The
Chemical Age

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Here and There

CHEMICAL commentary is invariably tied to a theme, but this habit, inevitable enough in an age of specialised and mass-produced research, is in itself restrictive. The oddments of discovery are left in the by-ways, quickly forgotten or even cruelly ignored from birth. There is, perhaps, something to be said, if only by way of exception, for the approach of the dilettante, the amateur 'art-fancier' who strolls through the galleries and picks out what he fancies without regard for schools. At least the cause of human justice may be better served at random than by the processes of specialised selection; for every piece of research is a labour of love, and oddments may often represent greater effort than the more obvious pieces that fit some current pattern. Japanese field tests in 1904 showed that small amounts of copper and manganese could increase crop yields; Gabriel Bertrand in France in 1905 and 1906 insisted that manganese was an essential plant nutrient. But in their own time these were non-fitting oddities and it was not until the 'twenties that the role of trace elements was nervously accepted.

A quiz of chemists, even of nutritional specialists, would yield a crop of wrong answers as to the world's richest source of the riboflavin portion of the vitamin B complex. For in September this year in *Nature* (1953, **172,** 544), J. V. Baht and Rajul Broker of Bombay displaced dried yeast and marmite from their accepted ascendancy. Saffron contains from twice to four times as much according to plant sample. Intrinsically this may not prove an epoch-making discovery, for saffron, though well enough known as a delicate spice, is made from the stigmas of a crocus family flower; as such, it cannot become an abundant or cheaply gathered natural material for riboflavin production. Nor will the very small amounts of saffron added to foods significantly fortify their vitamin B value. But the end-point need not lie there. A chemical discovery has dropped a botanical hint—why should just one member of the plant kingdom accumulate riboflavin on the stigmas of its flowers? May there not be others also possessed of this curious tendency? May it not be possible for one of these plant species to hold its riboflavin wealth more generally?

Would the same quiz crop wrong answers on the subject of cabbage juice's medicinal virtues? The drinking of cabbage juice has had many advocates and vitamin C salvage in the kitchen would no doubt be given by most as the main reason. But a new treatment for peptic ulcers at the Stanford School of Medicine utilises cabbage juice as a source of 'vitamin U,' the tentative name of an unknown nutritional factor that gives digestive tracts greater resistance to corrosive onslaughts of pepsin. A quart of cabbage juice per day disperses pain in five days and heals the ulcer residues in about 14 days. The latest developments show that a cabbage juice concentrate is no less effective and much easier to consume; and further dehydration is enabling the treatment to be tried out with capsules. Perhaps this is scarcely an oddment of research by-ways; nevertheless, widespread though ulcer trouble is today, we seem to have heard very little about it.

Perhaps after all we are developing a theme, the theme of naturally-derived chemicals discussed here but recently

(THE CHEMICAL AGE, **69**, 953). For another oddity in recent literature is the extraction of a substance from rhododendron leaves that lowers blood pressure. Its structure is still unknown but it has been called andromedoxitin; it has so far only been tested on animals, and it produces a temporary lowering of pressure. It is unlikely to be able to cure high blood pressure diseases but it may offer hope as a treatment for certain cases. The extraction and purification processes require many operations, and from 1,000 lb. of leaves only one ounce of pure andromedoxitin was obtained. But here again we may be seeing only the beginning and not the end-point. When the structure of this substance is elucidated—and it is a pure, alkaloid-resembling chemical—a new range of blood pressure changing drugs may be opened up. Molecular relatives may be synthetically producible; some of these may prove much more effective. It is often sufficient today to give the organic chemist one molecule with a physiological action for him to produce a dozen variations with this effect enhanced and some other effect blunted. Thus in 1953 rhododendron leaves gathered in Virginia and Carolina have been put to biochemical purpose at the National Heart Institute in Maryland.

This year has seen the synthesis of sugar accomplished. It is not an event of any economic importance, for no pure organic chemical is produced in such cheap and natural abundance as sucrose, but a challenging gap in the story of organic chemistry has been filled. A practical advantage is that sucrose with radio-labelled C atoms in specific molecular positions will probably be producible, an important step forward in the investigation of living processes. The sucrose synthesis took place in Canada and was accomplished in only three months from a new starting-point by Dr. R. A. Lemieux and Dr. G. Huber at the Prairie Regional Research Laboratories at Saskatoon.

Research at the Florida State University this year has shown that menadione, a methyl derivative of naphthoquinone, preserves unpasteurised milk if added in trace amounts. More remarkably, if menadione is fed to cows as a diet addition at the rate of 25 milligrams per cow per day, the milk produced has a 20 per cent longer 'fresh life.' There was no antibiotic signpost for this discovery. Menadione would seem to have no other biochemical status beyond that of being a precursor of vitamin K. There may be little or no practical significance in this means of extending milk's life. Pasteurisation becomes more and more universal in the civilised world each year, and the use of chemical additives in food processing is increasingly receiving official discouragement wherever alternative means exists.

This random scanning of the year's reports has so far ignored the inorganic sectors. A Canadian development, patented by the National Research Council, may eventually save motorists 50 or 75 per cent of their oil usage. The addition of lithium, potassium, sodium, or magnesium salts or oxides to hydrocarbon oils apparently retards the oxidation processes that bring about oil deterioration. Building a small piece of the requisite metal into the oil plug or oil filter of a car is a potential method of keeping small quantities of the anti-oxidant in the oil supply. Preliminary tests have been exceedingly promising. Sodium salts in small amounts have also been found to exercise an important influence upon phosphate solubility in fertiliser manufacture. In the ammoniation of superphosphate there is a grave risk of reverting phosphate into non-available forms, and so far there has been a limit to the degree of ammonia addition considered practicable. The presence of about 1 per cent of sodium significantly holds back this point of reversion.

Some of these swans chosen at random will perhaps turn out to be mere geese; for the moment, however, they are enough to demonstrate the staggering width and depth of the chemical research front today, the variegated efforts and energies of chemists all the world over—and, perhaps less happily, to show the utter impossibility of keeping pace with progress and potentialities. The hazard of the dilettante approach is undeniably indigestion.

Notes & Comments

A 'Synthetic' Antibiotic

ONLY last year it was predicted that important new chemotherapeutic agents would follow from the elucidation of terramycin's molecular structure. Predictions in chemistry today are speedily fulfilled. Both the Pfizer and Lederle organisations in America have made a new antibiotic substance, tetracyline, and described its properties. The molecular structures of terramycin and aureomycin being known, the modification of these structures becomes feasible. Aureomycin is chemically known as chlorotetracycline; terramycin is a close relation, chemically known as oxytetracycline. The new modification is the elimination of chlorine from aureomycin, replacing it with a single hydrogen atom. In other words, both aureomycin and terramycin are derivatives of a common or parent structure, tetracycline—and this parent molecule has now been produced. Strictly, this is not a synthesis—it is a simple change in the aureomycin molecule, accomplished by treating aureomycin with hydrogen gas in the presence of a palladium-carbon catalyst. As might have been expected, tetracycline has a pronounced antibiotic activity. Tests with micro-organisms *in vitro* have shown it to be active against bronchial pneumonia and 'strep' organisms. Clinical tests *in vivo* on 100 patients have shown that it is absorbed more readily by the blood than other broad-range antibiotics. It is said to have a low order of toxicity and side-effects have not been discerned; however, it seems far too soon for such claims to be justifiably put forward, for there obviously has been no time for long-term secondary effects of toxic or other nature to be manifested.

More Happy Events ?

OTHER man-made antibiotics may be expected. Chemical modifications of the terramycin molecule are bound to be attempted. In as highly competitive a field as the US antibiotics industry, the prize for a new antibiotic producible by modifying an old one is likely to be rich. Modification is likely to be a much less costly route to large-scale output than the development of fermentation processes for a new natural product. With the production processes for an existent antibiotic already capitalised and built, the attachment of one or two chemical steps is no more than the addition of a small wing to a large and expensive building. Along this new road we may see major events in 1954.

Russian Abstracts

THE passing of British Abstracts appears to have coincided with the re-birth of Russian abstracting. In October four Soviet abstract journals began regular publication under the auspices of the new Soviet Institute of Scientific Information. The journals issued so far cover chemistry, mechanics, mathematics, and astronomy. In 1954 journals covering biology, geology, and 'technical sciences' are likely to be added; though what fields may be embraced by the last classification is not yet known. How far this indicates another move towards Western outlook is difficult to assess. Since the revolution of 1917 Russian abstracting has been incomplete and subjectively selective, the somewhat heterogeneous effort of various libraries and institutions. Such abstract publications as existed had limited issue and circulation, and even scientists have required permits to study technical literature in their own fields. The new journals will cover world literature and their availability will not be limited; though it remains to be seen how far these changes are actually implemented. Certainly it seems that a new kind of window-opening is taking place. It is to be welcomed.

Australia's Uranium

A WARNING that the development of Australian uranium sources will not produce 'gold rush' prosperity was given recently by Mr. S. B. Dickinson, Director of Mines for South Australia. The popular opinion that Australia is on the verge of a uranium boom is too widely held and too often headlined in the newspapers. The main source, Radium Hill, provides a complex ore requiring special methods of treatment and extraction; had such methods not been worked out, this source could not have become at all important. Simultaneously with these developments there has been a steady but sure improvement in the world supply, with some trend towards the use of lower-grade uranium ores by economic processing methods. Uranium mining in Australia will not differ in basic principles from the mining of copper, lead, or zinc; the investment required will be much the same as that for other minerals, and the returns may be no more impressive. Uranium can become a valuable addition to the range of Australia's exports, but there is no evidence to support the view that it will by itself bring a new wave of prosperity. Mining companies are in fact hesitant to commit capital to uranium exploration; they are not sufficiently impressed by the prospects to overcome fears of Government control and the dangers in a situation when mining rights are as yet uncertain. (S. B. Dickinson, *Chemical Engineering & Mining Review,* **45,** 477-482.)

British Tar Confederation

Appointment of Officers for 1953/54

AT the recent annual general meeting of the British Tar Confederation the following were elected as officers of the Confederation for the year 1953/54:—

President, Major A. G. Saunders; *hon. treasurer,* Mr. C. E. Carey; *chairman of executive board,* Mr. R. H. E. Thomas; *vice-chairmen of executive board,* Mr. S. Robinson and Mr. Henry F. H. Jones.

The executive board consists of ten representatives nominated by the Association of Tar Distillers, the British Coking Industry Association, and the Gas Council, and one representative nominated by the Low Temperature Coal Distillers' Association of Great Britain, Ltd. The following constitute the board for the year 1953/54:—

Representing the Association of Tar Distillers: Mr. L. W. Blundell, North Thames Gas Board; Mr. E. P. Butler, Bristol & West Tar Distillers, Ltd.; Mr. C. E. Carey, South Eastern Gas Board; Mr. J. Colligon, Dorman, Long & Co., Ltd.; Mr. E. Hardman, E. Hardman, Son & Co. Ltd.; Mr. C. Lord, Lancashire Tar Distillers, Ltd.; Mr. Wm. McFarlane, Scottish Tar Distillers, Ltd.; Mr. S. Robinson, Midland Tar Distillers, Ltd.; Mr. J. B. Vickers, Yorkshire Tar Distillers, Ltd.; Mr. W. A. Walmsley, Thomas Ness, Ltd.

Representing the British Coking Industry Association: Lt.-Col. P. F. Benton Jones, United Coke & Chemicals Co., Ltd.; Mr. A. Bradbury, Staveley Iron & Chemical Co., Ltd.; Mr. G. W. J. Bradley, National Coal Board (East Midlands Division); Mr. W. Robson Brown, Richard Thomas & Baldwins, Ltd.; Mr. K. McK. Cameron, Stanton Ironworks Co., Ltd.; Mr. F. W. O. Doddrell, National Coal Board (North Eastern Division); Mr. C. F. Dutton, National Coal Board; Mr. C. M. Frith, South Yorkshire Chemical Works, Ltd.; Mr. C. F. Sullivan, National Coal Board (South Western Division); Mr. R. H. E. Thomas, National Coal Board.

Representing the Gas Council: Mr. S. Black, Northern Gas Board; Mr. D. D. Burns, Scottish Gas Board; Mr. W. Hodkinson, North Western Gas Board; Mr. W. K. Hutchison, South Western Gas Board; Mr. Henry F. H. Jones, Gas Council; Mr. A. W. Lee, East and West Midlands Gas Boards; Mr. A. McDonald North Eastern Gas Board; Mr. M. Milne-Watson, Eastern and North Thames Gas Boards; Mr. J. Powdrill, Wales Gas Board; Mr. S. E. Whitehead, South Western and Southern Gas Boards.

Representing the Low Temperature Coal Distillers' Association of Great Britain, Ltd.: Commander Colin Buist.

'Terylene' in Canada

Contracts valued at almost $3,000,000 have been placed to date with Canadian firms for supplies or services connected with construction of the $20,000,000 'Terylene' polyester fibre plant of Imperial Chemical Industries of Canada, Ltd., now being erected at Millhaven, near Kingston, Ontario. Site work began in June and a labour force of about 400 is employed.

US Chemical Industry Seeks Protection

Manufacturing Chemists' Association on Tariffs

THE effect on the American chemical industry of the importation of lower priced chemical products from the United Kingdom and other countries was referred to in a statement recently submitted to the Randall Commission on Foreign Economic Policy by the Manufacturing Chemists' Association.

The MCA, which represents the producers of more than 90 per cent of USA domestic chemical tonnage, declared in the statement that although American industry has thrived on legitimate competition, both from domestic and foreign producers, 'the American chemical industry does not welcome, and the national economy necessarily suffers from, competition of foreign goods offered in this country at prices lower than those at which we can profitably produce, resulting from cartels, government subsidies, disproportionate wage rates and standards of living, manipulation of foreign currencies, or dumping.'

According to the statement, the MCA is in complete agreement with President Eisenhower's broad declarations on US foreign trade policy. It urged the Randall Commission to consider the maintenance of a well-balanced industrial potential as of primary importance to the security of the US and the free world.

An Essential Industry

Declaring that the security of the US and the free world demands that the US should foster a well-integrated and independent domestic chemical industry, the statement continued:—'The chemical industry today must be reckoned among the greatest industrial forces of all time—it is the nerve centre of our entire industrial system. In peacetime its products are essential to every phase of our daily lives; in war-time they are indispensable.

'All industrial production in the US is directly or indirectly dependent on an incredible variety of chemicals and chemical processes. The chemical process industries account for about 20 per cent of our national output. The manufacture of automobiles, rubber, steel and alloys, paper, glass and ceramics, textiles, leather, as well as the great fields of agriculture and food processing, require various chemicals or chemical processes.

'In times of national emergency, chemicals achieve an even greater significance. Many chemicals, like certain branches of the armed forces, work at the front. However, just as each front line fighter can function only if supported by rear echelon and service troops, so chemicals used in combat must be backed up by a vast network of products and services which only an integrated chemical industry can supply.'

Mutual Security

In a reference to the Mutual Security Programme, the statement went on:— 'Because of the vital role played by chemicals, any policies which discourage the contemplated expansion of our chemical industry, or weaken its present position, will in even greater degree prevent the development of our mobilisation base and reduce the ability of the free world to resist aggression. . . . The improvidence of relying on foreign sources for vital chemicals is even greater today than it was in 1919.'

Under the heading of 'The Free World Stands Together,' the statement continued: 'For reasons of economy and efficiency there has been a marked tendency—both at home and abroad—to concentrate chemical operations in large-scale plants and, as demand increases or new products are added, to enlarge existing plants rather than build new ones. In addition, the same factors responsible for the choice of location of one chemical plant frequently lead to the construction of others in the same area. . . .

'Under these circumstances and so long as present world tensions continue a serious question is raised as to the advisability of depriving our chemical industry of reasonable tariff protection against low cost imports for the purpose of building up the chemical industry of our allies in areas much closer to the enemy, much more vulnerable to seizure, and much less able to supply the free world in a crisis.

'Our European allies now have strong and growing chemical industries and it is entirely appropriate that they should. They also have capacities far in excess of their own needs and export up to 50 per cent of their production, in contrast with the US consumption of 96 per cent of its chemical output.

'In conformity with universally accepted principles of protecting industry essential to national defence, the industrial nations of Europe carefully limit imports of chemicals by tariff and absolute controls. The UK prohibits the import of certain chemicals and uses a licensing system to limit imports of other chemicals. Western Germany controls imports through restricting the availability of exchange. France employs a quota system in conjunction with credit control. Italy has a licensing system.

'Clearly we should not hamper the ability of our allies to defend themselves, or to perform their full share in the Mutual Security Programme. Certainly we should not cripple their chemical industries for the sake of strengthening our own, even though ours may be relatively easier to defend. For the same reason, we should not reduce our military effectiveness merely to increase the chemical export trade of other countries. Our collective security will be weakened, and not strengthened, if one of us is sacrificed for the benefit of the others. . . .

Cartels & Monopolies

'In addition to the various kinds of governmental restrictions employed abroad, reference should also be made to the use of cartels in foreign countries, and to the high degree of concentration of the chemical industry among a few companies. For example, in the UK, two companies control 85 per cent of the production of organic chemicals; in France, two companies produce 95 per cent of its output of these materials; in Italy, two firms account for 80 per cent of capacity; in Western Germany, four companies produce substantially all the chemicals. By contrast, sales of the three largest American chemical companies amount to only about 15 per cent of aggregate chemical industry sales.

'The cartel system, of which all major European chemical producers were members prior to World War II, is not compatible with the American competitive system. . . . Evidence is mounting that the close-working relations of the pre-war European combines are being reinstituted. . . .

'Our present tariff rates have never functioned under conditions of normal international trade. The Trade Agreements Act was approved in 1934, and reductions in rates have been made at intervals from 1936 to 1951. During nine of the 16 years since the first reductions were made, most of the industrial countries of the world have been at war. The remaining seven years have largely been spent in restoring industrial, agricultural and residential areas destroyed or damaged by war and in building up peacetime industry adequate for national security.

'As a result of trade agreement concessions granted by the US during this period:

'Rates have been reduced on 312 out of 427 classifications of dutiable chemicals and allied products (Schedule 1 of the Tariff Act of 1930), representing 96 per cent in value of all dutiable imports of such products in 1952;

'The *ad valorem* equivalent of rates of duty on dutiable chemicals and allied products (Schedule 1) have been reduced a total of 51 per cent; since 1 January, 1945, alone, the *ad valorem* equivalent of rates of duty on dutiable chemicals and allied products (Schedule 1) have been reduced 38 per cent, principally as a result of negotiations at Torquay (28 September, 1950-21 April, 1951) which took effect in part on 6 June, 1951, and in part on 1 October, 1951. Present average *ad valorem* rates on dutiable chemicals and allied products (Schedule 1) is 12.4 per cent, compared with 12.2 per cent on all dutiable imports, on basis of 1952 data.

Expansion Far From Complete

'In the last five or six years the highly industrialised foreign nations have made impressive strides in rebuilding their chemical plants and expanding their capacities. But this foreign expansion and modernisation is still far from complete. It is clear, therefore, that the US chemical industry has not yet felt the full force of competition under present tariff rates from foreign chemical industries which are still being revitalised and expanded. Accordingly, the previous imbalance of trade between the US and the rest of the world is not a valid argument for further reducing US tariffs applicable to chemicals.

'One of the most distinctive characteristics of the chemical industry is its high degree of integration and the interdependence of its processes, particularly where large quantities of raw materials are processed by many successive steps into smaller and smaller amounts of greater and greater numbers of intermediate products to produce a whole host of different end products.

'This is just as true abroad as it is at home. For example, at the end of World War II the Allies planned to dismember the giant IG Farben chemical empire in Germany into 80 separate units. This, however, was found to be impracticable because the existing units were so interdependent—sometimes sharing the same factory site, power plants and other facilities. Accordingly, the original plan was revised downward, first to 40, then to 12, then to five, and finally to four companies.

'There are areas of chemistry in which our technology is ahead of competition abroad. There are others in which this is not true. And there are yet others in which we are behind. A large proportion of the chemical processes in use today originated abroad, and the many scientists who visited Germany following World War II found ample evidence of a highly-developed, modern industry which compared favourably with their own operations at home.

'In general it was found that, there, as here, basic chemicals were produced in large quantity with no substantial difference in techniques, manpower or productivity, with the organic chemical industry essentially a batch process. In each case, as the number of successive steps required to produce a product was increased, the manhours of labour per unit of product increased abroad in about the same proportion as in the US.

American Workers Better Off

'However, striking differences were then found and still exist between the wages and standards of living in Germany and other European countries, on the one hand, and in the US on the other.

'In the latter part of 1951, the latest period for which comparative figures have been published, the average hourly earnings in US industry were from three to six times those of the European worker and had a purchasing power (in terms of food) varying from one and a half to four times as much as in the industrial countries of Europe. Accordingly, the average American industrial worker is considerably better off than his European counterpart. . . .

'Many of the most spectacular developments of our chemical industry, as well as our success in holding down prices, have resulted from research made possible and encouraged by tariff protection against low-cost European and Japanese products. But, as previously pointed out, the margin of this protection has already been reduced to a major extent by reductions in tariff rates and is being further reduced as foreign plants are being modernised with the help of American engineering skill.

'Cartels have never been operated so as to raise the status of the working man and enable him to enjoy a higher standard of living. With the resurgence of cartels in Europe, we can expect a continuation of low labour rates, even though output is increased with modern equipment and processes. . . . .

Tariffs the Fairest Means

'A system of non-discriminatory tariffs (wholly aside from the level of rates that should be set under such system) is the simplest, fairest, and more direct means of regulating imports from foreign countries . . . Every important industrial country in the world employs protective devices of one kind or another, most of which are far more restrictive than those used by the US. As long as such devices are used, one cannot safely conclude that one of the countries (which have practised a policy of protection) would have been as successful or more successful without it. . . . In view of the complexity of the chemical industry and the interdependence of its processes, it is of the utmost importance that tariff rates applicable to chemicals should continue to be established by individual products or closely related groups of products, rather than on any " across-the-board " basis.'

'SASOL Will Pay'

South Africa's huge undertaking to produce oil from low-grade coal (SASOL) would cost a lot of money, but would be a paying proposition from a purely financial point of view, its managing director, said recently. Mr. Rosseau said development of the chemical industry in South Africa in the next 20 years would equal that of the metal processing industry since the establishment of ISCOR (the State-aided Iron and Steel Corporation), SASOL would be the source of the raw material for the chemical industry.

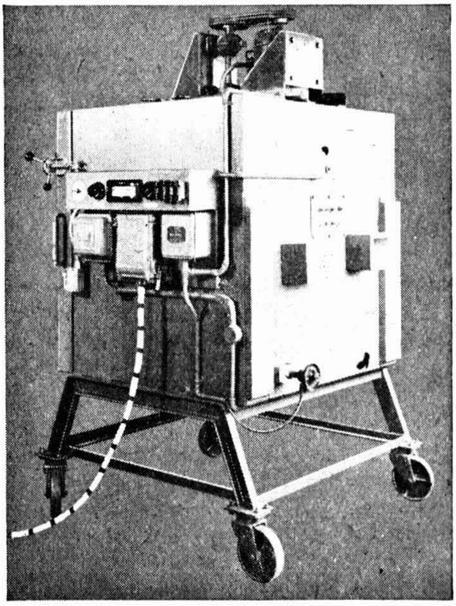
Low Temperature Oven

New Model for Laboratory Work

A RECENT addition to the range of low temperature ovens made by The General Electric Co., Ltd., is an easily transportable unit intended for laboratory work. It is said to incorporate all the features required to permit checking and controlling movement of components during tests involving long periods of heat treatment.

The oven has a standard double-case construction with ample heat insulation, and a full length door at the front. Forced air circulation is provided by a centrifugal fan mounted in the roof and driven by an induction motor. Sheathed wire elements are mounted on the side walls behind metal shields, which protect the charge from direct radiation and at the same time form part of the air circulation system.

The oven has internal dimensions of 3 cu. ft. and is rated at 9 kW. Its temperature is controlled by an expansion thermostat and the oven is provided with temperature indicator and recording instruments, door switch, and pilot lamps. Maximum operating temperature is 350°. Through connections are provided at the rear of the oven for external and internal connections to thermocouples for checking charge temperatures.



View of the new G.E.C. forced air circulation oven for laboratory work, showing temperature indicator, recording instruments, door switch and pilot lamps

Atomic Research

Experiments at Birmingham University

EXPERIMENTS in the use of gamma rays to quicken and possibly simplify chemical reactions in the manufacture of dyestuffs and other synthetic products from sugar, coal, oil, etc., are to be undertaken at Birmingham University, according to an article in the *Financial Times* last week.

The Midlands representative of that newspaper wrote:—

A radiation unit in which the chemical reactions will be studied is in the course of construction and it is hoped that experiments will begin in the New Year. After a year or so it should be possible to see in what directions it will be most worth while extending the work. The cost of the installation is to be borne by the Government, and a research fellowship to deal with the work is being established. A number of technical assistants will be provided by the Atomic Energy Research Department at Harwell.

Birmingham University has been closely identified with the development of atomic energy since the inception of the project in this country.

It is not generally known that the work on uranium by a team led by the late Sir Norman Haworth, of the chemistry department, and Professor Maurice Stacey, who is in charge of organic and biological chemistry, paved the way for the first atomic explosion. The University's reputation in this field made it a natural selection as the first university to undertake the new work.

Other universities will also participate. Initially the materials, radioactive by-products, will be obtained from Harwell. It is hoped that by the time the atomic power stations are in operation sufficient all-round progress will have been made to enable their by-products to be used for commercial production. It is hoped that the work will lead in the course of a generation or so to a revolution in the chemical industry from the economic point of view.

*Superphosphate Plant Effluents**

by R. DONALD, B.Sc., A.R.I.C.†

IN the manufacture of superphosphate, a number of reactions take place which give rise to the evolution of gases, but the only gas evolved in such quantity as to create a possible health hazard is silicon tetrafluoride. This fluoride arises from the reaction of hydrogen fluoride on the silica in the phosphate rock.

$$2\ Ca_5F(PO_4)_3 + 7\ H_2SO_4 + aq \rightarrow 3\ Ca(H_2PO_4)_2 + 7\ CaSO_4 + 2\ HF + aq$$

$$4\ HF + SiO_2 \rightarrow SiF_4 + H_2O$$

Given time, the silicon tetrafluoride would be hydrolysed by the water present in the reaction mixture but much of it is swept away from the reaction zone by the rush of carbon dioxide simultaneously liberated, although some hydrolysis does take place in the flues before the gases reach the wash towers.

Legal Responsibility

In Britain manufacturers have a legal responsibility not to discharge high concentrations of offensive gases to atmosphere. The relevant law is the Alkali etc., Works Regulation Act, 1906, which consolidates and extends previous similar Acts, the first of which was passed in 1863. It applies to Scotland as well as England.

This Act, which includes a schedule of chemical processes and a list of noxious or offensive gases, controls the emission of fluorine compounds from superphosphate works. The essence of the Act lies in the requirements that (1) scheduled processes must be registered annually, (2) as a prior condition in the case of a first registration, scheduled processes must be equipped to the satisfaction of the Chief Inspector with the 'best practicable means for preventing escape of noxious or offensive gases' to atmosphere and for rendering such gases 'harmless and inoffensive,' (3) the 'best practicable means' must thereafter be maintained in good and efficient working order and must be operated continuously, and (4) in the case of certain processes, upper limits are specified for the concentration of total acidity in effluent gases which may be discharged to the atmosphere.

In the case of superphosphate gases, the acidity and not the fluorine concentration is measured. No upper limits are specified but in the 1950 Annual Report, the Chief Inspector stated that the standard which he recognised as complying with 'best practicable means' presumes that either the acidity of the escape is less than 0.1 grain (calculated at SO_3) per cubic foot or that the efficiency of elimination exceeds 99 per cent.

Many of the present scrubbing plants in the UK were designed for a much lower load than they are now carrying and consequently are not able to work to these limits but they must be borne in mind when new plants are installed or old plants overhauled.

The one feature common to all the types of equipment used to remove silicon tetrafluoride from the effluent gases is that they rely on the hydrolysis of this compound by water according to the following reaction:—

$$3\ SiF_4 + 2\ H_2O \rightarrow SiO_2 + 2\ H_2SiF_6$$

This reaction is carried out at low temperature to avoid the alternative reaction:—

$$SiF_4 + 2\ H_2O \rightarrow SiO_2 + 4\ HF - 25.8\ cals.$$

This latter reaction, however, can only occur when the temperature is high enough to prevent the secondary formation of hydrofluosilicic acid, which develops sufficient heat to compensate for this absorption.

Oldest Absorption Methods

The oldest and still most commonly used type of absorption equipment is the simple spray tower system. With an adequate supply of water and sufficient delay period for the gases, this system is remarkably efficient in producing an inoffensive effluent. Usually a number of void towers are employed and the more efficient systems include a tower provided with horizontally-placed baffles so as to cause the gas to pursue a tortuous path. This provides a delay period for the gases in order to give sufficient time for efficient hydrolysis of the silicon tetrafluoride and also serves to provide settling trays for the precipitated silica. Because of the deposition of silica, it is not possible to

* Condensed from a paper read at a Technical Meeting of the International Superphosphate Manufacturers' Association, at Cambridge, 15 & 17 September.

† Scottish Agricultural Industries, Ltd.

use many of the conventional types of absorption equipment, e.g. packed towers, bubbling trays, etc.

Four Essential Requirements

The four essentials are (1) the gas must be cooled; (2) the gas must be thoroughly wetted; (3) the gas must be given a delay period, and (4) this must be followed by a series of towers to absorb the acid products of decomposition. We have found that these conditions are efficiently met by a unit having three vertical void spray towers, followed by a large vertical tower of rectangular section in which are placed a number of horizontal baffles ensuring that the gas follows a long tortuous path of about 100 ft. This tower has no water sprays and is followed by a further three void spray towers. The gases enter the top of the first tower, travel downwards and enter the bottom of the second tower, travel up and enter the top of the third tower and so on.

The total volume of the unit should be chosen so that the gases are delayed by not less than 8 sec. and preferably longer. Most of this delay can occur in the dry tower, provided the gases are well cooled and wetted in the preliminary spray towers.

The spray towers can be of either square or round section. Many materials of construction have been successfully used, including brickwork, either acid-resistant or common brick (preferably hard burnt), rubber-lined steel and woodwork (preferably pressure creosoted pitch pine).

With regard to the sprays, we have tried several types but found the most successful to be of the hollow cone type, delivering about 50 gallons per hour at 80 lb. per sq. in. pressure and constructed in hard rubber with acid resistant-nozzles and discs. These are inexpensive and are readily cleaned. The sprays are connected to a short piece of flexible rubber hose which permits them to be easily withdrawn for inspection or replacement. Nozzles should be inspected frequently (at least daily) for plugging. Chokages are not frequent but when they do occur, they can seriously impair performance of the towers.

It has been stated that the positioning of the sprays is critical (Annual Reports, HM Alkali Inspector, 1950) but in our experience, we have found that provided an adequate supply of water is maintained and the sprays are kept clean, the positioning appears to have a minor effect. Some towers have all the sprays in the top, some towers have all the sprays in the sides and some operate on a combination of these. We can attribute little, if any, difference in performance to this variation. It is of interest that it has been reported that a single large spray is practically as good as a number of small sprays handling a similar quantity of liquid.

The towers are usually cleared of solids once per week by hosing down.

Another important point is the siting of the fan. The best position is at the outlet of the last tower. In this way the entire system is maintained under suction and the fan has only to deal with clean gas. A common fan construction is 'Tufnol' blades fitted to mild steel spider arms but our most trouble-free fan has a large impeller of rubber-covered steel running in a concrete casing lined with an acid-resistant carbon cement. The casing is fitted with a wooden cover. This fan has been running several years without any renewals and with little attention. The fans are usually run at a comparatively slow speed of about 400 rpm.

Discharge into Chimney

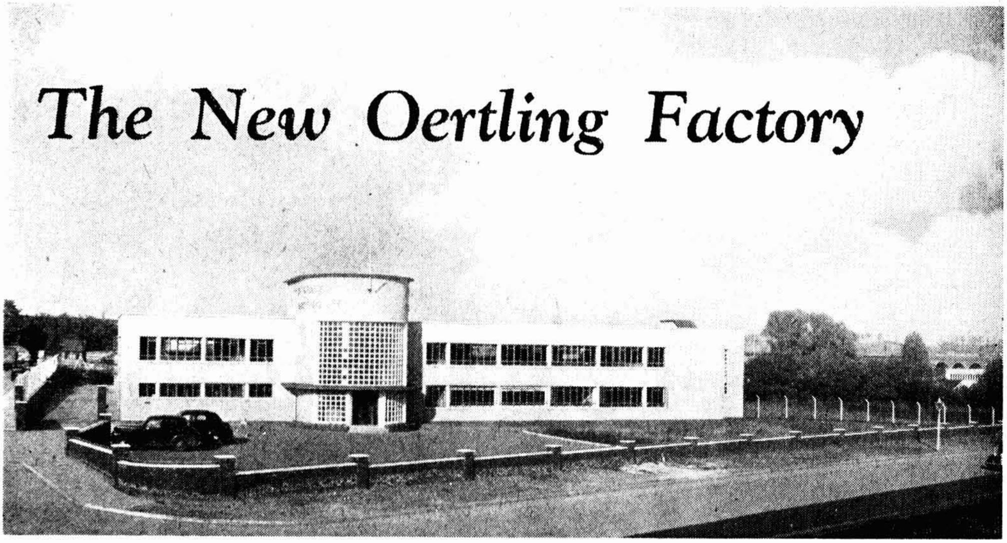
The gas from the fan should discharge into a chimney. This should preferably be by a high hot chimney to give good dispersion. A chimney of not less than 100 ft. high is recommended.

This water spray treatment removes most of the acidic constituents of the effluent but with some phosphate rocks the residual gases have a strong organic smell. This is readily removed, if necessary, by chlorination in the chimney.

Perhaps the simplest method of adapting the spray tower system for saving water and building up a concentrated solution of hydrogen silicofluoride is to recycle the liquor through the sprays. This, however, introduces many difficulties due to blocking of the sprays. A device to overcome this is the Lutyens scrubber. The sump is maintained full of liquor and at the bottom of each chamber or tower is located a square sectioned wooden roller, on a steel shaft, to which are attached wooden throwers. These pick up, and spray into the gases, liquor which falls back into the bottom of the scrubber. Alternate rollers are driven

[continued on page 1176

The New Oertling Factory



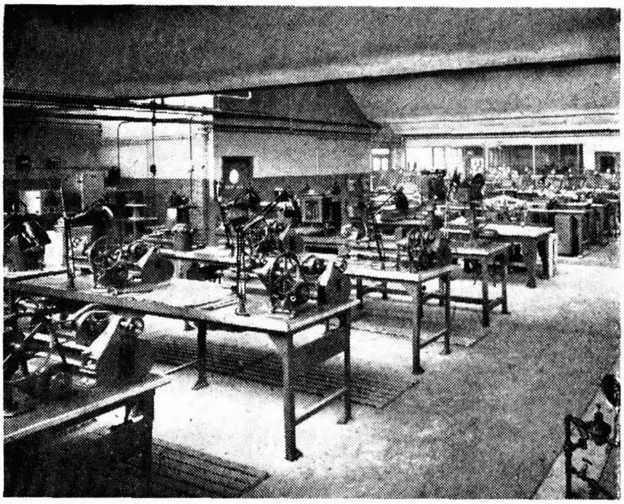
IT was several months ago that L. Oertling Ltd. began moving from very cramped London accommodation to their new factory at St. Mary Cray, near Orpington, Kent, but only fairly recently that full production was achieved there. A few weeks later the firm were able to announce that manufacturing economies resulting from the modern production methods and facilities at the new factory had enabled marked reductions to be made in the prices of Oertling Prismatic and Releas-o-matic balances. To those who have watched the firm's expansion and seen how difficult it was for them to carry on in premises which had been outgrown, this announcement must not have come as any surprise.

According to at least one authority the manufacture of the modern analytical balance as we know it today was begun by the firm of Oertling in London around the year 1846 and since that time many of the important developments in balance design and construction have been introduced by L. Oertling Ltd. Corundum planes and the Releas-o-matic principle are two recent examples of the way in which the firm's research department has proved its worth. No firm can hope to manufacture chemical balances without a force of highly skilled workmen but it is equally true that no firm can withstand the fierce competition which exists in overseas markets without something more than just a well-made balance. The export of Oertling balances, we are told, is now at a record level and a considerable proportion of this success must be due to the research work carried out in the company's laboratory.

At St. Mary Cray one can see all the processes connected with the manufacture of chemical balances, with the exception of the casting, for even the wooden cases and weight boxes are made on the premises. In a most modern machine shop the components are made on a wide range of lathes, drills, presses, etc. As one would expect the parts have to be very accurately machined and each is subjected to careful examination before being accepted and passed on to the assembly room or fitting-up shop.

Each balance is assembled by one individual and this same person, a highly-skilled and experienced instrument mechanic, is also responsible for initial testing. The fitting-up shop is air-conditioned and the temperature is closely controlled to make certain that the skill of the workmen will not be marred by physical variations in temperature or humidity. The roof of this building is covered with several inches of water which serves as an economical yet efficient insulating material.

Adjoining the fitting-up shop are the balance testing rooms, each of which is temperature controlled to 0.5°. The main room has a complete isolation bench on one side and a semi-isolation bench on the other, while the smaller room, used entirely



A corner of the machine shop where some of the smaller components are turned

for testing micro-balances, has complete isolation benches. Aperiodic prismatic balances are given a particularly thorough test in a third room. After the usual testing, this room is slowly heated to a temperature of 40° and sensitivity, 'length of arm error' and knife parallels are then checked against the original results The room is then allowed to cool slowly and the same checks made. The room is then heated again and the whole test repeated. If variations outside rigid specifications occur the balance is rejected.

A department of especial interest is the cabinet-making shop. Rare woods from many distant lands are used and visitors are surprised to find that the bulk of the polishing is still done by hand for the firm feels that a fine instrument deserves a fine case. At the time of the writer's visit the case was being made for a special balance destined for the Canadian Mint while boxes were also being finished for holding sets of measures for the Uganda Government made by an associate firm.

The development laboratory, where both applied and fundamental research is undertaken, is under the direction of Dr. G. F. Hodsman. At present, problems being studied include those connected with beam stress and the effects of extremes of temperature and humidity upon balance accuracy and maintenance. It was in this department that the 'Releas-o-matic' balance was developed and it may be from here that further interesting developments in the field of chemical balances will spring.

The assembly or fitting shop where the components are assembled by highly skilled instrument technicians

South African Newsletter

FROM OUR OWN CORRESPONDENT

BY the middle of next year the first units of Sasol—South Africa's £30,000,000 oil-from-coal project and the largest in the world—will be brought into operation and actual production can be expected by the end of the year. Sasol consists of a number of factories to turn out a wide range of fuels and chemicals. What 18 months ago was a bare stretch of veld is now 150 acres of concentrated activity. Buildings, towers and chimneys are reaching skywards, while underground mile upon mile of piping is being laid. When all units of plant come into operation Sasol will consume daily 8,000,000 gallons of water, 7,500 tons of air and 7,600 tons of coal from its own mine. The colliery, which lies to the south-west of the factory area, owns mineral rights over more than 13,500 acres and surface rights over nearly 5,500 acres. The coal will be transported by a 1½-mile conveyor belt.

The key to the manufacture of oil and a wide range of chemical by-products is the gasification of coal by treating it with oxygen and steam under high pressure. When full capacity is reached some 3,200 tons of coal will be treated each day, and 1,500 tons of oxygen used in the process. The gasification takes place in huge steel vessels, 26 ft. long and 14 ft. in diameter, each weighing 59 tons. The transport of these provided a major problem. Too large for the railway system, they were moved from Lourenco Marques by road, travelling at a maximum speed of 15 miles an hour. The oxygen will be produced by liquefying air.

The erection of this plant is well advanced and the tops of the extraction towers above the walls of the buildings housing them can now be seen from a distance. When completed this will be the largest oxygen plant in the world. It is not intended at present to make any use of the residual gases after the extraction of oxygen. In due course, however, consideration might be given to fixing the nitrogen, which would provide a valuable source of fertilising material.

The producer gas from the pressure tanks is fed in two streams to the two oil synthesising plants—one American and one German. The combination of the two methods of conversion has been accepted as providing the widest possible range of by-products.

* * *

At present large quantities of industrial salt have to be imported into the Union because it is claimed that the local product is not of a sufficiently high quality for a number of processes. A £300,000 salt processing works is now being developed near Port Elizabeth and this is to employ the most modern manufacturing techniques, with the aid of which it will be possible to sterilise the total output and produce a salt completely free of halophilic bacteria such as may cause deterioration in foodstuffs. That has happened with some of the inferior salt manufactured in South Africa. The promotors of this undertaking say that the new salt will be up to 99.7 per cent sodium chloride to any grade of fineness. It is also planned to produce iodised table salt as from 1 in 10,000 down to 1 in 40,000. So far as possible all the processes in this plant will be mechanised.

* * *

The Minister of Finance has announced that the Union Government have decided as from the beginning of next year to abolish discrimination against imports of goods from the dollar areas. Importers will then be in a position to buy goods in the markets that seem the cheapest. The Minister said this decision had been taken because of the considerable improvement in the competitive position of British and Continental exporters. The Union's guarantee, allowing Britain to earn a minimum of £50,000,000 worth of South African gold would, however, be renewed. This decision had been taken in view of the need to continue to strengthen the central reserves of the sterling area. The Minister said that unless the necessity for an adjustment in the price of gold was realised soon the other measures taken to restore multi-lateral trade must fail to achieve the best results. The heavy import requirements of the railways, Electricity Supply Commission and defence, combined with the slowing down of the inflow of investment as a result of the world-wide scarcity of capital would probably not allow the abolition of import control in the near future.

Superphosphate Effluents

continued from page 1172

in opposite directions so that the spray is projected against the flow of gases in the towers.

A very compact and efficient unit consists of two rectangular rubber-lined steel tanks, each of 25 tons water capacity but containing only 10 tons water. The gases are drawn into the tanks by means of a duct connection in the top and pass through the two tanks in series. Spray is generated in each tank by means of a conical spinner, suspended from the tank top and revolved at 1,000 rpm. The cone is perforated at its broad upper end by a number of holes and fitted with impeller blades at the lower narrow end which is submerged under water level. The efficiency of fluorine recovery has been reported as 90 per cent.

Another scrubber which occupies little space and which appears to be gaining popularity in the USA, is that made by Schutte & Koerting, Philadelphia. In this scrubber, the water serves a double function: (1) by injection it is used to create a pressure drop in a venturi, thus eliminating the need for a fan, and (2) it absorbs the gases by mixing and contact.

As a result of scrubbing the effluent gases to remove the acidic constituents, the superphosphate manufacturer is left with a liquid effluent which is highly acidic. Even if the liquor is used for the production of sodium silicofluoride by the conventional method of adding brine, there still remains an acidic effluent as shown by the following equation:

$$H_2SiF_6 + 2\ NaCl \rightarrow Na_2SiF_6 + 2\ HCl$$

If the superphosphate works is suitably placed, these effluents can often be run out to sea but if the only outlet available is either a river or a sewer belonging to the local authorities, the manufacturer in the UK is faced with reducing or eliminating this acidity before discharging the effluent from his works.

To reduce the acidity of the effluent it can be suitably diluted, either by a further supply of water or with other neutral or alkaline effluents from the works. The most satisfactory procedure is to adopt an automatic liming system. Recycling after liming is not usually practised, the neutralised liquor being run straight to drain.

If the superphosphate is granulated, then the subsequent drying and cooling operations raise additional effluent problems. The gases from the granulation plant which are hot, wet, dust laden and slightly acidic, are first passed through cyclones to remove most of the dust burden and are then usually passed through simple wet spray towers—usually only one tower is used. This treatment is often unsatisfactory.

In a very interesting paper on the comparable problem of washing boiler flue gases, it has been shown that in certain weather conditions washing opposes the dispersive effect of a tall chimney and may actually increase the local pollution by bringing the gases down before effective dispersion is ensured.

Northern Rhodesian Minerals

MINERALS which, apart from copper, were included in Northern Rhodesia's £78,880,363 mineral production last year, are reviewed in the recent annual report of the Rhodesia Mines Department.

Production of 15.50 tons of tin concentrates (value £9,371) was an all-time record for the Territory. Slimes from the electrolytic refinery at Nkana mine, exported for treatment abroad, contained 31,758 lb. of selenium, valued at £54,609.

Seventy-six tons of vanadium pentoxide realised £56,976; production of vanadium stopped at Broken Hill mine in June. Regarding iron, 5,943 tons of ore, averaging 63.69 per cent Fe, were produced and used as a reagent in the Broken Hill lead and zinc plant. Production of pig lead totalled 12,600 tons (about 1,000 tons less than in 1951).

Zinc production at 22,890 tons was slightly more than in 1951, but the value fell from £5,928,360 to £2,8588,852. Gold produced totalled 2,523 ounces, almost all of it being recovered from Nkana mine refinery slimes, while silver production was 348,954 ounces, all recovered from the Nkana slimes. Nkana was the only cobalt producer—24,973 cwt. of cobalt alloy, 540 cwt. of cobalt metal and 34 cwt. of cobalt hydroxide.

Chemical Activity of Nerve Cells

Address by PRS After Presentation of Medals

AT the anniversary meeting of the Royal Society on Monday, 30 November, the president, Dr. E. D. Adrian, O.M., presented the Copley Medal to Professor A. J. Kluyver, of Delft, for his work in microbiological metabolism and comparative biochemistry. The first Royal Medal was presented to Professor N. F. Mott, whose contributions to the study of the solid state are well known; and the second to Sir Paul Fildes, for his researches in bacterial nutrition. Sir John Lennard-Jones, the originator of the molecular orbital treatment of diatomic structures, and now Principal of the University College of North Staffordshire, won the Davy Medal; and Sir Edward Bullard, the geophysicist and Director of the NPL, was the winner of the Hughes Medal.

Major Interest of Mankind

In his presidential address, Dr. Adrian said that scientific research had now become one of the major interests of mankind, and as a result it had become increasingly difficult to pick out some special discovery to bring before the annual meeting. In the most promising fields there were already so many scientists at work that the general line of advance could be foreseen for a few years at least. Dr. Adrian continued:—

The rapid expansion of scientific research has another consequence which must be of some concern to a Society which deals as we do with the whole domain of natural knowledge. In the past it was a domain with isolated fields each yielding a different crop and mostly separated by tracts of unexplored country. It was easy to classify scientists as chemists, physicists, zoologists and botanists and so on. They had different data to bring together and a different way of dealing with them, with a different vocabularly and different apparatus; as soon as we were through the door we knew whether we had come to the right laboratory.

But it is becoming far more difficult nowadays to decide where the boundaries should be drawn; the major fields are experimenting with new crops and the barren areas which used to separate them have begun to yield fruit and to attract workers from distant regions. Mathematics and physics and chemistry lead without a break into the biological fields and it needs more than a casual glance to tell whether we are in a laboratory which studies the atom or the human brain.

We should all rejoice that the old barriers are yielding, for we aim at a single inclusive system of the world, one that will cover all the immense variety of natural events. Yet they have an immense variety and it is still necessary to classify them. For a society like ours the classification ought not to go into much detail. There must be committees with suitable labels, but if we are to judge the importance of different lines of inquiry there must be as much overlapping as possible, so that a new line of work can be considered by experts who are not all biased in the same directions.

The problems of the borderline subjects and of the specialist groups are bound to grow as the content of natural science increases, but they are signs of progress and will no doubt be settled as they arise, by reasonable compromise. I have mentioned them to emphasise the more general difficulty of keeping our enormous territory in focus. It has long ago passed the competence of one mind and it will need a more and more highly organised co-operative effort if we are to make the best use of our time.

The Human Birthright

The ability to make such an effort is, of course, our birthright. The human brain surpasses that of other animals in its capacity for what Henry Head called 'symbolic thinking' and expression; it is because we can communicate our thoughts that two heads are better than one and because we can express the results in permanent form by pictures or writing that each generation has a greater store of knowledge than its predecessors. Individually we can be specialists, because, in Isaac Newton's phrase, we stand on the shoulders of giants.

With our modern instruments, miracles of calculation are possible because the operations can be carried out at an unimaginable speed; a vast number of figures must be dealt with and some of them must be stored for a limited time, but if the machine is to be of reasonable size they must be stored no longer than they are needed and in a space which can be constantly used for new sets of figures as the calculation proceeds. Thus the record must be of a kind which will vanish instantaneously and completely when the need for it is over.

Too Many Variables

The human brain can neither remember nor forget with such precision—if it could we should be in a far better position to assess its powers. There are too many variables to be considered. The items of information coming from the sense organs are not all treated in the same way: a few are given priority for the storage process and many are unnoticed. And the signals which reach the brain may be stored for a time as self-perpetuating cycles of activity, but before long the traces leave some more enduring change which does not need constant renewal.

What physical or chemical changes are responsible for these alterations is still unknown but we have a new method, introduced by Eccles, for studying the bio-physics of the nerve cell by the use of a microelectrode thrust into its interior. The method was first used in the study of muscle fibres; its extension to the nerve cell has already given important results and cannot fail to give more.

It is naturally more difficult to study the biochemistry of the individual nerve cell than to study its electrical properties, but the storage process may well involve a chemical as well as a physical reorganisation. If the cell chemistry of a grown man can bear the mark of an infection with measles in childhood it is not unreasonable to suppose that the nerve cell constituents are plastic enough to be modified by past activity. Evidence accumulates in favour of the view that the transmission of signals from one cell to another depends on the release from the cell terminals of stimulating molecules, and their rapid destruction by enzymes. The stimulating molecules so far discovered, acetyl-choline and perhaps *nor*-adrenalin, are of relatively simple structure, but we know too little about the enzymes to be sure that the destruction of the stimulus always proceeds at a uniform rate uninfluenced by the past history of the cells.

I have reason to be impressed by the versatility of the nerve cell in relation to chemical stimuli, for I have been trying for some years to find out how the olfactory organ enables us to distinguish an immense variety of molecules brought to it in the air. The receptor cells number several millions, but they differ very little in external appearance, and for a time I thought that the discrimination of one smell from another depended more on the particular regions stimulated than on the particular receptor cells. But it is becoming more and more certain that there are marked differences in the specific sensitivity of the receptors. One group will react most readily to aromatic molecules, another to particular terpenes, and so on.

These differences are no doubt permanent, but they show that cells which look alike may have some physico-chemical organisation which makes them react quite differently to a particular stimulus. It is perhaps to be hoped that the cells of our brain have a more uniform constitution, and that memory traces depend on bio-physical rather than biochemical alterations. It will certainly be easier to detect the former, yet until we know more about the nature of these traces we cannot begin to understand what is by far the most important property of the brain.

Elections

The Society's officers were re-elected, and the following were elected as new members of the council: Dr. F. P. Bowden, Dr. F. Dickens, Mr. A. E. Ingham, Dr. G. M. Lees, Professor P. B. Medawar, Sir Edward Mellanby, Professor P. B. Moon, Professor W. H. Pearsall, Professor R. O. Redman, and Dr. C. Sykes.

Public Analysts

The Association of Public Analysts has been registered as a company limited by guarantee, without share capital, to 'assist in upholding and maintaining the character and position of public analysts and official agricultural analysts and of the profession of analytical chemistry in the public service, etc.' The management is vested in a council. The solicitors are Neve Beck & Co., 21 Lime Street London, E.C.3.

Works Fire-Fighting Equipment

by ALEC WEBSTER, M.Sc., M.I.Chem.E., A.R.I.C.

IT is often a matter of difficulty to know quite what to recommend as fire-fighting equipment in a chemical works. In the first case, the equipment should be such as will put the fire out at the earliest possible moment but, at the same time, it is desirable that there should be as little extraneous damage done as possible. In addition, the methods used should be such that they will not increase the danger by creating undesirable reactions with other products with which they may come into contact.

The position is also complicated by the fact that not every chemical works is able to have its own full-, or part-time, fire brigade. Whether or not there is a permanent fire brigade, it is, of course, desirable that the closest liaison is maintained between the responsible person at the works and the local fire brigade. This can work in two ways: it can be arranged that the local authority is made aware of the peculiar hazards existent in the works concerned or, as sometimes happens where a permanent fire brigade is maintained, it can be arranged that this brigade will be on call for part of the district—the financial arrangements being used to off-set the cost of the fire brigade.

In general, an ample water supply is the surest method of putting out most fires, but caution should be used in allowing inexperienced persons to handle standard fire hose. The force behind such a jet is very high and, in the hands of an inexperienced person who has not the physical strength to hold such hose, could cause quite a considerable amount of damage. This risk could be materially lessened by using reducing nozzles and a hose of about 1 in. diameter, instead of the usual $2\frac{3}{4}$ in.

Most works' fire-fighting equipment could, in general, be only regarded as a first-aid measure and, should this not succeed in curbing the outbreak, it is better that a professional brigade be called in at once. It is usually not difficult to decide whether the first-aid arrangements in use actually will put the fire out.

In order to cause a fire, three factors must be present—(i) some combustible material; (ii) a supply of oxygen, or other powerful oxidising agent, to enable combustion to take place, and (iii) the material must be raised to a sufficient temperature to start the combustion. All fire-fighting devices have as their aim the removal of at least one of these factors. For example, the extinguisher which delivers a jet of carbon dioxide works on the system that the carbon dioxide, being much heavier than air, forms a blanket of an atmosphere which is a non-supporter of combustion, and then the fire can no longer proceed.

Clearly, if the burning material is such that it contains within its composition sufficient oxygen to keep the combustion going, smothering is useless. An example of this is nitrocellulose. In such a case, the only thing to do is to cool the material, and this is where water has its main advantage. Its specific heat is extremely high and so is its latent heat, and therefore it possesses a very high capacity for removing sensible heat. Water must not be used, however, with any metal, or other substance, which is likely to form a hydroxide with the evolution of a considerable amount of heat. The other product of such a reaction will be hydrogen and the inflammable mixture, together with finely-powdered metallic dust, may produce a very large explosion. Such

For the fourth time in succession we publish, in the first issue of the month, an article on safety in industrial premises. The preceding articles—on Non-sparking Tools, Safe Floors, and Bursting Disks—have been so well received that we intend to publish articles on safety as regular features. Readers who have knowledge of accident control and safety installations are invited to share their experience with others. These communications may deal with any aspect of works safety or accident prevention

Industrial Safety . . . . .

an example is magnesium powder and, of course, sodium or potassium.

Another set of fire-extinguishing media are the halogenated hydrocarbons, of which carbon tetrachloride is probably the most widely used. The presence of a halogen atom in a compound generally tends to enhance the fire-extinguishing effect, and there are numerous compounds now on the market; it seems reasonable, too, to suppose that more will come. The main reason behind this lies in an attempt to find a halogenated hydrocarbon which is non-toxic.

Most of these compounds have vapours which are toxic and, therefore, they must not be used in enclosed spaces. Carbon tetrachloride, in contact with metal at red heat, can be converted into phosgene, and other similar compounds may react in the same way. Methyl bromide, which is perhaps the best fire extinguisher of this type, is extremely toxic and, although it is widely used in the engine nacelles of aircraft, there are no methyl bromide extinguishers which have received approval from the Fire Officers' Committee.

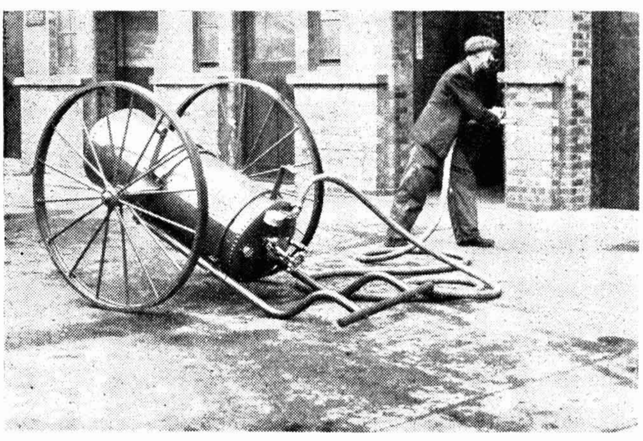
To turn now to the methods of use of these various agents:—

In the case of water, there is the ubiquitous fire bucket, a piece of equipment the advantages of which have always been much over-rated. It suffers from numerous faults: it is heavy; one has to get very near to the fire for it to be of any use—it is almost impossible to use a bucket with any accuracy at distances more than about 10 ft. from a fire. Its sole advantage is that one can get a relatively large quantity of water on to a small fire very quickly. The same remarks apply to a sand bucket, but there is the additional disadvantage with sand that, if it is used on moving machinery, it is certain that this machinery will be considerably damaged.

The next simplest method of dealing with water is a stirrup pump, or some variant of it. The stirrup pump is cheap and requires no particular skill, but the labour involved in using it may be a little fatiguing. However, this can be obviated by working the users as a team, so that they can change places one with another.

There are numerous extinguishers on the market which expel a jet of water by means of the pressure generated inside the vessel, either by bursting a container of compressed gas, or by mixing two chemicals together which generate the gas. These are available in sizes from about 2-gal. upwards, and are very simple to use. They have the disadvantage that, in most cases, once the discharge has started, it cannot be stopped, and thus a re-filling is required after every use. Appliances of this type can also be obtained, mounted on wheeled carriages.

Foam is produced by the admixture with a jet of water of some froth-producing compound, of which there are a number on the market. The purpose of this foam is to cause a blanket over the surface of the fire, so that smothering takes place. This is particularly useful for solvents which are not miscible with water. There are foam-producing compounds available which claim to be effective on fires involving solvents which are miscible with water, but even in these there is a much greater quantity



Photograph by courtesy of Merryweather & Sons, Ltd.

The 'PERNIX' chemical fire engine, of the soda-acid type. The appliance can easily be moved by hand

required than in the case of a fire with a non-miscible solvent.

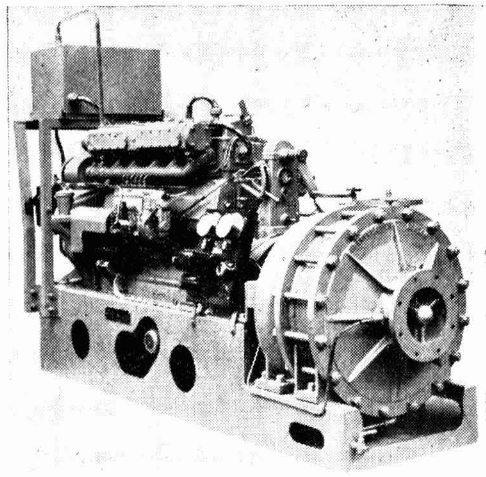
One difficulty arises with foam and that is, that if one uses foam to extinguish a fire in, say, an open tank, one is then faced with the fact that the contents of the tank may have been contaminated with the material which is used to generate the foam.

These are usually forced on to the seat of a fire by the use of a small pump operating in a cylinder containing the liquid. Methyl bromide is an exception to this, as its vapour pressure at normal temperatures is sufficiently high to expel the liquid when the container is punctured. The effect of these halogenated hydrocarbons is that of a vapour blanket. The liquid plays no part in the fire-extinguishing, as its specific heat and latent heat are so low as to make these particular properties of little value. The vapours are invariably extremely heavy and therefore not easily dispersed by the upward currents from the flame.

During the war, it was found that sodium bicarbonate had an unusually high capacity for extinguishing fires, and it is used in a number of dry powder extinguishers where the powder is expelled as a cloud from an apparatus not unlike a child's pop-gun in appearance. These are very effective and have the advantage that they do not cause much damage and are non-toxic.

Carbon dioxide is a gaseous smothering agent, and it is used in cylinders of varying sizes, from the small hand-extinguisher with a capacity of about three pints, to large installations which operate on a temperature relay and are completely automatic in action; these latter are favoured for such places as remote electrical sub-stations.

There are numerous automatic fire-extinguishing arrangements, of which probably the commonest is the sprinkler, in which—as the temperature rises—the stop valve is caused to open, allowing water to be discharged from the sprinkler in the ceiling. Here again, once a sprinkler has started, it will not stop until the water is turned off at some main valve and, therefore, as it is the usual intention that a sprinkler shall operate at times when the building is unoccupied, it is essential that some warning be given that the sprinkler has started to operate, so that it may be turned off.



[Photograph by courtesy of Merryweather & Sons, Ltd.

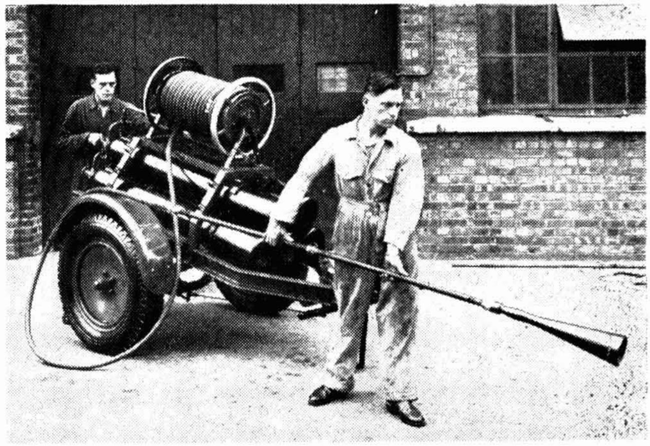
Pumps such as this—driven by diesel, petrol or steam engines—can be independent of mains supplies. They have been installed in many important works

In some cases, it is possible to arrange for an automatic alarm to sound in the headquarters of the local fire brigade, but this is a matter of local arrangement and a request for such a facility is not automatically granted.

In the case of high buildings, it is often a practice to put in what is known as a 'dry riser,' that is to say, a straight length of water-pipe running inside the building vertically and having valve connections to each floor. The method of operation is to connect a hose to the bottom and pump the water up, drawing it as required from the various floors.

An apparatus of this type is one which would normally be used by a professional fireman, because, if a fire has got a reasonable hold on a building, it should have been evacuated and there would be nobody to operate the valves on the 'dry riser' at the various floors; what is more, in order to connect this, it would be necessary for somebody to run towards the fire, and this is an action which one could hardly expect of an amateur fireman. The same may be said for the situation of hydrants. They should be sited at such a distance from the possible source of a fire that the operator

Industrial Safety . . . . .



A 'Karbono' CO_2 trailer with gas cylinders and hose reel. Excellent for installations where CO_2 is a suitable extinguishing medium

is not likely to have to stand too near the fire.

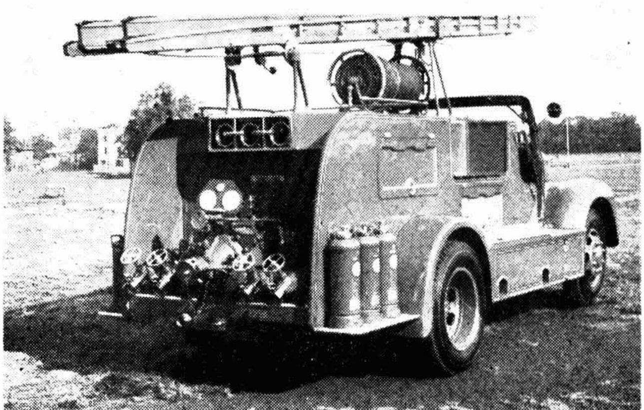
Another point in connection with liaison with the local fire brigade is to ensure that the access road is capable of accommodating any equipment which is likely to be required; for example, the 100-ft. turntable ladder weights about 17 tons (that is to say, there will be a 3-ton load at least on each of the rear wheels), and has a total clearance from ground level of approximately 13.5 ft.

The writer knows of one place where, in order to get a turn-table ladder of this type into the works, it was necessary to remove the ladder to take the engine under a low-level railway bridge, after which it was decided by the firm that they would purchase such a turn-table as part of their own fire equipment. Such a ladder as this also requires a fairly large turning circle and quite an amount of space in which to operate.

A form of appliance which appears to be coming more into favour is the automatic hose reel, which consists of a length of hose permanently connected to a water supply, the hose being usually about $\frac{3}{8}$ in. internal diameter. This is run on a reel and the removal of the nozzle from the wheel, and the turning on of the water, can be done in one operation. The user takes hold of the nozzle and walks towards the fire with the water spray in operation, and the hose reel unrolls as he walks. This is a very convenient piece of apparatus for general use.

The general question of fire-fighting equipment is one of ingenuity; for instance, the writer's attention was drawn some time ago to an occasion where the contents of a small laboratory muffle furnace had caught fire, and it was successfully extin-

Photographs by courtesy of Merryweather & Sons, Ltd.



A light motor fire engine, very useful for large industrial premises. It embodies, on a specially short wheelbase, a major fire pump, water tank, hose reel and extinguishers, and carries a 'Telescala' ladder

guished by throwing in several lumps of solid carbon dioxide.

Another weapon which has been used quite effectively on certain fires is what is known as a 'steam lance,' which consists of a pipe delivering high pressure steam in the form of a jet, which literally blows the fire out. An apparatus of this type is not one that is likely to be available in a large number of works, but it is an idea which could be used should the need arise.

Although there are many standard types of fire equipment, the science of fire-fighting is still, in many ways, in its infancy, and there seems no reason why plant supervisors and others should not use their ingenuity to devise their own methods of combating their own particular risks. In general, they will find the local fire brigade very co-operative and helpful.

Cleaning Greasy Floors

New Self-Powered Cleansing Machine

THE concern shown by the factory inspectorate and others regarding the risk to life and limb arising from ill-kept and greasy floors in industry has prompted S. R. Cowlard, Ltd., of Birmingham Road, Bromsgrove, Worcs., to develop a new self-powered floor cleansing machine. Known as the C50A, this latest addition to the Cowlard range of industrial cleansing equipment is a combined dry or wet scrubber and drier.

Battery-operated and, therefore, free from dangerous trailing cables, this machine, the first of its kind, enables one man to scrub, clean, and dry 4-500 yards an hour without impeding production—a job which would normally involve at least five men and cause serious delays unless performed at the weekend when labour costs are naturally higher.

The machine is claimed to be particularly suitable for treating those floors where compacted oil and grease have made the surface treacherous under foot and increased the likelihood of accidents caused by operatives slipping near moving machinery or by skidding works trucks. It will also cope successfully with both canteen and office flooring of all types.

The Cowlard C50A consists fundamentally of a cast aluminium machined base, suspended on an adjustable front castor and

two rear wheels, upon which is mounted a divided tank—one half for the clean solution of water and detergent and the other to receive the dirty water. This tank is flanked by two 12-volt Exide traction batteries connected in series to power, a B.T.H. 1 hp. heavy industrial motor, which drives the twin rotary brushes and a $\frac{1}{2}$ hp. 11,200 rpm. suction motor and fan which exhausts the air from the dirty water tank. Mounted on the handles of the tubular steel framework are the motor switches, water and suction control levers.

In operation the cleansing solution is gravity fed from its 4-gal. tank to a sprinkler system immediately ahead of the brushes. Then, as the machine passes over the scrubbed portion of the floor, the dirty water is piled up by trailing squeegee rubbers attached to the suction bar at the rear and sucked vertically up into the other half of the tank. This suction system, it is stated, is so efficient that the clean floor is dry within seconds of the machine passing.

The sole selling agents are Industrial Colloids, Ltd., Altrincham, Cheshire.

Papilloma of the Bladder

Booklet on ABCM Scheme

IN February, 1947, the Dyestuffs Group (Group D) of the Association of British Chemical Manufacturers appointed a small sub-committee to formulate detailed proposals for organising and financing a major research project on industrial papilloma of the bladder, with special reference to the dyestuffs section of the chemical industry. The proposals of this sub-committee were accepted by Group D in September 1947, and steps were taken forthwith to implement them and to provide the necessary finance.

At the outset, the scheme was to be focused on three suspected compounds—namely α-naphthylamine, β-naphthylamine, and benzidine—although it was envisaged that other lines of inquiry might emerge as the research work developed. The duration of the scheme was expected to be five years, and guaranteed finances of the order of £25,000 were deemed necessary. A short booklet describing the findings of the

Industrial Safety . . . . .

scheme, and in language intended for the layman, has just been published.

Dr. R. A. M. Case was appointed ABCM Research Fellow at the Chester Beatty Institute for five years from 1 October, 1948, and Dr. D. B. Clayson, of the Department of Experimental Pathology, Leeds University, was appointed as an additional research worker for the same period.

An industrial field survey covering over 30 years of industrial data led to the conclusion that the potency of α-naphthylamine was very much less than that of β-naphthylamine, and in view of the extreme potency of the latter its manufacture has been discontinued. In the case of manufacture of benzidine or α-naphthylamine, there is good reason to believe that necessary standards of safety can be achieved.

Much work has been carried out on the carcinogenic properties of the three compounds under review, their metabolism, analysis and removal. A limited number of copies of the booklet are available for distribution to those who have a firsthand interest in the problem, and may be obtained from the Intelligence Officer, ABCM, 166 Piccadilly, London, W.1.

Bravery Recognised

British Empire Medal for Three Men

FOR toiling among 150 tons of flood-damaged explosive—regardless of their own safety—so that it could be scuttled at sea, three men have been awarded the British Empire Medal.

They are Ronald Rosslyn Ranson, laboratory steward at the factory of Explosives & Chemical Products, Ltd., at Bramble Island, Great Oakley, Essex; Donald Victor Rumble, senior laboratory assistant; and Gordon Leslie Youngman, of Harwich, a ganger.

According to the citation in the *London Gazette,* when the factory was flooded it became necessary to dispose of some 100 to 150 tons of damaged explosives. Rumble and Ranson were concerned with the scuttling at sea of a concrete barge loaded with about 150 tons of waste explosives in a dangerous condition.

The citation continues:—'The cargo was in very bad shape after lying wet for nearly four months, and during the loading it became apparent that the operation was going to be extremely hazardous. The holds were filled with nauseating fumes and the cargo under its own weight gradually liberated quantities of nitroglycerine. No alternative course was open but to continue the loading, and no alternative method of disposal was possible.

'Without regard for their own safety the two men carried out the operation with courage and determination. Youngman was concerned with clearing the magazines, which were in a dangerous condition. Nitroglycerine was found to be exuding freely on the floors, and the slate roof had collapsed in sections and was supported by some tons of explosive underneath. The explosive was, in part, packed in fibreboard cases which had softened and burst open. Youngman cleared away the broken brickwork mixed up with explosive and dismantled a damaged magazine, in spite of the fact that large sections of wall were liable to fall on to the explosive at any moment.'

MCA Safety Sheet Available

A NEW safety data sheet on *ortho*-dichlorobenzene, a chemical widely used as a solvent and intermediate for other chemical products, has been published by the Manufacturing Chemists' Association of America. Chemical Safety Data Sheet SD-54 gives essential physical properties and information for the safe handling, storage and transportation. *ortho*-Dichlorobenzene is a colourless liquid having an aromatic, distinguishable odour. Its vapour, in high concentration, is irritating to the eyes and upper respiratory system, and thus has good warning properties. It is slightly toxic but in normal use and with application of specific precautions, there is no unusual hazard involved. The generally accepted maximum allowable concentration is 75 ppm. by volume in air for an eight hour day.

ortho-Dichlorobenzene gives off toxic and flammable vapours at elevated temperatures. However, the flash point of the liquid is markedly higher than the temperature at which it is normally handled. Complete recommendations for safety procedures to be followed in loading and unloading, storing, handling and waste disposal are given in the Safety Data Sheet. A section on health hazards and their control outlines proper personal protective equipment.

New Sulphur Mine

Freeport Sulphur Co.'s Latest Project

PRODUCTION has started at Freeport Sulphur Company's new Garden Island Bay mine at the mouth of the Mississippi River, Louisiana. At peak operation, the mine is expected to yield 500,000 long tons of sulphur annually—which makes it the largest single sulphur-mining development anywhere in the world since 1933.

Garden Island Bay, 100 miles south-east of New Orleans in remote and desolate marshland, is one of four new salt dome projects that have resulted from Freeport's long-range exploration and development programme. The undertaking required $14,000,000 to carry out because of costly engineering and construction problems.

Before construction could begin, the marsh site of cane, grass and water hyacinth, from one to two feet above the level of the nearby Gulf of Mexico, had to be filled with hundreds of thousands of cubic yards of mud. Then several thousand pilings, 85 to 90 ft. long, had to be driven into the soft clay subsoil for the power plant foundation. The pilings support a 16-in. concrete mat over which are 16-ft. high concrete cells. The main floor of the plant is at this level, a necessary precaution against high water from storms and hurricanes.

To melt the sulphur, which is embedded in the caprock of a salt dome 1,750 to 1,850 ft. below the surface, the Garden Island Bay plant is designed to pump 3,500,000 gallons of superheated water (160°) into the deposit every 24 hours. For its water supply, Freeport taps the Mississippi but the water must be taken from the river when salt intrusion from the gulf is at its lowest point—usually from February to June—and stored in two earthen reservoirs carved out of the marsh. These reservoirs occupy an area a mile square and are capable of holding nearly 1,000,000,000 gal. of water.

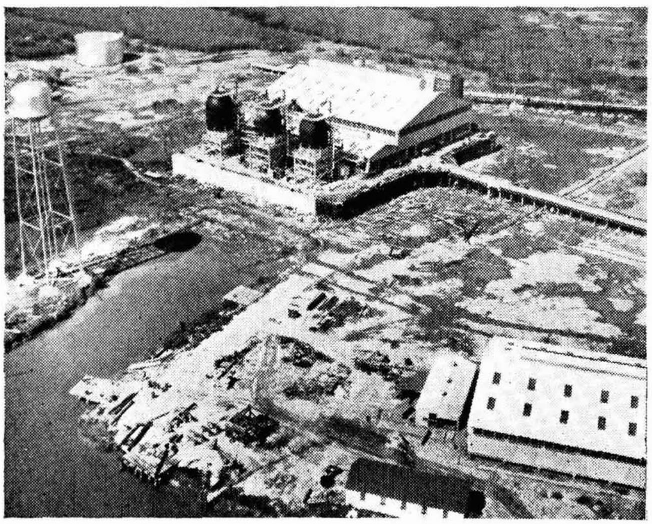
The mining area is more than a mile from the power plant which heats the water, as well as treating it, and supplies service water and compressed air, which lifts the molten sulphur to the surface. The molten sulphur, freed of air and metered at the relay station, is pumped directly into insulated tank barges and transported 50 miles up-river for storage at Port Sulphur.

New Scottish Industry

Successful tests having been made earlier this year with dolomite, quarried from the hillside above the highway in North Argyll, a new industry has been started there. The dolomite can be used in steelmaking and in the manufacture of synthetic materials. A private company is behind the venture.

Two Killed by Fumes

Two men were killed on Saturday, 28 November, when they were overcome by fumes while engaged on maintenance work in a steel rolling mill at Corby, Northants.



The Garden Island Bay plant of Freeport Sulphur Company. The large building, upper centre, is the power plant which treats and heats some 3,000,000 gallons of water per day

Titanium Dioxide

Questions in the House on Exports

IN the House of Commons last week, Mr. Turner asked the President of the Board of Trade if he would furnish particulars of the amount of titanium dioxide sold by the UK to Canada during the past 12 months; if he was aware of the concern felt by British manufacturers about the present shortage of this material; and what action he proposed to take.

In reply, Mr. Heathcoat Amory, Minister of State, said exports of titanium dioxide were not separately recorded in the trade statistics. He added: 'To ensure as far as possible that the valuable market which has been built up in Canada should not be lost, we thought it right not to ask manufacturers to divert supplies to meet the temporary shortage at home, particularly since new plant is in the course of erection. In the meantime, however, it has been decided to allow sufficient dollar imports to meet all reasonable requirements.'

Mr. Turner: 'While I appreciate that my right hon. friend cannot give exact figures, may I ask whether a matter of 7,000 tons would be about the correct figure? Secondly, does he appreciate that the purchase of titanium dioxide from Germany and other Continental sources would be approximately 300 per cent in excess of current home supplies?'

Mr. Amory: 'I am sorry that I cannot confirm whether my hon. friend is right or wrong in the figures which he has just given, because I am unable to separate them from other statistics. But I would emphasise the temporary nature of this difficulty and how highly undesirable it would be to interrupt an increasing export business.'

Mr. Bottomley: 'Would not the right hon. gentleman emphasise the general importance of increased exports to Canada?'

Mr. Amory: 'I could not agree more with the right hon. gentleman.'

Unit Oxidation Processes

A JOINT conference on 'Unit Processes of Oxidation' is to me held in the Netherlands next May between the Institution of Chemical Engineers, the Chemical Engineering Group of the Society of Chemical Industry, the 'Koninklijk Instituut van Ingenieurs' (Royal Institution of Engineers) (Chemical Engineering Group) and the 'Koninklijke Nederlandse Chemische Vereniging' (Royal Netherlands Chemical Society) (Section for Chemical Technology).

British and Netherlands committees have been appointed for the preparatory work of the conference. The British Committee consists of: Professor F. H. Garner (chairman), Mr. E. Le Q. Herbert, Mr. A. M. Clark, Professor M. B. Donald, Dr. F. A. Freeth and Mr. R. C. Odams (secretary), while for the Netherlands, the committee includes: Professor Dr. H. I. Waterman (chairman), Professor Dr. D. W. van Krevelen, Dr. J. C. Vlugter and Mr. H. Verschoor (secretary).

The conference will take place at the Hague on 6-7 May, 1954, a third day being reserved for excursions. In view of the necessity to limit the subject, the unit processes of oxidation have been chosen, particular stress being laid on the chemical engineering aspects of these processes.

The organising committees have invited a number of universities and industrial concerns in England, Germany and the Netherlands to contribute papers. The conference language will be English. A detailed programme will be published in January, 1954.

Requests for further information should be addressed to the secretary of the British Organising Committee, The Institution of Chemical Engineers, 56 Victoria Street, London, S.W.1.

I.C.I. & Profit-sharing Plan

AFTER examining the possibility of introducing a profit-sharing scheme, Imperial Chemical Industries, Ltd., have informed their employees—numbering about 140,000—that so far they have been unable to find a scheme which could be operated fairly in an organisation so large and complex. The matter had been discussed by a special committee of the company's main board of directors on numerous occasions.

At a recent meeting of I.C.I.'s main joint consultative body, Sir Ewart Smith, technical director, stated: 'The problem is still being considered, but it would be wrong to start a weak scheme which eventually might cause difficulties and discontent.' He was more hopeful about arrangements for enabling employees to buy shares in the company.

The Chemist's Bookshelf

GREAT DISCOVERIES BY YOUNG CHEMISTS. By J. Kendall. Thomas Nelson & sons, Ltd., London. 1953. Pp. 231. 12s. 6d.

This book carries to its logical conclusion the thesis suggested by the title, that most great discoveries were made by chemists in their twenties. This contention is well supported in the descriptions of the lives of the dozen or so chemical personalities. It is perhaps unfortunate that since the book is intended to be read by boys and girls so much attention is paid to biographical detail. This bias is due to the manner in which the material has been assembled. The origin was a series of lectures delivered by the author in 1938 at the Royal Institution. They constituted one of the now famous 'Christmas Courses of Lectures Adapted to a Juvenile Auditory' first introduced by Michael Faraday to whom is devoted the second chapter of the book. A popular feature of these lecture courses has been the number of elaborate demonstration experiments carried out. Little of the impact of these demonstrations can be conveyed in print, and so with one or two exceptions reference to them has been omitted. Where a description has been attempted such as in the boiling lead experiment devised by Lyon Playfair, then it is vivid and exciting.

The most complete account of a young chemist is that of Humphry Davy in the first chapter. In addition to the descriptions of his background and benefactors there are illuminating extracts from his diary and notebooks, and specimens of his poetry. The author has some witty and amusing observations to make on the chemist's literary friends, and on the relationship between their output of lyric verse and the inhalation of nitrous oxide. Against this spectacular career, matched only by that of Count Rumford, the founder of the Royal Institution, who is mentioned later in the book, that of Michael Faraday appears rather colourless, although in the laboratory he undertook experimental hazards as great as those undertaken by his master.

As more of the lives are described, Perkin, Kekulé, the Curies, etc., an impression of the intellectual climate of the age is built up and the interrelationship of the great names is revealed. But the author is not content to tell only the stories of successful chemists, he has also devoted a section to one of the great failures, Archibald Scott Couper. The tragic story of this young man, cheated during his lifetime of the honour of enunciating one of the most fundamental principles of organic chemistry, driven by ill health to sacrifice his chemical career, and finally succumbing to an attack of sunstroke, is told in a series of snippets of information recounted as they were discovered by the men who, at the beginning of the 20th century, were trying to reconstruct it. This section has the excitement of a detective story, and something of the same appeal can be found in the later chapter dealing with the first chemical society and the first chemical journal. Starting with the only clue, a single sheet of paper bearing the names of the members of a society, the historical detectives finally prove the Chemical Society of Edinburgh University to be the first on record, clear the name of Joseph Black from the charge of being a supporter of the doctrine of phlogiston after the announcement of the discoveries of Lavoisier, and uncover a copy of the first chemical journal. The name of a contributor to this issue was Mr. Beddoes, later an employer of Humphry Davy at the 'Pneumatic Institution.' It is these connecting links which make the book so fascinating to the adult reader.

The book must be most heartily recommended to all youngsters with scientific interests, and to their parents. It is well illustrated with portraits of the heroes, cartoons and photographs, and is conveniently priced for the Christmas stocking.—J.R.M.

Engineers & Food

SCI Groups' Conference Programme

A CONFERENCE on 'Chemical Engineering in the Food Industry' is to be held by the Chemical Engineering Group and the Food Group of the Society of Chemical Industry at the Wellcome Research Institution, London, on 18-19 March, 1954.

Sir Ben Lockspeiser, secretary of the Department of Scientific & Industrial Research, will deliver the opening address at 10 a.m. on the first day when the chairman will be Dr. J. H. Bushill. The following papers will be read:—'Recent Trends in the Technology of Food Processing,' by W. Price-Davies; and 'Recent Developments in the Technology of Food Packaging,' by Dr. G. L. Riddell and J. G. H. Huntley.

Storage & Handling

Professor A. W. Scott will be in the chair at the afternoon session when the following papers will be read and discussed:—'The Storage and Bulk Transport of Liquids,' by J. D. Usher; 'The Handling of Liquids within the Factory,' by Dr. R. Falconer; 'The Handling of Powders and Liquids within the Factory,' by J. Lockwood and C. H. Wooll; and 'The Bulk Storage and Transport of Sugar,' by J. Hobbs and C. E. G. Simmons.

On the morning of the second day, Professor F. H. Garner will be in the chair. The papers will include:—'Mixing, Grinding and Sifting,' by P. M. C. Lacey and 'Heating: Evaporation and Dehydration,' by J. W. Grose and G. H. Duffield.

Dr. Franklin Kidd will be chairman of the afternoon session. The papers will be: 'Research Problems in the Cooling and Freezing of Foodstuffs,' by Dr. R. Gane; 'Sterilisation and Pasteurisation,' by E. Capstick; and 'Instrumentation,' by Dr. J. B. M. Coppock.

Arrangements are being made for an informal dinner on 19 March. It is hoped to circulate preprints of the papers to those who register. Details of registration, together with full details of the programme, will be sent to all members of the two groups in the New Year. Other members of the society, and those who are not members, should inform the Assistant Secretary, Society of Chemical Industry, 56 Victoria Street, London, S.W.1, if they wish to receive further details.

Tubular Heat Exchangers

THE British Standards Institution has just issued a further standard in the series which is being prepared for equipment used in the petroleum industry—BS. 2041, 'Tubular Heat Exchangers for Use in the Petroleum Industry.' In view of the international character of the petroleum industry, careful consideration was given to the Standards of the Tubular Exchanger Manufacturers' Association of the USA for R class heat exchangers because of their use in the petroleum and chemical industries and the advantage of ensuring interchangeability in practice between equipment produced by American and British manufacturers. The British Standard applies to shell and tube heat exchangers for use in the petroleum industry and covers dimensions and manufacturing requirements peculiar to the tubular heat exchangers. It should also be read in conjunction with BS. 1500 (Provisional) 'Fusion-welded Pressure Vessels for Use in the Chemical and Allied Industries' or any other suitable code which may be specified. Copies of the new standard may be obtained from the British Standards Institution, Sales Branch, 2 Park Street, London, W.1 (12s. 6d. net).

Inventor Now Penniless

WHEN Edward H. Strange, of The Grange, Leominster, an 80-years'-old retired experimental chemist, appeared at Leominster Bankruptcy Court this week, he claimed that he 'contributed to the invention of synthetic rubber as now used in America' and said he was now penniless.

Replying to the Official Receiver (Mr. R. Kynoch Clark), Strange said: 'Every person making rubber in America today is using one or more of the patents taken out in my name, but which have now run out, so that there are now no royalties.'

The Registrar, Mr. P. Gwynne James, said it seemed unfortunate that a man of such scientific ability should have finished in this position. Strange's gross liabilities of £3,838 included unsecured liabilities of £2,357. There was a deficiency of £3,022.

Strange attributed his position to the failure of companies with which he was associated.

The examination was adjourned to a date to be fixed for signing of the notes.

HOME

Increased Fee

The Pharmaceutical Society proposes increasing its membership fee to £3 13s. 6d. The fee has been £2 for the last eight years.

Change of Address

The London plant branch office of Crompton Parkinson Ltd. will be moved from Crompton House, Aldwych, W.C.2, to 1-3 Brixton Road, London, S.W.9, as from 7 December. The telephone number will be Reliance 7676 (15 lines). Other departments of the company located at Crompton House will remain there.

Change of Venue

Meetings of the Food Group (Nutrition Panel) of the Society of Chemical Industry are usually held at Burlington House, Piccadilly, but the meeting on 9 December is being held in the rooms of the Medical Society of London, 11 Chandos Street, Cavendish Square, London, W.1. Dr. R. Passmore will present a paper entitled 'Some Recent Investigations of Human Calorie Requirements.'

Plastics Exhibition

The British Plastics Exhibition, now established as a biennial exhibition, is to be held at Olympia, London, from 1-11 June, 1955. As in former years, a convention will be held concurrently with the exhibition.

Chemicals *versus* Organics

Research to determine the relative merits of organic and chemical fertilisers is to be undertaken by the Horticultural Department of the Edinburgh and East of Scotland College of Agriculture. Mr. R. L. Scarlett, convener of the horticultural committee, informed the committee that the experiments might take many years.

Sodium Fluoride in Dentistry

Questioned in the House of Commons last week regarding efforts to reduce dental decay by applying solutions of sodium fluoride the Secretary of State for Scotland, Mr. J. Stuart, said such work had been carried out among certain Scottish schoolchildren and while it promised a measure of protection against dental decay it would be some years before final conclusions could be drawn as to its place in preventive dentistry.

Paper Read on Vinyl Emulsions

At the meeting of the London section of the Oil & Colour Chemists' Association on Wednesday, 25 November, a paper on 'Vinyl Emulsion Polymers and their Use in Coatings' was presented by C. E. Hollis (Distillers Co., Ltd.) and J. H. W. Turner (British Resin Products, Ltd.).

Colour Makers' Dinner

Professor H. V. A. Briscoe, director of the laboratories of inorganic and physical chemistry at the Imperial College of Science & Technology, was principal guest at the recent annual dinner of the British Colour Makers' Association in London. The retiring chairman, Mr. C. M. Beavis, presided.

Drugs for China

The Government has decided not to continue after this year the ban on the export of antibiotic, anti-malarial and sulphonamide drugs to China. Mr. Heathcoat Amory, Minister of State, Board of Trade, announced this in the House of Commons this week. He added that the Government believed and hoped there would be an increase in our trade in non-strategic goods, both with China and the Soviet bloc.

Fundamentals for Technologists

Speaking at Manchester on 28 November, Sir Ben Lockspeiser said that the neglect of fundamental science in the teaching of technology would lead not to the beginning of a new technological era, but to the beginning of its end. If the education of the technologist was not rooted in fundamentals it would have no roots at all. Sir Ben was speaking after honorary associateship of the Manchester College of Technology had been conferred upon him.

More Money for Research

The full-scale development of post-war expansion plans by the Department of Scientific & Industrial Research, curtailed for financial reasons two years ago, is to be resumed, according to Sir Ian Heilbron, chairman of the Advisory Council for Scientific & Industrial Research, when speaking at a dinner in London this week. He said the Government had taken the 'absolutely revolutionary' step of allowing the DSIR to plan research broadly on a five-year budget.

OVERSEAS

Copper & Zinc in Sweden

What are considered 'remarkable' finds of copper and zinc have been made by Swedish geologists in the provinces of Norrbotten and Västerbotten, and in the Jämtland mountains of North Sweden. Ore containing more than 7.5 per cent of copper has been found in the State mining area of Stekenjokk near Vilhelmina.

Australian Uranium

Mr. Howard Beale, Federal Supply Minister, stated last week that the Australian Government hopes that the treating of uranium at the Rum Jungle field in the Northern Territory will begin by 1 July.

Fewer Chemicals Imported

Although during the first half of this year the total value of commodity imports into Norway was higher than during the same period last year, certain groups including chemicals, ores and metals, and oils and fats, showed a marked decrease in import values.

USA Tin Stockpile

The USA delegation to the United Nations International Tin Conference stated this week that by next March the US Government would have 38,000-40,000 long tons of tin in excess of present requirements for its strategic stockpile. The delegation added that no decision had been reached regarding disposing of surplus tin held by the Reconstruction Finance Corporation.

Malayan Tin Exports

Tin exports from Malaya next year will be 20 per cent less than this year, according to a Federation Government estimate. It is stated that taking the metal content at 75 per cent, the tin exported would be around 46,000 tons, compared with the 56,000 tons expected for this year.

Canadian Plastics Development

According to a recent issue of *Foreign Trade* (an official Canadian publication), the manufacture of plastics in Canada is developing so rapidly that it will probably become one of the most important segments of that country's chemical industry. Some 17 factories, employing about 2,000 people, are producing about $25,000,000 worth of resins and other plastic materials a year.

Chilean Copper Output

Output of copper by producers in Chile in the first eleven months of this year totalled 291,810 metric tons, as against 342,847 tons for the comparable period last year.

More Fertilisers in the Philippines

As a result of intensive efforts to stimulate food production in the Philippines, 72 per cent more fertilisers were distributed to farmers during the first quarter of this year than during the same quarter last year.

USA Synthetic Rubber

The USA Office of Defence Mobilisation has revoked a Government order issued in April, 1952, requiring that, if US consumption of GR-S synthetic rubber fell below 450,000 long tons a year and butyl synthetic fell below 60,000 tons a year, domestic rubber consumption controls would be imposed.

New Zealand Sulphate Pulp

New Zealand Forest Products, Ltd., of Kinleith, has shipped its first consignment of 500 tons of unbleached sulphate pulp to Tasmania. The pulp is to be blended with eucalypt groundwood pulp to make newsprint. More than 1,000 tons are to be shipped each month.

New Plants Proposed for Brisbane

A new plant for the production of aromatic spirits, and the establishment of a refinery, both in Brisbane, are planned by Bitumen and Oil Refineries Ltd., of Sydney.

Israel Imports of Fertilisers

Israel has imported 2,000 tons of superphosphate from France. This brings total imports of phosphate fertilisers for the next agricultural season to 5,000 tons. Hopes that Israel would be able to manage without imported phosphate this winter did not materialise, because of lagging home production.

Copper in Northern Rhodesia

Proven reserves of the new copper field on the Northern Rhodesia-Belgian Congo border exceed 80,000,000 short tons, with a 3.6 per cent copper content. When production begins in 1958, it is anticipated that 150,000 tons of ore will be handled a month and copper production will reach 1,000 tons a week.

PERSONAL

It has been announced that DR. H. G. HEAL has been appointed to a lectureship in chemistry in the University of Belfast.

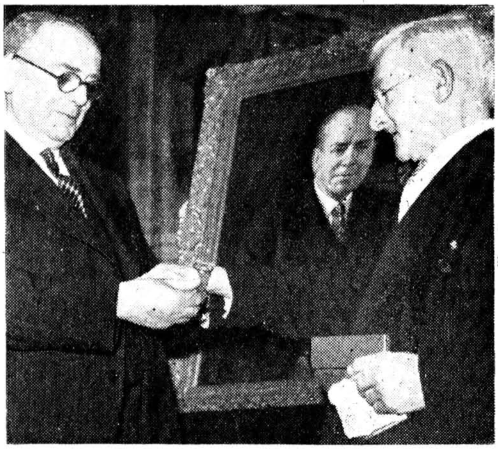
MR. P. P. MACDIARMID has been appointed a director of United Gas Industries, Ltd. He became a director of subsidiary companies in the group last July.

MR. EDWARD A. O'NEAL, Jr., chairman of Monsanto Chemicals, Ltd. has in addition been elected a vice-president of Monsanto Chemical Co., St. Louis, Missouri, USA.

MR. J. H. IMMELMAN and DR. E. C. REES are retiring from the board of directors of African Explosives & Chemicals, Ltd., on 31 December, and the vacancies will be filled by MR. S. LEITH and DR. E. TABERNER.

The first woman to be elected a fellow of the Textile Institute is MISS GLADYS G. CLEGG, M.Sc., senior research officer, British Cotton Industry Research Association, who is an authority in regard to microscopic studies of textile fibres. Other newly-elected fellows are MR. J. W. REIDY, M.A.Com., who has been connected with the development and application of new dyestuffs, and MR. A. SCHOLES, A.M.C.T., who has been responsible for the development of high tenacity rayon yarns for industrial purposes.

The officers and council of the British Colour Makers' Association for the ensuing year are:—*Chairman*, MR. A. S. CALLAGHAN (Imperial Chemical Industries, Ltd.); *vice-chairman*, MR. J. H. GRIMSHAW (Horace Cory & Co., Ltd.); *hon. treasurer*, MR. C. G. A. COWAN (Cowan Bros. [Stratford], Ltd.); *council*: MR. C. M. BEAVIS (Golden Valley Colours, Ltd.), MR. F. BURRELL (J. W. & T. A. Smith, Ltd.), MR. A. S. CALLAGHAN (Imperial Chemical Industries, Ltd., Dyestuffs Division), MR. C. G. A. COWAN (Cowan Bros. [Stratford], Ltd.), MR. H. GOSLING (Cornbrook Chemical Co., Ltd.), MR. V. WATSON (Cromford Colour Co., Ltd), MR. H. A. WILSON (The Derby-Oxide & Colour Co., Ltd.), MR. C. E. YOUNG (Hardman & Holden, Ltd.); *secretary*, MR. ALLAN J. HOLDEN.



Every year the Clayton Aniline Co. Ltd. present gold watches to those employees who have completed 25 years' service, and at the presentation on 19 November no less than 93 received watches. At the same time the chairman of the company, MR. A. E. PEAK, was presented with a portrait to mark his 40 years with the firm, which he joined in 1913 as commercial sub-manager. Mr. Peak said: 'We have 256 employees working for the company with over 25 years' service. Next year at the same time we have a further 48 qualifying for gold watches.' The picture shows Mr. Peak congratulating the oldest recipient, MR. A. HEATON (70), who is now retired. The painting of Mr. Peak is in the centre of the picture.

Obituary

MR. W. J. TEMPLE, who died suddenly on 29 November, was chairman of Chemical & Insulating Company, Ltd., as well as a director of other companies.

The body of DR. A. L. BETTISON, vice-principal of Grimsby College of Further Education, was found last Sunday, 29 November, on the foreshore near Grimsby. Dr. Bettison disappeared a month ago, soon after his appointment to the college. He was a former student of Leeds University and held a degree in chemistry.

Publications & Announcements

A COMPREHENSIVE publication on the engineering properties of spheroidal graphite cast iron, issued by The Mond Nickel Company, Ltd., helps to establish the position of this material relative to other cast ferrous materials. In every field of engineering practice, examples occur where steel has replaced cast iron to meet conditions of stress and shock. The development of SG iron enables cast iron to come back into its own for many such purposes. SG iron can also provide a solution to the problem of the casting which is too heavy for production in malleable cast iron. The publication includes a list of typical applications and a bibliography. Copies can be obtained free of charge from The Mond Nickel Company, Ltd., Sunderland House, Curzon Street, London, W.1.

* * *

VOLUME 28 of the *Journal of the Electrodepositors' Technical Society* (now the Institute of Metal Finishing) has recently been published, and contains papers presented at meetings of the Institute from September, 1951, to the Spring conference at Eastbourne in April, 1952. Copies may be obtained from the Institute, 32 Great Ormond Street, W.C.1, price £2 2s.

* * *

A SERIES of brochures are being issued by the British Rubber Development Board, Market Buildings, Mark Lane, London, E.C.3, to publicise the uses of rubber in building. Two which are of particular interest to chemical engineers or those responsible for the maintenance of chemical installations deal respectively with latex-cement compositions and with paints incorporating natural rubber.

* * *

A LICENCE to design and supply the Shell Petroleum Company's patent 'Turbogrid' distillation trays has been granted to Metal Propellers Ltd. 74 Purley Way, Croydon, and the manufacture of a number of these trays in 'Monel' is already in hand. This company has many years' experience in the design and manufacture of a wide range of distillation equipment for the petro-chemical, and allied industries. 'Turbogrid' trays are claimed to offer important advantages to the chemical industry. The tray spacing can be close, the simple construction reduces the cost when expensive corrosion-resisting metals are required and the pressure drop is lower, per tray, than for bubble cap trays. The well-known Glitsch 'Truss-type' bubble cap trays will continue to be manufactured by Metal Propellers Ltd. The company's chemical engineering staff are available and ready to discuss the advantages of both designs for the individual process under consideration.

* * *

THE versatility of glycerine as an ingredient in commercial formulations is the subject of a new bulletin published by the Glycerine Producers' Association, 295 Madison Avenue, New York 17, NY. The booklet discusses six properties of glycerine and shows how manufacturers have put these properties to work in new products. The functions of glycerine as an emollient in a new calamine lotion, as the humectant in a new lotion base, as a vehicle for a new tonic for anaemia, as a demulcent in a new detergent aerosol used to lessen respiratory difficulties of infants, as a solvent for a new digitalis injection, and as a plasticiser in a new sausage casing are all detailed. The booklet explains the formulator's problem in each case, and describes how glycerine enabled him to solve it. Copies of the booklet are obtainable on application to the association.

* * *

LEAFLET No. 314 from the Cambridge Instrument Co., Ltd., 13 Grosvenor Place, S.W.1, describes a new Cambridge instrument which it is believed will prove valuable to all concerned with the prevention of electrolytic corrosion of buried ferrous structures. Operating on the potentiometer principle, it takes no current from the circuit under test and thus enables absolute values to be obtained of the electrical potential between the structure and its environment, providing data from which it is possible to obtain an accurate estimate of the location and extent of corrosive action, and to facilitate steps to neutralise the effect. This instrument, termed the Cambridge Corrosion Voltmeter, is simply constructed and conveniently arranged for use in the field. Copies of the descriptive leaflet will be gladly sent by the company to any interested inquirer.

Law & Company News

Commercial Intelligence

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

Mortgages & Charges

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

CAVENDISH LABORATORIES, LTD., London, W. 31 October, £800 second charge, to Mrs. L. M. Stonham, New Eltham, and £400 third charge, to Miss E. E. Wakefield, Putney; both charged on 30, 32, 34 and 36 Eastcheap, E.C. *—. 14 July, 1953.

CROWN CHEMICAL CO., LTD., Lamberhurst. 30 October, £2,300 second charge, to Miss E. O'Sullivan, Penshurst; charged on Stair House, High Street, Lamberhurst, and land and buildings adjoining. *£6,000. 22 July, 1952.

STOWE GYPSUM PRODUCTS, LTD., Nottingham. 2 November, series of £10,000 debentures, present issue £2,800; general charge (ranking next after a charge dated 14 January, 1952). *£8,000. 29 May, 1953.

Increases of Capital

The following increases of capital have been announced:—SHIRLEY ALDRED & CO., LTD., from £50,000 to £75,000; CARNEGIES OF WELWYN, LTD., from £100 to £399,900.

New Registrations

Overseas Medicinal Products Ltd.

Private company. (525,547.) Capital £100. Objects: To enter into an agreement with Medicinal Chemicals, Ltd., and to carry on the business of research and manufacturing chemists, etc. Directors: Jas. H. Dennis, and Peter E. De Rees, directors of Medicinal Chemicals, Ltd. Reg. office: 36 Victoria Street, London. S.W.1.

Saltney Chemicals Ltd.

Private company. (525,717). Capital £5,000. Objects: To acquire the business of a chemical manufacturer carried on by Valeria A. C. Pitts at St. Marks Lane, Saltney, Ches. as V. A. C. Pitts and Co. Directors: Valeria A. C. Pitts and Mrs. Freda L. Stott. Reg. office: 24 Mosley Street, Manchester.

A. L. Lloyd & Co. Ltd.

Private company. (525,830.) Capital £250. Manufacturers of and wholesale and retail dealers in insecticides, rodenticides and other fumigants, chemicals, gases and disinfectants, etc. Directors: Alice L. Lloyd and Gwyneth M. Lloyd. Reg. office: Glenwood, Prince Avenue, Southend on Sea.

Company News

Benzol & By-products Ltd.

For the year ended 30 June last, net profit of £3,496 (before tax of £6,084) is reported by Benzol & By-products Ltd. This compares with £12,758 (before tax of £6,261) for the previous year. A sum of £8,316 has been allocated to preference dividends on account of arrears, leaving £10,333 to carry forward.

Calor Gas Holding Co. Ltd.

A consolidated trading balance of £762,143 is shown by Calor Gas Holding Co., Ltd., for the year ended 31 July last. This compares with £626,115 for the previous year. After allowing for depreciation and fees, the profit, before tax, was £441,312, as against £368,142 for the previous year. The dividend of 32½ per cent is the same as before.

Powell Duffryn Ltd.

A dividend of 2⅜ per cent actual, less tax, is to be paid by Powell Duffryn Ltd., on the 4¾ per cent cumulative preference stock for the six months ending 31 December next.

Wade Potteries Ltd.

According to the directors' report, Wade Potteries, Ltd., showed a profit of £39,472 for the year ended 31 July last. This was earned solely by the subsidiary companies and was before taxation, which amounted to £22,846, leaving a net profit of £16,626. The report of the chairman, Mr. G. A. Wade, stated that the year had seen a great change in market conditions, which, coupled with increased costs of fuel and labour, resulted in a reduction of profits. The directors recommend a dividend of 27½ per cent on ordinary shares.

Next Week's Events

MONDAY 7 DECEMBER

Royal Institute of Chemistry

London: Chemical Society, Burlington House, Piccadilly, 6.30 p.m. Joint meeting with SCI. Dr. R. F. Goldstein: 'Ten Years Hence: The Promise of Chemical Technology in Great Britain.'

TUESDAY 8 DECEMBER

Royal Institute of Chemistry

London: Sir John Cass Institute, Jewry Street, E.C.3, 6.30 p.m. E. Lester Smith: 'The Manufacture of Antibiotics.'

Society of Chemical Industry

Belfast: Agricultural Lecture Theatre, Elmwood Avenue, 7.15 p.m. C. Damoglou: 'Some Problems in the Production & Handling of Milk.'

Birmingham: Birmingham & Midland Institute, Paradise Street, 6 p.m. H. J. Seavell and J. J. Sleightholme: 'Some Products of Heat-thickening of Linseed Oil.'

Institution of Chemical Engineers

London: Geological Society, Burlington House, Piccadilly, 5.30 p.m. J. J. H. Hastings: 'Problems of Biochemical Engineering.'

Hull Chemical & Engineering Society

Hull: New York Hotel. Annual dinner.

WEDNESDAY 9 DECEMBER

Society of Chemical Industry

London: Medical Society of London, 11 Chandos Street, Cavendish Square, W.1, 6.30 p.m. Food Group, Nutrition Panel. Dr. R. Passmore: 'Some Recent Investigations of Human Calorie Requirements.'

London: Chemical Society, Burlington House, Piccadilly, 6.30 p.m. Joint meeting of Corrosion Group with London Section of Oil & Colour Chemists' Association. Two papers on aspects of protection of metal by paint, by J. E. O. Mayne and D. V. Rooyen; and D. M. Brasher, H. H. Kingsbury and F. Wormwell.

Royal Society of Arts

London: John Adam Street, Adelphi, W.C.2, 2.30 p.m. Dr. E. G. Woodroffe: 'The Seed Crushing Industry.'

Institute of Fuel

Birmingham: Imperial Hotel, Temple Street, 6.30 p.m. G. W. Farquharson: 'Smoke Abatement.'

Manchester: Engineers' Club, Albert Square, 2 p.m. G. Nonhebel: 'The Work of a Central Fuel Technology Department.

Sheffield: The University, 6.30 p.m. D. S. Macfarlane: 'Fans: Design & Application.'

THURSDAY 10 DECEMBER

Royal Institute of Chemistry

Acton: Technical College, High Street, W.3, 7 p.m. Films.

Pharmaceutical Society of Great Britain

London: 17 Bloomsbury Square, W.C.1, 7.30 p.m. A. A. Miles: 'Biological Standards.'

Society of Public Analysts & Other Analytical Chemists

London: Sir John Cass Institute, Jewry Street, E.C.3, 6.45 p.m. Polarographic Discussion Panel annual general meeting and general meeting. D. J. Ferrett: 'Studies with the Rotating Platinum Cathode'; G. F. Reynolds: 'The Polarographic Determination of Indium in Zinc & Zinc-base Alloys.'

Institute of Metal Finishing

Manchester: Engineers' Club, Albert Square, 7.30 p.m. R. A. W. Ottley: 'Organic Finishes.'

Institute of Welding

Slough: Community Centre, Farnham Road, 7.30 p.m. F. Clark: 'Gas Welding.'

FRIDAY 11 DECEMBER

Institution of Chemical Engineers

London: Caxton Hall, S.W.1, 6.30 p.m. Graduates' & Students' Section. D. C. Freshwater: 'The Influence of Alcohol on Chemical Engineering.'

Oil & Colour Chemists' Association

Manchester: Engineers' Club, Albert Square, 6.30 p.m. Dr. J. A. Kitchener: 'Some Current Problems in Colloid Chemistry.'

British Society of Rheology

London: Institute of Physics, 47 Belgrave Square, 2 p.m. Symposium on 'Methods of Presenting Rheological Results & Their Relations.'

Institute of Metal Finishing

London: Rembrandt Hotel, Thurloe Place, Kensington, S.W.7, 7 p.m. Annual dinner and dance.

[continued on p. 1196

SATURDAY 12 DECEMBER

Institution of Chemical Engineers

Birmingham: The University, Edmund Street. T. H. Wood: 'Mechanical Shaft Seals for the Chemical Industry.'

Leeds: North-West branch. G. Burrows: 'Some Aspects of Molecular Distillation.'

Market Reports

LONDON.—A steady movement to the home consuming industries has been reported from most sections of the industrial chemicals market, and inquiries for new business on home account have been extremely good. Although the aggregate volume of export trade is fully maintained competition from Continental suppliers is very keen. Price adjustments have been comparatively few and unimportant, and for the most part quotations display a firm undertone. Business in the coal tar products market continues to be brisk with a fair export trade to the Continent for pitch and creosote oil. The position of the light distillates is unchanged, with supplies none too plentiful.

MANCHESTER.—Traders on the Manchester chemical market during the past week report that contract deliveries of most of the heavy products are being called for steadily by the textile and allied industries and other leading outlets, but in the case of new bookings the bulk of the transactions as is usual at about this time of the year, are confined to near delivery positions. The alkalis are going steadily into consumption, as are also borax and boracic acid (reduced prices for which came into force this week), most of the barium compounds, and the potash and ammonia products. Generally firm price conditions in the tar products section have been maintained and most lines are finding a ready outlet.

GLASGOW.—Contrary to the expectation of a slight falling off in demand encountered at this time of the year, the momentum has been maintained and an extremely busy week in all branches of the chemical trade is reported.

A change in the valuation basis for certain copper goods which may be exported without licence became effective on 30 November.

Chemical Dispersal of Fog

Cheap Scheme Proposed

A SCHEME whereby, it is claimed, fog could be destroyed by chemical means at low cost has been submitted to the Ministry of Fuel and Power, and is to be put before the Beaver Committee. Its purpose would be to break down polluted fogs similar to the one which affected London last winter, and to disperse the ordinary fogs which frequently disrupt traffic and cause great monetary loss.

The proposal, which is based upon the principle of rain-making, has been made by Mr. N. Pilpel, a research scientist at King's College, London, and submitted on his behalf by Professor Sir Eric Rideal, F.R.S., chairman of the Scientific Advisory Council, to the Ministry of Supply.

Surface Active Agents

He suggests that very weak solutions of surface-active materials made up with traces of seeding agents and finely sprayed into fogs from aircraft could cause the tiny water droplets of which fogs are composed to flow together until their size and weight made them fall as rain. Soot, tar, and sulphur dioxide, which pollute fogs, would be dispersed as well.

Seeding agents—silver iodide, dry ice, or salt—spread into cold clouds, drive the super-cooled water droplets together as snow, and the clouds then snow or rain themselves away. This happens efficiently only if the temperature is 10° or more below zero. Fog clouds are not cold enough to be cleared in this manner, and therefore the seeding agent must be reinforced.

It is suggested that surface-active agents, such as any common soapless detergent, could work either with or independently of seeding agents. These materials are already widely used in industry to overcome similar temperature difficulties, and as little as 0.0001 per cent, for example, can initiate the deposition of crystals from otherwise static solutions. They would make it easier for water particles to flow together and for snow to clump together. The quantities needed for fog clearance would be small—a few pounds compared with the millions of tons of smoke and fumes which are liberated each year into the air throughout the country.

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.

AMENDED

SENIOR SCIENTIFIC OFFICERS: SCIENTIFIC OFFICERS: PATENT EXAMINER AND PATENT OFFICER CLASSES. The Civil Service Commissioners invite applications for permanent and pensionable appointments to be filled by frequent competitive interviews. The Scientific posts are in various Government Departments and cover a wide range of Scientific research and development in most of the major fields of Fundamental and Applied Science. In Biological subjects the number of vacancies is small; individual vacancies exist at present for candidates who have specialised in palaeobotany, invertebrate fossils and foraminifera. The Patent posts are in the Patent Office (Board of Trade), Admiralty and Ministry of Supply.

Candidates must have obtained a University Degree with first or second-class honours in an appropriate scientific subject (including Engineering) or in Mathematics, or an equivalent qualification: or for Scientific posts, possess high professional attainments. Candidates for Senior Scientific Officer posts must in addition have had at least three years' post-graduate or other approved experience.

AGE LIMITS: Senior Scientific Officers, between 26 and 31, but specially suitable candidates under 26 may be admitted. For Scientific Officers and Patent Classes, between 21 and 28 during 1953 (up to 31 for permanent members of the Experimental Officer Class competing as Scientific Officers). Inclusive London Salary Scales: Senior Scientific Officers (men), £917-£1,075, (women), £786-£949; Scientific Officers (men), £440-£812, (women), £440-£707; Patent Examiner and Patent Officer Classes (men), £440-£760, (women), £440-£576. Women's rates for Patent Classes under review. Somewhat lower rates in the provinces.

Further particulars from the **CIVIL SERVICE COMMISSION, SCIENTIFIC BRANCH, TRINIDAD HOUSE, OLD BURLINGTON STREET, LONDON, W.1,** quoting No. S.53/53 for Senior Scientific Officers and S.52/53-S/128/53 for the other posts. Completed application forms to be returned on or before 31st December, 1953. **24054/100/JP.**

CHEMICAL ENGINEER required by Prominent Company in Westminster district. Qualifications required are: Age about 30; B.Sc., or equivalent; good knowledge of Physics, Mathematics and Chemistry desirable; practical works experience of assistance; understanding of general office procedure and technical sales an advantage. The position offers excellent opportunities to a man having these qualifications coupled with a keen business outlook. Write, stating fullest possible particulars, including age, qualifications and salary required, to **BOX No. C.A. 3281, THE CHEMICAL AGE, 154, FLEET STREET, LONDON, E.C.4.**

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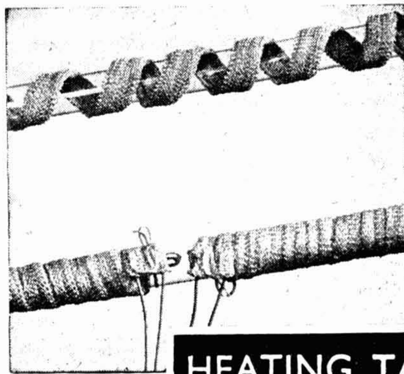

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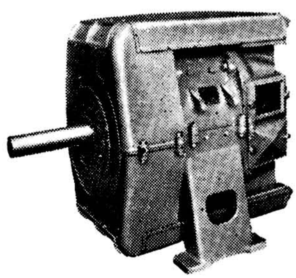
No admittance...



...to dirt and dust,
acid splashes,
corrosive fumes in
gas works, boiler houses
and coke oven plants

...When you employ
Metrovick TECAC Motors

The illustration shows a Metrovick TECAC direct-current motor with integral fan-operated air cooling circuits

METROPOLITAN-VICKERS ELECTRICAL COMPANY LIMITED TRAFFORD PARK MANCHESTER 17

Member of the A.E.I. group of companies

METROVICK *Motors for all industrial drives*

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