contemporary articles, that if they are white and light in colour, they contain titanium dioxide. A well-produced booklet just published by the British Titan Products Co. Ltd., York, describes the chemical and physical properties of both rutile and anatase, and their uses in paint, rubber, paper, printing ink, vitreous enamel, textiles, plastics and many other products.

* * *

SEVEN pages of the Spring number of the *Bulletin of the Institute of Metal Finishing* (Vol. IV, No. 1) contain details of the overseas authors who are reading papers at the International Conference in London, 21-24 April. Other contents include three papers: 'The BNF Jet-Test on Organic Bright Nickel Deposits' by J. Edwards; 'Electrodeposition and the Printing Trade' by J. Riley; and 'Practical Colour Matching on Anodic Films' by A. E. Bratt.

* * *

THE problem of handling abrasive and corrosive liquids in centrifugal pumps is claimed to have been solved by a Swedish company, Jonkopings Mekaniska Verkstad, who have produced a pump which has a liquid lock wheel having the sealing located entirely on the suction side. Known as the Nobox pump, it is a hydro-mechanically sealed pump without stuffing box and is stated to be absolutely tight, requiring no maintenance. Space and labour are saved by its being vertically mounted and designed so that it is possible to dismantle the whole pump without removing the motor or motor stand. The liquid handled by the pump, say the manufacturers, can be used for sealing even if it contains large concentrations of solids—up to 55-60 per cent. In Sweden there are many 'stuffing-box-less' pumps operating on sulphate and sulphite liquors with this concentration. The Swedish cellulose industry has for certain purposes adopted the Nobox centrifugal pump to meet 98 per cent of its requirements.

Tall Oil Outlook

CONFIDENCE in the outlook for tall oil and tall oil products was expressed at the recent annual meeting of the Tall Oil Association in New York. Mr. Albert Scharwachter, vice-president of Arizona Chemical Co., New York, was for the third successive year re-elected president of the association, whose membership includes 14 of the nation's leading manufacturers and sellers of tall oil. Mr. Artcher E. Griffin, sales manager of the Chemical Division, Camp Manufacturing Co., Inc., Franklin, Virginia, was re-elected vice-president.

A complete statistical review was presented at the morning session, at which the growing use of tall oil products in the soap, paint, linoleum and floor covering fields was discussed. Other markets in which tall oil products are used include core oils, insecticides, asphalt emulsions, printing inks, rubber, drawing compounds, lubricating greases, adhesives, degreasing compounds, textile oils, floor polishes and cleaners, plasticisers, metallic driers and synthetic detergents.

Later sessions were devoted to discussions on the latest developments of tall oil and tall oil products. Among the technical problems discussed were the compatability of treated tall oil with alkyds, the solubility and viscosity of tall oil in mineral spirits, the effect of pour point depressants on tall oil, the effect of anti-oxidants on preventing the drying of tall oil esters and the establishment of standard methods for sample tall oil.

Answering a question in the House of Commons recently, the Parliamentary Secretary to the Ministry of Fuel & Power said the estimated cost of the expansion of oil refining in Britain from its pre-war to present value was about £190,000,000.

British Chemical Prices

LONDON.—Markets have resumed on the quiet side following the Easter holiday but there has been a steady flow of new inquiry both for home account and for export. Industrial chemicals prices have remained firm. The spot price for formic acid 85 per cent is dearer at £86 10s. per ton, and the 90 per cent at £90 per ton. Oxalic acid quotations have also increased, the spot price being £129 10s. per ton. Zinc dust is also reported to be dearer. Among the coal tar products naphthalene is in good request and the solvents remain scarce relative to the demand.

MANCHESTER.—The effects of the holidays on operations at the consuming end of the trade has been unmistakably reflected in the movement of chemical and allied products in the Lancashire area as well as the volume of new business reported on the Manchester market during the past week. The resumption of work has, however, been accompanied by a quietly steady recovery in market activity. Prices remain on a generally steady to firm basis. The outstanding feature since last report has been an increase of £4 a ton in the quotation for sulphate of copper and advances in sulphide of soda—25s. a ton in the solid grade and 30s. in the broken and flake.

GLASGOW.—Owing to the approach of the Easter holidays, it was expected that trade would be somewhat slow. However, this has not been the case and, although business did slacken off towards the end of the week, on the whole the period has been a busy one. Prices have been more or less maintained at last week's level, apart from lead and copper, which showed some variation.

General Chemicals

Acetic Acid.—Per ton : 80% technical, 10 tons, £86. 80% pure, 10 tons, £92 ; commercial glacial 10 tons, £94 ; delivered buyers' premises in returnable barrels ; in glass carboys, £7 ; demijohns, £11 extra.

Acetic Anhydride.—Ton lots d/d, £130 per ton.

Alum.—Ground, about £23 per ton, f.o.r. MANCHESTER : Ground, £25.

Aluminium Sulphate.—Ex works, £14 15s. per ton d/d. MANCHESTER : £14 10s. to £17 15s.

Ammonia, Anhydrous.—1s. 9d. to 2s. 3d. per lb.

Ammonium Bicarbonate.—2 cwt. non-returnable drums ; 1 ton lots £58 per ton.

Ammonium Chloride. — Grey galvanising, £31 5s. per ton, in casks, ex wharf. Fine white 98%, £25 to £27 per ton. See also Salammoniac.

Ammonium Nitrate.—D/d, £18 to £20 per ton.

Ammonium Persulphate. — MANCHESTER : £6 5s. per cwt. d/d.

Ammonium Phosphate.—Mono- and di-, ton lots, d/d, £97 and £94 10s. per ton.

Antimony Sulphide.—Golden, d/d in 5-cwt. lots as to grade, etc., 2s. 2d. to 2s. 8d. per lb. Crimson, 3s. 4½d. to 4s. 5½d. per lb.

Arsenic.—Per ton, £59 5s. nominal, ex store.

Barium Carbonate.—Precip., d/d : 4-ton lots, £39 per ton ; 2-ton lots, £39 10s. per ton, bag packing.

Barium Chloride.—£42 15s. per ton in 2-ton lots.

Barium Sulphate (Dry Blanc Fixe).—Precip., 4-ton lots, £42 10s. per ton d/d ; 2-ton lots, £43 per ton d/d.

Bleaching Powder.—£21 per ton in casks (1 ton lots).

Borax.—Per ton for ton lots, in free 140-lb. bags, carriage paid : Anhydrous, £58 10s.; in 1-cwt. bags ; commercial, granular, £38 10s. ; crystal, £41 ; powder, £42 ; extra fine powder, £43 ; B.P., granular, £47 10s. ; crystal, £50 ; powder, £51 ; extra fine powder, £52.

Boric Acid.—Per ton for ton lots in free 1-cwt. bags, carriage paid : Commercial, granular, £67 ; crystal, £75 ; powder, £72 10s. ; extra fine powder, £74 10s. ; B.P., granular, £80 ; crystal, £84 10s. ; powder, £87 ; extra fine powder, £86 10s.

Calcium Chloride.—70/72% solid £12 10s. per ton.

Chlorine, Liquid.—£32 per ton d/d in 16/17-cwt. drums (3-drum lots).

Chromic Acid.—2s. 0⅝d. per lb., less 2½%, d/d U.K., in 1-ton lots.

Chromium Sulphate, Basic.—Crystals, £65 6s. 8d. per ton d/d U.K., in lots of 1 ton and over.

Citric Acid.—1-cwt. lots, 205s. cwt. ; 5-cwt. lots, 200s. cwt.

Cobalt Oxide.—Black, delivered, 13s. per lb.

Copper Carbonate.—MANCHESTER : 2s. 1d. per lb.

Copper Sulphate.—£77 per ton f.o.b., less 2% in 2-cwt. bags.

Cream of Tartar.—100%, per cwt., about £9 12s.

Formaldehyde.—£37 5s. per ton in casks, d/d.

Formic Acid.—85%, £86 10s. in 4-ton lots, carriage paid.

Glycerine.—Chemically pure, double distilled 1.260 S.G., £14 7s. 6d. per cwt. Refined pale straw industrial, 5s. per cwt. less than chemically pure.

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

Hydrofluoric Acid.—59/60%, about 1s. to 1s. 2d. per lb.

Hydrogen Peroxide.—27.5% wt. £124 10s. per ton. 35% wt. £153 per ton d/d. Carboys extra and returnable.

Iodine.—Resublimed B.P., 16s. 4d. per lb. in 28 lb. lots.

Iodoform.—25s. 10d. per lb. in 28 lb. lots.

Lactic Acid.—Pale tech., 44 per cent by weight £122 per ton ; dark tech., 44 per cent by weight £67 per ton ex works 1-ton lots ; dark chemical quality 44 per cent by weight £109 per ton, ex works ; usual container terms.

Lead Acetate.—White : About £132 per ton.

Lead Nitrate.—About £112 per ton.

Lead, Red.—Basis prices per ton. Genuine dry red lead, £126 5s. ; orange lead, £138 5s. Ground in oil : red, £145 10s. ; orange, £157 10s.

Lead, White.—Basis prices : Dry English in 5-cwt. casks, £132 5s. per ton. Ground in oil : English, under 2 tons, £136 15s.

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

Litharge.—£128 5s. per ton, in 5-ton lots.

Magnesite.—Calcined, in bags, ex works, £22 to £24.

Magnesium Carbonate.—Light, commercial, d/d, 2-ton lots, £84 10s. per ton, under 2 tons, £92 per ton.

Magnesium Chloride.—Solid (ex wharf), £14 10s. per ton.

Magnesium Oxide.—Light, commercial, d/d, under 1-ton lots, £245 per ton.

Magnesium Sulphate.—£15 to £16 per ton.

Mercuric Chloride.—Technical Powder, 21s. 3d. per lb. in 5-cwt. lots ; smaller quantities dearer.

Mercury Sulphide, Red.—25s. 3d. per lb., for 5-cwt. lots.

Nickel Sulphate.—D/d, buyers U.K. £154 per ton. Nominal.

Nitric Acid.—£35 to £40 per ton, ex-works.

Oxalic Acid.—Home manufacture, minimum 4-ton lots, in 5-cwt. casks, £129 10s. per ton, carriage paid.

Phosphoric Acid.—Technical (S.G. 1.700) ton lots, carriage paid, £92 per ton ; B.P. (S.G. 1.750), ton lots, carriage paid, 1s. 3½d. per lb.

Potash, Caustic.—Solid, £94 10s. per ton for 1-ton lots ; Liquid, £37 15s.

Potassium Carbonate. — Calcined, 96/98%, £59 10s. per ton for 1-ton lots, ex-store.

Potassium Chloride.—Industrial, 96%, t-ton lots, £23 to £25 per ton.

Potassium Dichromate.—Crystals and granular, 11¾d. per lb., in 1-ton lots, d/d UK.

Potassium Iodide.—B.P., 14s. 10d. per lb. in 28-lb. lots ; 14s. 4d. in cwt. lots.

Potassium Nitrate.—Small granular crystals, 81s. per cwt. ex store, according to quantity.

Potassium Permanganate.—B.P., 1s. 9½d. per lb. for 1-cwt. lots ; for 3 cwt. and upwards, 1s. 8½d. per lb. ; technical, £8 7s. per cwt. ; for 5-cwt. lots.

Salammoniac.—Dog-tooth crystals, £70 per ton ; medium, £67 10s. per ton ; fine white crystals, £21 10s. to £22 10s. per ton, in casks.

Salicylic Acid. — MANCHESTER : Technical 2s. 7d. per lb. d/d.

Soda Ash.—58% ex-depot or d/d, London station, about £14 3s. per ton.

Soda, Caustic.—Solid 76/77% ; spot, £26 to £28 per ton d/d. (4 ton lots).

Sodium Acetate.—About £80 per ton d/d.

Sodium Bicarbonate.—Refined, spot, £13 10s. to £15 10s. per ton, in bags.

Sodium Bisulphite.—Powder, 60/62%, £40 per ton d/d in 2-ton lots for home trade.

Sodium Carbonate Monohydrate.—£25 per ton d/d in minimum ton lots in 2-cwt. free bags.

Sodium Chlorate.—£75 15s. to £82 per ton.

Sodium Cyanide.—100% basis, 9¾d. to 10¾d. per lb.

Sodium Dichromate.—Crystals, cake and powder, 10d. lb. Net d/d UK, minimum 1-ton lots ; anhydrous, 11½d. lb. Net del. d/d UK, minimum 1-ton lots.

Sodium Fluoride.—D/d, £4 10s. per cwt.

Sodium Hyposulphite.—Pea crystals £28 a ton ; commercial, 1-ton lots, £26 per ton carriage paid.

Sodium Iodide.—B.P., 16s. 4d. per lb. in 28-lb. lots.

Sodium Metaphosphate (Calgon).—Flaked, loose in metal drums, £12 7s. cwt.

Sodium Metasilicate.—£22 15s. per ton, d/d U.K. in ton lots.

Sodium Nitrate.—Chilean Industrial, over 98% 6-ton lots, d/d station, £27 10s.

Sodium Nitrite.—£31 per ton (4-ton lots).

Sodium Percarbonate.—12½% available oxygen, £8 2s. 10½d. per cwt. in 1-cwt. drums.

Sodium Phosphate.—Per ton d/d for ton lots : Di-sodium, crystalline, £37 10s., anhydrous, £81 ; tri-sodium, crystalline, £39 10s., anhydrous, £79.

Sodium Prussiate.—1s. to 1s. 1d. per lb. ex store.

Sodium Silicate.—£6 to £11 per ton.

Sodium Sulphate (Glauber's Salt).—About £8 10s. per ton d/d.

Sodium Sulphate (Salt Cake).—Unground. £6 per ton d/d station in bulk. MANCHESTER : £6 10s. per ton d/d station.

Sodium Sulphide.—Solid, 60/62%, spot, £33 2s. 6d. per ton, d/d, in drums ; broken, £33 2s. 6d. per ton, d/d, in drums.

Sodium Sulphite.—Anhydrous, £59 per ton ; pea crystals, £37 12s. 6d. per ton d/d station in kegs ; commercial, £23 7s. 6d. per ton d/d station in bags.

Sulphur.—Per ton for 4 tons or more, ground, £23 11s. to £26, according to fineness.

Tartaric Acid.—Per cwt. : 10 cwt. or more, £10 10s.

Titanium Oxide.—Standard grade comm., with rutile structure £148 to £150 per ton ; standard grade comm., £135 per ton.

Zinc Oxide.—Maximum price per ton for 2-ton lots, d/d : white seal, £92 10s. ; green seal, £91 10s. ; red seal, £90.

Solvents and Plasticisers

Acetone.—Small lots : 5-gal. drums, £136 per ton ; 10-gal. drums, £126 per ton. In 40/45-gal drums less than 1 ton, £101 per ton ; 1 to 9 tons, £98 per ton ; 10 to 49 tons, £96 per ton ; 50 tons and over, £95 per ton. All per ton d/d.

Butyl Acetate BSS.—£173 per ton, in 1-ton lots ; £171 per ton, in 10-ton lots.

***n*-Butyl alcohol, BSS.**—10 tons, in drums, £161 10s. per ton d/d.

***sec.*-Butyl Alcohol.**—5 gal. drums £159 ; 40 gal. drums : less than 1 ton £124 per ton ; 1 to 10 tons £123 per ton ; 10 tons and over £122 per ton ; 100 tons and over £120 per ton.

***tert.*-Butyl Alcohol.**—5 gal. drums £195 10s. per ton ; 40/45 gal. drums : less than 1 ton £175 10s. per ton ; 1 to 5 tons £174 10s. per ton ; 5 to 10 tons, £173 10s. ; 10 tons and over £172 10s.

Diacetone Alcohol.—Small lots : 5 gal. drums, £177 per ton ; 10 gal. drums, £167 per ton. In 40/45 gal. drums ; less than 1 ton, £142 per ton ; 1 to 9 tons, £141 per ton ; 10 to 50 tons, £140 per ton ; 50 to 100 tons, £139 per ton ; 100 tons and over, £138 per ton.

Dibutyl Phthalate.—In drums, 10 tons, 2s. per lb. d/d ; 45 gal. drums, 2s. ¾d. per lb. d/d

Diethyl Phthalate.—In drums, 10 tons, 1s. 10¼d. per lb. d/d ; 45 gal. drums, 1s. 11¾d. per lb. d/d.

Dimethyl Phthalate.—In drums, 10 tons, 1s. 7¼d. per lb. d/d ; 45 gal. drums, 1s. 8¾d. per lb. d/d.

Dioctyl Phthalate.—In drums, 10 tons, 2s. 8d. per lb. d/d ; 45 gal. drums, 2s. 9½d. per lb. d/d.

Ethyl Acetate.—10 tons lots, d/d, £135 per ton.

Ethyl Alcohol (PBS 66 o.p.).—Over 300,000 p. gal., 2s. 9d. ; 2,500-10,000 p. gal., 2s. 11½d. per p. gal., d/d in tankers. D/d in 40/45-gal. drums, 1d. p.p.g. extra. Absolute alcohol (75,2 o.p.) 5d. p.p.g. extra.

Methanol.—Pure synthetic, d/d, £28 to £38 per ton.

Methylated Spirit.—Industrial 66° o.p. : 500 gal. and over in tankers, 4s. 10d. per gal. d/d ; 100-499 gal. in drums, 5s. 2½d. per gal. d/d. Pyridinised 64 o.p. : 500 gal. and over in tankers, 5s. 0d. per gal. d/d ; 100-499 gal. in drums, 5s. 4½d. per gal. d/d.

Methyl Ethyl Ketone.—10-ton lots, £141 per ton d/d.

Methyl *iso*Butyl Ketone.—10 tons and over £162 per ton.

***iso*Propyl Acetate.**—In drums, 10 tons, £130 per ton d/d ; 45 gal. drums, £135 per ton d/d.

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

Rubber Chemicals

Antimony Sulphide.—Golden, 2s. 3½d. to 3s. 1½d. per lb. Crimson, 3s. 4½d. to 4s. 5½d. per lb.

Carbon Bisulphide.—£60 to £65 per ton, according to quality.

Carbon Black.—6d. to 8d. per lb., according to packing.

Carbon Tetrachloride.—Ton lots, £76 10s. per ton.

India-rubber Substitutes.—White, 1s. 6¾d. to 1s. 10½d. per lb. ; dark, 1s. 4½d. to 1s. 8d. per lb.

Lithopone.—30%, £50 per ton.

Mineral Black.—£7 10s. to £10 per ton.

Sulphur Chloride.—British, £55 per ton.

Vegetable Lamp Black.—£64 8s. per ton in 2-ton lots.

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

Nitrogen Fertilisers

Ammonium Sulphate.—Per ton in 6-ton lots, d/d farmer's nearest station, March-June, £17 18s. 6d.

Compound Fertilisers.—Per ton in 6 ton lots, d/d farmer's nearest station, I.C.I. Special No. 1 £27 9s.

'Nitro-Chalk.'—£15 14s. per ton in 6-ton lots, d/d farmer's nearest station.

Sodium Nitrate.—Chilean agricultural for 6-ton lots, d/d nearest station, March to June, £26 12s. 6d. per ton.

Coal-Tar Products

Benzole.—Per gal., minimum of 200 gals. delivered in bulk, 90's, 4s. 10¾d. ; pure, 5s. 2d.

Carbolic Acid.—Crystals, 1s. 4d. to 1s. 6¼d. per lb. Crude, 60's, 8s. MANCHESTER : Crystals, 1s. 4½d. to 1s. 6½d. per lb., d/d crude, 8s. naked, at works.

Creosote.—Home trade, 1s. to 1s. 4d. per gal., according to quality, f.o.r. maker's works. MANCHESTER : 1s. to 1s. 8d. per gal.

Cresylic Acid.—Pale 99/99½%, 5s. 8d. per gal. ; 99.5/100%, 5s. 10d. American, duty free, for export, 5s. to 5s. 8d. naked at works.

Naphtha.—Solvent, 90/160°, 4s. 10d. per gal. for 1000-gal. lots ; heavy, 90/190°, 3s. 9½d. per gal. for 1000-gal. lots, d/d. Drums extra : higher prices for smaller lots.

Naphthalene.—Crude, 4-ton ots, n sellers bags, £14 12s. to £22 per ton, according to m.p. ; hot pressed, £28 per ton in bulk ex-works ; purified crystals, £53 per ton d/d.

Pitch.—Medium, soft, home trade, 160s. per ton f.o.r. suppliers' works ; export trade 230s. per ton f.o.b. suppliers port.

Pyridine.—90/160°, 32s. 6d. to 35s. per gal. MANCHESTER : 42s. 6d. to 45s. per gal.

Toluol.—Pure, 5s. 7d. ; 90's, 4s. 10d. per gal., d/d. MANCHESTER : Pure, 5s. 8d. per gal. naked.

Xylol.—For 1000-gal. lots, 5s. 8d. to 5s. 10d. per gal., according to grade, d/d.

Intermediates and Dyes (Prices Nominal)

***m*-Cresol** 98/100%.—3s. 9d. per lb. d/d.

***o*-Cresol** 30/31° C.—1s. 4d. per lb. d/d.

***p*-Cresol** 34/35° C.—3s. 9d. per lb. d/d.

Dichloraniline.—2s. 8½d. per lb.

Dinitrobenzene.—88/89°C., 1s. 11d. per lb.

Dinitrotoluene.—S.P. 15° C., 1s. 11½d. per lb. ; S.P. 26° C., 1s. 3d. per lb. S.P. 33°C., 1s. 1½d. per lb. ; S.P. 66/68°C., 1s. 9d. per lb.

***p*-Nitraniline.**—4s. 5½d. per lb.

Nitrobenzene.—Spot, 9½d. per lb. in 90-gal. drums, drums extra, 1-ton lots d/d buyers' works.

Nitronaphthalene.—2s. per lb.

***o*-Toluidine.**—1s. 7d. per lb., in 8/10-cwt. drums, drums extra.

***p*-Toluidine.**—5s. 6d. per lb., in casks.

Dimethylaniline.—3s. 1d. per lb., packed in drums, carriage paid.

Chemical & Allied Stocks & Shares

ALTHOUGH there was a little disappointment in the City that the Budget did not bring major tax reductions, stock markets, after a temporary pause, quickly renewed their upward movement. Many leading industrials reached new high levels, though profit-taking prevented best prices from being fully held. Sentiment has been helped by the many dividend increases announced in recent weeks and by the numerous share bonuses that have also featured company results. The higher dividends are still moderate compared with earnings, but they indicate that there is a general tendency to relax the very conservative policy which has been followed for many years. Share prices have naturally responded, though it is quite possible in some instances that the rise already discounts the scope for higher dividends.

Reflecting the General Trend

Shares of chemical and allied companies have naturally reflected the general trend. Imperial Chemicals, after touching the new high level of 60s. 3d. have eased to 59s. 7½d. awaiting the impending results. They are expected to show a further increase in profits. It will be recalled that when the big issue of loan stock was made recently, the directors said the dividend would be raised from 13 per cent to 15 per cent and that this would be followed by a share bonus of 100 per cent. Hopeful views persist in the market, where the assumption is current that the dividend on the doubled capital that will result from the bonus may be 9 per cent next year.

Monsanto 5s. shares have moved up to 25s. 6d. and Laport's 5s. shares to 16s. 4½d., while Fisons were 47s. 3d. and following the results and higher dividend, Albright & Wilson 5s. shares were 21s. 9d. xd. Brotherton 10s. shares held steady at 25s. 6d. on the raising of the dividend from 12½ per cent to 15 per cent. William Blythe 3s. shares were strong at 12s. 6d. after publication of the results. Hickson & Welch 10s. shares were 11s., and British Chrome Chemicals 5s. shares 17s. 6d. Bowmans Chemicals 4s. shares were quoted at 3s. 9d. Coalite & Chemicals 2s. shares were 2s. 5d. while Yorkshire Dyeware & Chemical 5s. shares strengthened to 9s. 6d.

Buyers were about for Borax Consolidated, which moved up to 50s. 6d. Hopes of a higher dividend kept the 4s. units of the Distillers Co. active and they moved up to 20s. 9d. United Molasses were up to 36s. 6d. while, in advance of the results, Unilever rose to 68s. 3d. on share bonus hopes. Elsewhere, United Glass Bottle at 74s. 9d. were also firm in front of the financial results. Turner & Newall were 78s. 6d. and, in other directions, higher dividend hopes put Triplex Glass 10s. shares higher at 24s. 9d.

British Celanese strengthened to 27s. 1½d. on larger dividend expectations. Courtaulds at 27s. 6d. moved higher on attention drawn to the prospects of much higher earnings from British Nylon Spinners when increased production plans are completed. British Nylon Spinners, who are jointly controlled by Courtaulds and I.C.I., have recently announced lower prices for nylon yarn which make their prices the lowest in the world and will help manufacturers of nylon goods, particularly in export markets.

Boots Drug 5s. shares were 24s. 9d. and British Oxygen 54s. 6d. xd. Among paint shares prices rose with Pinchin Johnson 34s. 9d. and International Paint 4s. shares 18s. 10½d. on higher dividend hopes. British Paints 4s. shares at 16s. 6d. also moved in favour of holders. Power Gas 10s. shares rose to 29s. 9d.

Oil shares remained prominent with Shell at £5 7/16 on the coming share bonus announced by the directors. Anglo-Iranian have not kept best levels, but at £11 1/16 remained very active on higher dividend and share bonus hopes, though it is recognised that the question of a bonus may depend on a satisfactary Persian agreement.

Australian Uranium

Announcing in the House of Representatives that uranium deposits in the Rum Jungle field in Northern Australia are more extensive than at first believed, the Minister of Supply, Mr. H. Beale, stated that new treatment plant should soon be operating at Rum Jungle and that meanwhile 'large-scale' prospecting for uranium was proceeding there and in other parts of Australia.

Company News

New Registrations

Intermetal Ltd.

Private company. (531,246.) Capital £1,000. Dealers, merchants, wholesalers, retailers, exporters, importers and distributors of all kinds of minerals and ores, chemicals, pharmaceutical products, drugs, fertilisers, metals, etc. First director to be appointed by the subscribers. Reg. office: Room 150, 20 Copthall Avenue, London, E.C.2.

Poundgate Products Ltd.

Private company. (531,349.) Capital £100. Manufacturers, importers and exporters of and wholesale and retail dealers in medicines, drugs and chemical products, preparations and compounds, etc. First directors to be appointed by the subscribers. Solicitors: Collyer-Bristow & Co., 4 Bedford Row, London, W.C.1.

Anzin Ltd.

Private company. (530,606). Capital £1,000. Objects: To acquire and perfect chemical, physical and metallurgical processes of all kinds and inventions in connection therewith, etc. First directors to be appointed by the subscribers. Solicitors: Linklaters & Paines, 6 Austin Friars, London, E.C.2.

Technicrystal Ltd.

Private company. (531,682). Capital, £12,000. Physical, chemical and electronic engineers, experts and specialists, etc. First directors to be appointed by subscribers. Reg. office: 5 Thavies Inn, London, E.C.1.

Company News

J. & E. Atkinson Ltd.

Available net profit of £30,337, after tax, is reported by J. & E. Atkinson Ltd., for the year 1953, compared with £21,076 for the previous year. An ordinary dividend of 7½ per cent, free of tax, has been declared, this being the same as before.

Ayrton Saunders & Co. Ltd.

Group trading profit of £74,388 for the year 1953 is reported by Ayrton Saunders and Co. Ltd. This compares with £94,751 for the previous year. The ordinary dividend remains at 10 per cent.

Bede Metal & Chemical Co. Ltd.

The annual report of the Bede Metal and Chemical Co. Ltd. for 1953 states that the works have been kept well employed during the year. Trading profit amounted to £28,367, compared with £40,242 for the previous year, and the net profit was £9,183, as against £11,112. The dividend remains the same at 21⅞ per cent.

British Xylonite Co. Ltd.

A final dividend of 8 per cent, making a total of 10 per cent for the year, is being paid by British Xylonite Co. Ltd., compared with a total of 8 per cent for 1952. After allowing £251,100 for taxation, as against £160,870, group profits have risen from £75,030 to £177,954, of which £159,795, against £86,138, is attributable to the holding company. After adjustments, the net profit attributable to the holding company is given as £165,310, compared with £105,262.

Brotherton & Co. Ltd.

The preliminary statement of Brotherton and Co. Ltd. for the calendar year 1953 shows group net profit of £202,000, compared with £222,000 for the previous year, after tax of £191,000 (against £180,000), and after a £10,000 credit for EPT no longer required, compared with a credit of £50,000 for initial allowances and excess tax provisions. The dividend is 15 per cent, which is 2½ per cent higher than for the previous year. The comparative figures for 1952 are for the parent concern only, since the subsidiary, Stockport United Chemical Co. Ltd., was acquired during the year under review.

Cussons, Sons & Co. Ltd.

After all charges, including taxation, net profit of £124,131 for 1953 is reported by Cussons, Sons & Co. Ltd. This compares with £91,765 for the previous year. The final dividend of 21 per cent makes 35 per cent for the year, an increase of 3 per cent. There will also be capital distribution of 6 per cent, free of tax, arising from liquidation of Cussons (South Africa) Pty.

Fisons Ltd.

Fisons Ltd. have announced an offer to outside shareholders holding ordinary shares in Fisons Chemicals. For every four Fisons Chemicals ordinary shares of 10s. each, Fisons offer one ordinary £1 share in the company, to be issued credited as fully paid, plus 6s. in cash. The offer is conditional

upon acceptance on or before 6 May or such later date as Fisons may decide, by not less than three-quarters in number of the ordinary shareholders (other than Fisons) holding not less than 90 per cent of the outstanding 95,168 ordinary shares or such lesser number or proportion as Fisons may decide.

Glaxo Laboratories Ltd.

The directors of Glaxo Laboratories Ltd. announce an interim dividend of 5 per cent (the same as last year) on the ordinary stock on account of the year ending 30 June, 1954, payable less tax on 4 June, 1954.

Lacrinoid Products Ltd.

A dividend of 10 per cent—twice as much as for the previous year—is being paid by Lacrinoid Products Ltd. for 1953. After all charges, including taxation of £11,200, compared with £2,132 for 1952, the net profit rose from £2,556 to £6,161.

Newton Chambers & Co. Ltd.

A final dividend of 20 per cent, less tax, is recommended by the directors of Newton Chambers and Co. Ltd. for the year 1953. With the interim dividend of 10 per cent this makes a total of 30 per cent for the year on the £653,040 ordinary shares and £146,960 cumulative preference shares. For the previous year a total of 25 per cent was paid on £750,000 capital prior to a 6⅔ per cent scrip issue which capitalised £50,000 of reserves. Gross profit for 1953 increased from £671,973 to £726,057, but an increased tax charge resulted in net profit being reduced from £179,331 to £163,290. As already announced, the directors propose that the issue share capital of the company be increased to £2,000,000, in accordance with a scheme of arrangement, details of which have now been sent to shareholders.

Titanium Intermediates Ltd.

British Titan Products Co. Ltd. are partnering Peter Spence and Sons Ltd. in the formation of Titanium Intermediates Ltd. as a private company to make titanium tetrachloride. British Titan Products Co. is the largest producer of titanium oxide outside the US. It has an issued ordinary capital of 3,000,000 £1 shares, of which I.C.I., Imperial Smelting Corporation and Goodlass Wall and Lead Industries each hold 910,710, the remainder being held by R. W. Greeff and Co. Ltd. Peter Spence and Sons, of Widnes, is a private concern.

Next Week's Events

MONDAY 26 APRIL

Chemical Society

Swansea: University College (Chemistry Department), 6 p.m. Joint meeting with RIC and College Chemical Society. Dr. A. W. Noyes: 'Some Reactions of Free Radicals.'

TUESDAY 27 APRIL

Chemical Society

Edinburgh: University Biochemical Department, Teviot Place, 5.30 p.m. Centenary lecture, 'The Story of the Isoquinoline Alkaloids,' by Dr. R. H. Manske.

WEDNESDAY 28 APRIL

Institute of Fuel

Manchester: The Engineers' Club, Albert Square, 2 p.m. North West Section annual general meeting, followed by paper by Dr. J. Bronowski: 'Energy in the Future.'

THURSDAY 29 APRIL

Chemical Society

St. Andrews: United College (Chemistry Department), 5.15 p.m. Centenary lecture, 'The Story of the Isoquinoline Alkaloids,' by Dr. R. H. Manske.

Society of Chemical Industry

London: Institute of Structural Engineers, 11 Upper Belgrave Street, S.W.1, 6 p.m. Annual general meeting, followed by paper by H. J. Purkis: 'Control of Sound in Buildings — Requirements, Materials and Methods.'

Royal Society

London: Burlington House, Piccadilly, 2.15 p.m. Discussion on 'The First and Second Viscosities of Fluids,' opened by Professor L. Rosenhead.

Royal Statistical Society

Sheffield: Grand Hotel, 6.30 p.m. Sheffield Group annual general meeting.

FRIDAY 30 APRIL

Chemical Society

Newcastle: King's College (Chemistry Building), 5.30 p.m. Centenary lecture, 'The Story of the Isoquinoline Alkaloids,' by Dr. R. H. Manske.

Society of Chemical Industry

London: National Institute for Medical Research, The Ridgeway, Mill Hill, N.W.7, 6.30 p.m. Dr. R. K. Callow: 'Medical Research and Fine Chemicals.'

Scarborough: Grand Hall, The Spa, 10 a.m. Food Group joint meeting with Royal Sanitary Institution at Annual Health Congress.

CLASSIFIED ADVERTISEMENTS

SITUATIONS VACANT

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

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