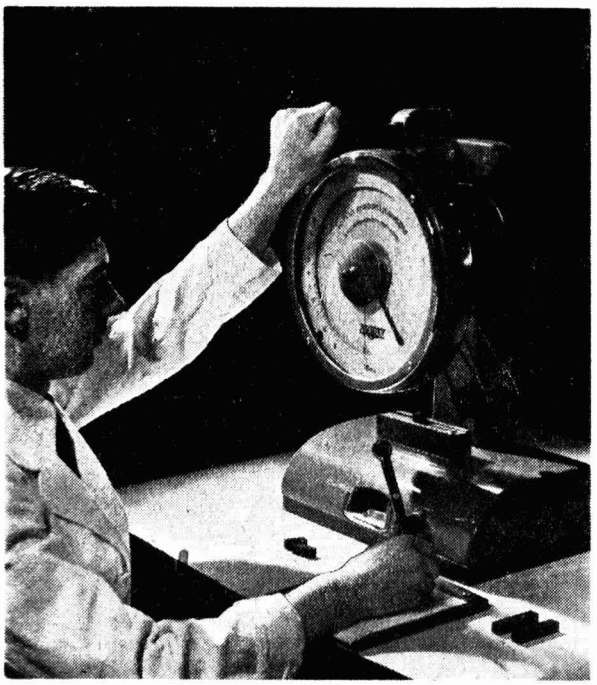
THE Chemical Age

VOL LXX 6 FEBRUARY 1954 No. 1804

COMBATING CORROSION



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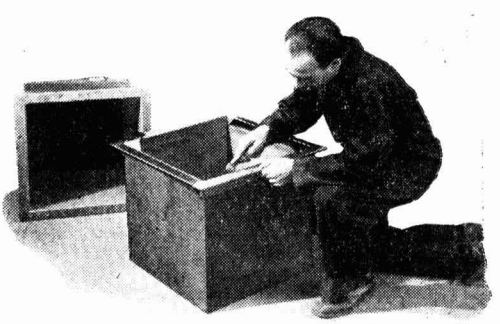

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Fuel & Utilisation

A LITTLE over a year ago when commenting upon indications that productivity in the coal industry was then dropping (THE CHEMICAL AGE, 1953, **68**, 197), we said, 'Nevertheless, the problem of our fuel supplies is not wholly a problem of production. We are not making nearly enough national progress towards better utilisation. The pace at which technical methods for economy are introduced is still too sluggish.' Recent releases of information about British progress in atomic energy development have not discouraged the view that in 20 years' time the energy from atomic piles will save up to 20,000,000 tons of coal a year. Even if this fact of speculation is accepted, it has but a small bearing upon our total coal problem. A saving of 20,000,000 tons by the 1970's must be placed against its background in terms of the ancient provider of energy. Two more decades of good progress in atomic energy development will not affect coal utilisation by more than twice the effect that would be caused by a rigid five-day week in the mines. The position further ahead might well be different, but no accountant can sanction improvident budgets today because windfalls may square the books on some distant morrow. We are still, and must remain for some tens of years, in and right in the coal age; if there is to be an atomic energy age it will come not abruptly.

No industrial country has achieved so much with so slender a range of basic raw materials, and in that range Britain's principal asset has always been coal. It is the very bedrock of our manufacturing industries and therefore of our economic survival. The point of view that measures our prospects in world trade by the price of coal per ton is only partially sound. If price is one factor, what the user of coal derives from the ton is another and no less important factor. A factory that learns how to get 50 per cent more useable energy from its annual coal purchases can pay up to 50 per cent more for coal without being placed in a less competitive position. Yet we still have no national fuel policy; or, if we have one, it has been ingeniously kept an official secret. The continuation of former patterns or habits of usage, with here and there a drive to encourage known methods of improving utilisation efficiency, would seem the sum total of national policy. Yet the two major means of using coal indirectly—as gas or as power—have been nationalised together with coal production itself; all stand as state-run, state-planned undertakings. Perhaps in an age of planners it has been too difficult to find a planner. The post-war years have seen a heavy and considerably-achieved programme of power-station construction; the gas industry has not been given comparable opportunities for expansion although it has made steady technical progress. Yet the flexibility of the gas industry together with its capacity to produce a diversity of by-products from raw coal have long combined to form one of the most effective methods of coal conservation.

The technical case for encouraging maximum enterprise in the nationalised gas industry is not sufficiently appreciated. One reason for this is undoubtedly psychological. Electricity is a more modern utility and expansion in its distribution seems a much greater token of twentieth-century progress. This view may be correct, but it could be held with greater certainty and unanimity if all the expansion was based upon the tapping

of renewable sources of energy, as is the case with countries more fortunate than Britain in suitable sites for hydro-electricity development. Whether or not it has been right to expand generation capacity so much since 1945, it is regrettable if in consequence the gas industry is pushed into the position of a Cinderella. Another reason why the gas industry's potentialities are widely underrated is that the modern technology of gas production—or at any rate its likely future shape—is insufficiently known.

One of the most promising means by which the gas industry may conserve coal is to escape from the necessity to use coal as its single primary material. Over the past four years the gas industry's coal bill has risen by £25,000,000 a year as a result of coal price advances. That is one economical fact which is stimulating interest in non-coal gas-making projects. Another stimulus is the steady yearly decline in the production of those classes of coal that are best suited to low temperature carbonisation; indeed, it is one of the current grievances of the industry that good carbonising coals are being used for other purposes. Alternatives to coal are heavy oil residues from the post-war refineries, liquefied light fractions of oil, refinery tail gases, methane from coal mines, and, if it can be found, natural gas. The first and the last of these offer the biggest prospects of escape from coal; the others would not seem to be significantly useful except in particularly suitable localities. Heavy oil residues can be thermally decomposed to yield gaseous hydrocarbons for enriching water-gas, or they can be treated in special plants with catalysed thermal decomposition and gasification in steam to produce without other admixture a gas of suitable composition for town distribution.

The possibility that natural gas supplies can be found and developed in Britain need not be regarded as a wishful speculation simply because natural gas has not self-advertised its presence in the past. Natural gas has long been one of the key blessings of America's raw material wealth; but here it may only elude us because it has been more deeply hidden. It exists in Britain: small quantities have been commercially developed in Sussex for many years and natural gas sources are known in Yorkshire and Scotland. The Gas Council has arranged to spend up to £1,000,000 on a five years' exploration project; survey work has already commenced in Yorkshire and will shortly start in Lincolnshire as well. The D'Arcy Exploration Company will be co-operating in this venture.

The gas industry's problem of declining supplies of suitable coal may also be remedied by technological progress. Two new methods of carbonisation are being actively studied, a high pressure process of complete gasification in which oxygen is utilised, and a low pressure method already used in Europe. The former, though better suited for large-unit operation, is less sensitive to grade differences in coal and produces a gas not requiring special enrichment; it is more likely to make a significant contribution to gas industry economics although at present it is one of the low pressure system plants that is being installed for combined production and development research. Any process that reduces the industry's dependence upon specific types of coal will remove a long-standing adverse distinction between gas and electricity as competitive methods of coal utilisation. Nevertheless, despite the decline in gas-making coal supply and the improvised remedies of blending that have had to be introduced, in the last two years the therm production per ton of coal carbonised has risen from 71.62 to 73.65, which is equivalent to a saving of rather more than 750,000 tons of coal per annum. Some of this saving has been achieved by the closing of smaller and less efficient works, however, and in that sense the economy must reach its optimum point at an early date.

In any national fuel policy for utilisation, more emphasis than seems to exist at present would have to be placed upon the technological development of the gas industry. Great possibilities with good prospects of complete fulfilment certainly await exploitation, and the time seems ripe for investment on an enterprising scale. Nor should it be forgotten, that in coal carbonisation many chemical products that are lost in combustion are (a) added to our wealth, and (b) not added to the smog belt.

Notes & Comments

Situations Vacant

AN article in *Chemical & Engineering News* (1952, **32**, 124) makes it crystal clear that no part of the boot is on the US employer's foot when graduates in chemistry, physics, or chemical engineering look for a job. Indeed, they need not do any looking, for most of the industrial companies conduct 'job-selling' campaigns at the colleges from January to June, and to varying degrees the technique of high-pressure salesmanship is used. 'Colleges have all they can do to keep some company representatives from camping on their doorsteps in October.' Teaching staffs complain that recruiting interviews interfere with the curriculum, and it would seem not impossible for a prospective graduate to spend so much of his final year choosing between attractive offers that he fails in the end to pass the qualifying examinations. One of the key factors is 'selling the company' and to this end companies install permanent exhibits in colleges and advertise heavily in college magazines. The fullest use of commercial art and copy-writing is made in 'promotional booklets.' The fact that few graduates are likely to obtain deferment from military service has no damping effect upon these recruiting drives. It is enough to get the graduate on the company's books for a short time, as a high proportion, after completing military service, is likely to return, even if previous employment with the company has been only a matter of months. One company recruiter is quoted as follows: 'In times like these we're not interviewing the students. The students are interviewing us.'

Good Time Chemists

THIS general situation will be regarded with mixed feelings by the older school. No one would want to see a return to conditions when dejected young graduates wonder whether there is any real point in taking a scientific degree, but the pendulum swing has surely gone too far. It cannot be a good thing for the youthful chemist to be fêted in the hope that he will agree to work for one company rather than for another; certainly it will require a large amount of inborn common sense to make him also realise that a job is only the starting point to a career. The harder ways of the past produced good chemists; these new ways are likely to produce a considerable crop of good-time chemists.

Down in the Depths

THERE has been little news of the development of the British deposits of potash in Yorkshire during the past year, and this is hardly surprising in view of the mining problems associated with such deep-sited mineral wealth. It was reported towards the end of 1953, however, that Powell Duffryn Ltd. had been consulted for advice, possibly an indication that direct mining methods rather than the indirect brine-pumping suggestion are now considered more likely to be the means of uplift. One fact is clear enough—if this potash is ever to be mined, the deepest shaft yet sunk in this country will have to be made; indeed, two, not one, may be required and the capital costs will fall between £2,000,000 and £4,000,000. Yet even these figures are not hopelessly formidable. Over £5,000,000 each year is being spent on importing potash, and the Yorkshire deposits are known to contain enough for British needs for at least 50 to 100 years. The critical consideration is not capital expenditure but the actual cost per ton—will British potash when brought 4,000 feet up from the bowels of the earth be able to compete with potash brought here from Germany or France? There is, of course, the highly important consideration of national security, but at the present time farmers here can hardly be expected to add to their fertiliser costs to support a home-based material. It is perhaps not uninteresting that farmers today are subsidised for their purchases of nitrogen and phosphates but not for potash. In that distinction some means of encouraging a youthful British potash industry might be found.

Worth Watching

THERE is a somewhat parallel potash development on the other side of the Atlantic. The Government of the Canadian province of Saskatchewan has just made an agreement with the Potash Co. of America to 'explore' the potash deposits near Saskatoon. If Yorkshire's potash is 4,000 feet down, Saskatchewan's is 3,000 feet down. The problem is 75 per cent as severe! In the new agreement the US potash organisation, according to reports, is to spend several hundred thousand dollars on development and the exploration project is to be completed not later than 1956. America with her own large potash mining industry may be better equipped technologically to tackle the deep-mining problems involved.

Ponds, Insects and Fish

A BRIEF but interesting paper in *Proceedings of the Indian Academy of Sciences* (1953, **38**, B, 211) reveals new usage possibilities for some of the vegetable oils. In many countries with hotter climates the sea is much farther from most of the cities and in any event tropical seas are seldom well-stocked with fish. As a result, fish-farming based upon large ponds is becoming a far from minor industry. A serious problem for India's fish farms is the destruction of small fry, e.g., carp fry, by aquatic insects. When the week-old fry are introduced to the pond, their size is about the same as that of predatory insects and this prevents the use of sieving or netting as a method of separation. The use of oil films on pond surfaces seemed an obvious possibility in view of its success in mosquito control; but vegetable oils were likely to be less harmful to the fish fry or to the zooplankton on which they must feed. The research work now reported by B. Pakrasi compares the insecticidal effectiveness of a number of vegetable oils. Mustard, coconut, castor, til, groundnut, and linseed oils were all tested; none of them failed to achieve a complete kill of aquatic insects under laboratory conditions, but mustard oil and linseed oil were the most efficient.

New Market Possibilities

TO OBTAIN rapid film-spread it was found necessary to add soap to the oils, applying them to the water as emulsions; no mention is made of the possibility that smaller quantities of synthetic spreading agents might be as effective. Linseed oil was slightly harmful to both fish fry and zooplankton so the new field seems a wide open opportunity for mustard oil. Extensive field trials on the basis of these initial small-scale tests are likely to be organised in India. Producers of vegetable oils may see new market possibilities in other countries as well, however; in view of the fact that safely selective agricultural insecticides like derris are highly toxic to fish, oils would seem to possess strong advantages in this special type of insect control.

A recent picture showing constructional work in progress on the polymer section of I.C.I.'s 'Terylene' plant at Wilton. The plant was commenced in July, 1952, and since then work has proceeded day and night and is up to schedule. The first unit of this £20,000,000 project will be completed by the end of this year

Scientific Research in America

Report from Washington Office

PUBLISHED last week, 'Science in USA' is a report by the British Commonwealth Scientific Office in Washington on the principal features of scientific effort in the United States for the year ended June, 1953. This, the sixth annual issue, reveals that US Federal expenditure on research during 1951-52 was $1,800,000,000 and that it was expected to be $2,200,000,000 during 1952-3. Only 25 per cent of this was for research in Government stations.

The following is extracted from the sections on chemistry and fuel technology.

Production Records

In 1952, with the appearance of a variety of new products, new production records were achieved by the US chemical industry. The year began with serious shortages in several vital raw materials, among them sulphur, chlorine, ammonia and benzene, but increased output has largely satisfied the demand for the first two and the supply of the others has greatly improved. In October, 1952, the Federal Reserve Board Index of Industrial Chemical Production reached the highest level yet of 574, compared with 100 in 1935-9, and the peak figure of 412 during World War II production. At the same time chemical prices have dropped by an average of 3.5 per cent during the year.

As the output of materials increased during the year, the trend of the national mobilisation programme turned from controls to rapid expansion plans. Out of 200 plans for expansion announced by the Defence Production Administration, 56 were for chemicals and the Certificates of Necessity issued to the chemical industry amounted to 10 per cent of the total amount for all industry. In all it is estimated that capital expenditure amounted to $1,500,000,000. This is thought to have been a peak year, as most of the new plants scheduled for building after the commencement of the Korean war have now been finished. The expansion of output and a decline in sales was no doubt responsible for the drop in prices already noted. This, and the rising costs of raw materials, labour and transportation, has meant reduced earnings for most chemical companies.

Some of the more interesting items of capital expenditure are as follows. Much of the capital expenditure for Du Pont was for synthetic textile plants, including a plant capable of producing 30,000,000 lb. of orlon per year, a Dacron plant and increased manufacturing capacity of nylon fibre and raw materials. The Union Carbide and Carbon Co. completed a huge ferro-alloy plant at Marietta, Ohio, while other expansions included polythene, synthetic phenol and ethylene oxide. American Cyanamid began the construction of a $50,000,000 acetylene, ammonia and acrylonitrile plant near New Orleans as well as expanded facilities for the production of aureomycin. Commercial Solvents have completed a $1,800,000 plant to make dextran, the blood plasma substitute. In the fertiliser field International Minerals has a new $14,000,000 project for production of defluorinated phosphate, one by-product of which will be uranium. Hercules Powder Co. has appropriated $7,000,000 for a plant for producing phenol by the new cumene process.

Increasing Industrialisation

A new and significant trend in the industrial pattern of the US is the increasing industrialisation of the South. Plans to spend more than $700,000,000 on new plants in Texas, Louisiana, Oklahoma and Arkansas were announced during the year. The reasons for this change are the abundance of raw materials in the South, together with plentiful petroleum and natural gas and low-cost water transportation to markets in the East. The effect on the life of the South of this development will be far-reaching.

During the year several new sulphur domes were brought into production, using the Frasch process. In addition to the two major operators, Texas Gulf Sulphur and Freeport Sulphur, several new companies have entered the field. The Texas Gulf Co. has several new domes at Spindletop and Moss Bluff, both in Texas. Freeport Sulphur is working on three new deposits at Bay St. Elaine and Garden Island Bay, Louisiana, and at Nash Dome, Texas. These are expected to produce at the rate of 100,000, 500,000, and 70,000 tons per annum.

Another outcome of the sulphur shortage was the increased attention paid by the US fertiliser industry to processes for producing available phosphorus by partial or complete replacement of sulphuric by nitric acid, or phosphoric acids, and processes aiming at increasing the availability of calcium phosphate by various processes of defluorination. The Tennessee Valley Authority has been in the forefront of the experiments on these lines and has developed a number of alternative processes. Several of these are slurry type processes which require machinery of new design. TVA has also investigated another process which can be carried out in an ordinary superphosphate plant with very little modification. Large plants for the nitric acidulation of phosphate rock are now in course of construction by at least three large US companies.

The TVA is carrying out an active research and development programme with new forms of phosphatic fertilisers. Chemical engineering aspects are carried out by the Division of Chemical Development at Muscle Shoals, Alabama. Promising products are then plot tested in glasshouses by the Soils and Fertiliser Research Branch. Those still showing promise are tested under field conditions under a co-operative venture between TVA and Agricultural Experiment Stations of some eleven Land Grant Colleges. In this way the new chemicals are compared under a wide variety of soil and climate.

Experience to Date

The agronomic experience from these tests is discussed at an annual conference by agronomists and chemical engineers taking part in this co-operative venture. Briefly, the experience to date shows that under field conditions:

(1) Granule size is an important factor in the efficiency of the less water-soluble nitrophosphates. Granules between 15 and 20 mesh are successful on acid soils, but less so on neutral soils.

(2) Fused tricalcium phosphate appears under most conditions to be a more slowly available source of phosphorus than triple superphosphate, although the residual effect may be better.

(3) Ammonium phosphate is approximately as effective as superphosphate on most soils.

(4) Some results with calcium metaphosphate are confusing, particularly on the more alkaline soils.

(5) Phosphoric acid can be applied direct to the soil and it is also becoming increasingly popular as an additive to irrigation water.

(6) Rhenania phosphates have produced very promising results on western calcareous loams in a small number of tests. A new plant in Wyoming will soon produce 30,000 tons per annum.

Metal Shortages

In the metals industries, shortages have continued, owing to the combined demands of defence and increased civilian consumption, but the situation improved towards the end of the year. In October, 1952, steel production rose to 10,000,000 tons, a new record. Titanium continues in the news, but little has been heard about the progress of the long awaited electrolytic process which might materially decrease the price of the metal. In spite of increased demand, the producers are finding it difficult to dispose of all their output, as much of it is not of the desired quality. Nevertheless, expanded production facilities have been announced by both Du Pont and by Titanium Metals. New metals appearing on the market during the year included molybdenum alloys, and zirconium and hafnium sponges. Increased outputs of aluminium, iron and steel and magnesium were all achieved. No major uses were apparent for ductile vanadium, which first appeared in 1951.

In the field of medicinal chemistry, advances in the production of both antibiotics and hormones have taken place. Penicillin is now in danger of over-production, owing to surpluses being available for export in several countries. Theoretical advances have also been made, notably the elucidation of the structures of aureomycin and terramycin. However, the structure of the molecules has turned out to be so complex that the possibility of total synthesis is remote at present.

In the plastics field the most interesting development has probably been the new semi-permeable ion exchange membranes which are produced in two forms, permitting the passage of anions or cations respectively. This discovery has come at a time when concern is being shown over the falling water table of the US and it has become a necessity to try to find other sources of

water, such as economical methods of desalting saline waters. The efforts in this direction are under the guidance of the Office of Saline Water Research Co-ordination which was allotted $1,000,000 to be spread over five years.

During the last year a great deal of laboratory development work on ion exchange membranes has been done by Ionics Inc. (almost entirely under Government contracts), and by the firm of Rohm and Haas of Philadelphia, who are now producing their well known 'Amberlite' resins in flexible sheet form, under the name of 'Amberplex.' It appears most improbable, however, that the demineralisation of sea water by these processes will be economically attractive. The position with brackish waters is considerably more promising.

Special Advantages

The applications of these membranes in electro-chemical and metallurgical process, and in the preparation of biochemicals, food, etc., are considerably more attractive from the commercial point of view because they offer special and substantial advantages not attainable by other methods. On this account the development of units for the treatment of salt and brackish waters is proceeding at lower priority, and satisfactory devices for this purpose are most unlikely to become generally available for several years at the earliest.

The BCSO Annual Review for 1952 (THE CHEMICAL AGE, 1953, **69**, 71) drew attention to the controversy that had arisen over the costs of producing oil from shale, and oil from coal by the hydrogenation or Fischer-Tropsch processes. Briefly, the Bureau of Mines made estimates of the costs of commercial production based on their work at the Louisiana, Mo., demonstration plant and on German experience. The oil industry objected that these costs were too low and the Secretary of the Interior subsequently invited the National Petroleum Council to make their own investigation. The NPC's interim report gave estimates of the costs of converting coal into oil by hydrogenation that were nearly four times those the Bureau had calculated. As a result, the Bureau submitted certain crucial questions to Ebasco Services Inc., a well-known firm of consultants, for independent evaluation.

The NPC's final report maintains the view that neither the hydrogenation nor the Fischer-Tropsch process approaches a cost competitive with gasoline from crude petroleum at 12 cents per US gallon; oil shale is the only alternative source that could begin to be considered commercially. The industry considers that the output of oxygenated aliphatics from a Fischer-Tropsch plant, or of phenols, etc., from a coal hydrogenation plant, run to produce the maximum amount of chemicals, would be so large compared to the present market demand that their value would be essentially that of liquid fuels. The NPC also insists that the costs of providing housing for the employees at an isolated site must be charged against the operation.

Carbide and Carbon Chemicals Co. has erected a large-scale coal hydrogenation plant, primarily for the production of aromatic chemicals. In May, 1953, the company advertised their first commercial product, a high-boiling phenol fraction with a large degree of *meta*-substitution, both alkyl groups containing four carbon atoms or fewer. Little is heard of the plant for Fischer-Tropsch synthesis, from natural gas, at Brownsville, Texas, but it is rumoured that it is operating at a rate considerably below the designed capacity.

The complete report, which contains 15 reviews of different branches of scientific research, together with summaries of US Government expenditure, is obtainable from HMSO, price 2s.

Radioisotope Conference

THE announcement that a second Radioisotope Conference is to be held in Oxford during the week 19-23 July has led to a large number of applications to read papers and attend.

The provisional programme is: 19 July, medical applications, therapy and diagnosis; 20 July, medical applications other than therapy and diagnosis; 21 July, biological applications, including agriculture and biochemistry; 22 July, chemistry and metallurgy; 23 July, physics, engineering and industrial applications.

Application forms and further information can be obtained from the Conference Secretary, Second Radioisotope Conference, Atomic Energy Research Establishment, Harwell, Berks.

Recognising Intoxication

Analysis of Alcohol in Urine

SINCE 1951 the Alcohol and Road Accidents Committee of the British Medical Association has been studying tests for the recognition of intoxication by the determination of alcohol in body fluids, with the assistance of a panel of analysts appointed by the Royal Institute of Chemistry. The panel consisted of Dr. D. W. Kent-Jones (chairman), Mr. N. Heron, Mr. J. King, Dr. R. F. Milton, Mr. L. C. Nickolls and Mr. George Taylor, and at a joint meeting of the Society for Analytical Chemistry and the Royal Institute of Chemistry on Wednesday, 20 January, Dr. Kent-Jones and Mr. Taylor presented a survey of the report prepared by the panel.

Two Methods Recommended

It was of the utmost importance, if the tests adopted were to have any legal standing, that the proposed methods of analysis should be standardised and capable of accurate reproduction. Two methods have been recommended: an amended Cavett micro method (*J. Lab. Clin. Med.*, 1939, **23**, 543), and the macro method of Kozelka and Hine (*Ind. Eng. Chem., Analyt. Ed.*, 1942, **13**, 905).

Cavett's method, which requires only a drop or two of blood or urine, and no supervision during incubation, consists in distilling the alcohol in the sample from a small cup into acid dichromate in a stoppered flask. Excess dichromate is estimated by titration with a reducing solution consisting of ferrous sulphate and methyl orange. A number of substances, such as salicylic acid, may interfere.

The Kozelka-Hine analysis is recommended as the reference method, but it requires the uninterrupted attention of the operator. The sample required is 1-2 ml., and the alcohol is steam-distilled through a saturated solution of mercuric chloride and caustic soda, to remove interfering substances. The distillate is incubated with acid dichromate, and the excess dichromate is estimated by adding potassium iodide and back-titrating with thiosulphate. Details of the modifications of these tests will appear in *The Analyst*.

Although the report deals with alcohol in both blood and urine, it is agreed that the latter is more likely to be used in practice. Methods based on estimation of alcohol in exhaled air are not recommended. If samples are stored in sterilised containers in a cool place, no appreciable change in alcohol content occurs within seven days.

Results are expressed in mg. per 100 ml., and it is recognised that this may have little meaning for a court. Tables have therefore been drawn up relating the analyses to actual consumption of the common alcoholic drinks. This work will appear in its proper context in the forthcoming report by the BMA, 'Recognition of Intoxication.'

Methane Found in Yorkshire

ACCORDING to a recent announcement by Imperial Chemical Industries Ltd., methane has been tapped at Grosmont, North Yorkshire, at a depth of 4,800 ft.

An I.C.I. official described the discovery as encouraging, but said it was too early to assess the prospect commercially. He added that if the gas was in sufficient quantities it would be piped to the I.C.I. factories at Billingham and Wilton, about 30 miles away.

Methane was found beneath the North Yorkshire moors before the war as the result of borings by the D'Arcy Exploration Company. When I.C.I. were prospecting for potash they again became aware of its presence and boring specifically designed towards the discovery of methane began at Grosmont in October, 1952. I.C.I. and the Anglo-Iranian Oil Company (through its subsidiary, the D'Arcy Exploration Company) were jointly interested.

Element 99

THE Atomic Energy Commission has announced the production of element 99, with an atomic weight of 247. It is radioactive and has a short half-life, reverting in a few minutes to berkelium, element 97. The name ekaholmium has tentatively been conferred on the new element, because of its relation to element 67, holmium. The element was first made in the 60 in. cyclotron in the Berkeley laboratories of the University of California. Although radioactive, it is not a fissile material.

Automatic Oil Blending

New Installation at Manchester

THE first of its type to go into operation in Britain, a fully automatic and continuous lubricating oil blending plant was recently installed at Manchester Oil Refinery.

One of the secrets of producing high-quality lubricating oils is good blending. It is for the purpose of further increasing quality—coupled with the economy of a continuous process—that the new installation has been made.

The unit was manufactured by the Cornell Machine Co. of America and produces a finished, bright, de-aerated, dehydrated, thoroughly blended and accurately proportioned lubricating oil from up to six individual components at one time. Thus, a limited number of 'base' oils—obtained through the normal refinery methods of distillation, solvent extraction and chemical treatment—can be blended (together with additives, where necessary) to give any individual oil specifically suited to the exact requirements of the customer.

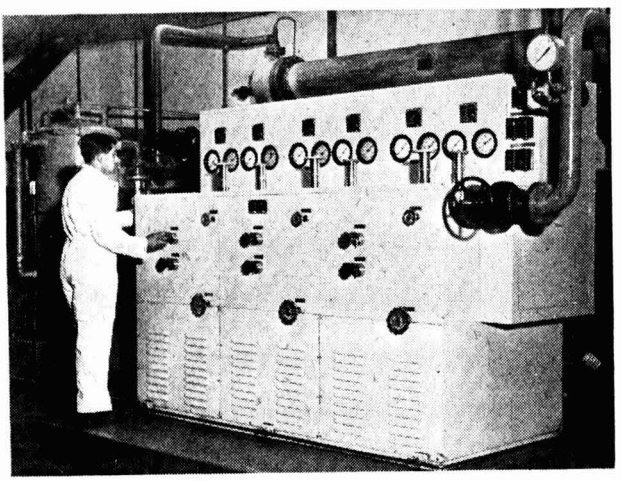
The new plant consists of two distinct parts: a proportioning panel, which controls the ratio of components of the blend to an accuracy of 0.1 per cent by volume; and a homogenising section, which completes the thorough dispersion, de-aeration and dehydration of the components. The simultaneous operation of the two sections is controlled and synchronised by instruments.

The unit has a maximum output of 90 gallons per minute. Finished products can be fed directly from the plant either to drum or bulk filling points or into storage tanks. When feeding into storage tanks, a pre-set meter control will automatically shut down the plant when the required quantity of oil has been blended.

The total equipment is comparatively small and compact and thus makes a striking contrast with the older types of refinery batch blending plants—with their huge 'kettles,' agitators and masses of complicated pipework. The ability to blend, de-aerate and dehydrate oils, in one continuous and automatic operation, provides obvious advantages—not the least of which is the certainty of maintaining a high standard of quality.

Gas Absorption Symposium

Nearly 20 papers will be discussed at a symposium on 'Gas Absorption' which the Institution of Chemical Engineers is arranging at Birmingham University on 5, 6 and 7 April next. The respective chairmen at the four sessions will be Professor F. H. Garner, chairman of the Chemical Engineering Group of the Institution; Mr. Stanley Robson, president of the Institution; Mr. E. J. Dunstan; and Dr. B. Edgington, chairman of the Midlands branch of the Institution.



The proportioning panel, which is equipped with pressure control valves and vernier volume controllers for the oil and additive lines, and also speed regulators for the additive pumps. Behind the operator is the homogeniser section; at the top of this unit is a disc chamber operating under vacuum, and the base forms an accumulator vessel

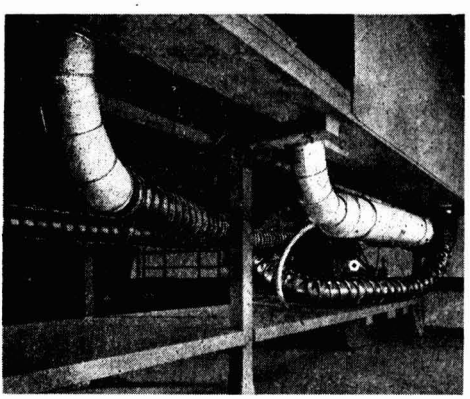
New Ducting

Flexible & Light, but Robust

WHAT is claimed to be an entirely new type of flexible ducting is being manufactured in Scotland by Flexible Ducting Ltd., of Maryhill, Glasgow. Invented in the US during the war, and developed for portable ventilation systems on ships, 'Spiratube' was brought to this country through the activities of the Economic Cooperation Administration and the Scottish Council for Development & Industry.

The ducting is constructed of a helix of high-carbon spring steel wire, covered with fabric, which may be cotton, glass, rayon, or any other desired material. This fabric is coated with a substance most suitable for the particular working conditions, such as rubber, neoprene, PVC, silicone polymer, etc. 'Spiratube' is therefore light yet robust; easily retractable for storage or transport—non-kinking; and suitable both for suction and blowing. Air friction losses, it is claimed, are very low.

Intended for mine and tunnel ventilation; dust, fume and air handling; and for the general engineering, chemical and oil industries, 'Spiratube' is normally available in three stock qualities. Specification A, neoprene-coated cotton duck, is intended for light ventilation and fume removal. Specification M, a much heavier quality of rubber-coated jute, is for mine and tunnel systems; and S-20, of cotton duck coated with abrasive resistant rubber, is for the handling of grindings, buffings and other abrasive materials.



A typical installation of the new ducting attached to a ventilation system

Oil & Colour Exhibition

OWING to war damage repair work being undertaken at the Borough Polytechnic, the exhibition committee of the Oil & Colour Chemists' Association have found it necessary to re-organise the dates and location for the holding of the sixth technical trade exhibition (see THE CHEMICAL AGE, 16 January, p. 220). It has now been arranged to hold the exhibition at the Royal Horticultural Society's Old Hall, Vincent Square, London, S.W.1, on the following dates and times:—21 April, 3-8.30 p.m.; 22 April, 2-8.30 p.m.; 23 April, 2-7.30 p.m.

The change in dates means that the exhibition will now be held in the week after Easter instead of the week before Easter, as originally fixed. One advantage which will follow from the change in location is that the exhibition will be in one hall.

An exhibition luncheon will be held at the Criterion Restaurant, Piccadilly on 21 April. Tickets are restricted to members and to two per exhibitor. Single tickets are £1 1s. Applications for these tickets and for copies of the exhibition brochure should be made to the General Secretary, Oil & Colour Chemists' Association, Memorial Hall, Farringdom Street, London, E.C.4 (Tel. CENtral 2120).

Rockefeller Grants

AMONG grants made by the Rockefeller Foundation during the fourth quarter of 1953 to institutions in Great Britain were $5,000 to the University of Leeds toward research in radiation chemistry under the direction of Professor F. S. Dainton; and $4,000 to the University of Cambridge, toward the purchase of equipment for research in X-ray crystallography of proteins under the direction of Max Perutz.

Grants to individuals included $2,350 to Mr. J. H. Smith, inspector of factories, Ministry of Labour and National Service, for travel to visit laboratories and industrial hygiene departments in the USA and Canada; $2,350 to Dr. R. Murray, HM medical inspector of factories, East Lancashire division, to visit occupational health and industrial hygiene centres in the USA and Canada; and $2,150 to Mr. G. L. Ackers, chief sanitary engineer of the Ministry of Works, to visit training and research centres in the field of public health engineering in the USA and Canada.

Addition of Chemicals to Food

Debate in House of Lords

ON Wednesday, 27 January, Lord Douglas of Barloch raised a motion in the House of Lords on what he called 'mass-medication,' referring in particular to the addition of calcium carbonate to bread, potassium iodide to salt, and fluoride to water. He said that the motion had originally been placed on the order paper at the end of July, when it had been announced that the Ministry of Food intended to make an order requiring chalk to be added to wholemeal bread. Happily, the Ministry had exempted 'true wholemeal flour' from this order, but his Lordship considered the addition of chalk at all to bread to be obnoxious and immoral.

Turning to the addition of iodide to table salt, Lord Douglas noted that the plan to make it compulsory appeared to be on its way out, as there had been scarcely any mention of it for the last three years. Iodine, he said, was a very potent and active chemical; it was immoral to force it upon everyone, and a negation of the art of medicine as hitherto practised.

Lord Douglas finally came to the subject of fluoridation of drinking water, beginning his argument with the statement that it was well known that fluorides were deadly poisons. One thing was clear to him, that fluorine reacted with something in the teeth and consequently changed their nature. The advocates of fluoridation admitted that it could prevent dental decay only if administered to children; if, in the adult, the teeth were no longer capable of combining with fluorine, would not fluorine combine with calcium elsewhere in the body?

Reckless & Unethical

Quoting from a paper by the Professor of Pharmacology in the University of Pretoria, that fluorine in drinking water gave rise to endemic goitre, and that fluorine tended to accumulate in the bone system, Lord Douglas inquired whether this tied up with the addition of iodides to salt to combat goitre, and whether the Government intended to add more chalk to flour to counteract the immobilisation of calcium by fluorine. He considered the administration of a drug to everyone, with teeth or without, whether young or old, a reckless and unethical practice.

Lord Amulree, who spoke next, recalled the comment of *The Times*, during the campaign by Edwin Chadwick in the 1860's to stop cholera, that they would rather die dirty than be cleaned up by the board he was proposing to set up. His Lordship could not agree that the practice of putting drugs into various foods and water supplies was a negation of medical practice, since a doctor existed primarily to stop his patients from becoming sick. This was not only for the good of the community, but was economic work.

A Difficult Question

As far as he knew, there was no chalk either in white or in wholemeal flour, and although most of the people did not take to either, they were at liberty to buy them. The same argument applied to iodised table salt, and Lord Amultree believed that if it were introduced, it would be possible to buy non-iodised salt from the same shops. But the question of fluoridation was much more difficult, and he felt sure that the Government would not raise the fluorine content of water above 1 ppm., which already existed in many parts of the country.

Other speakers were Lord Webb-Johnson, who described how every new idea in medicine had had to fight for acceptance; Lord Hankey, who felt that the truth lay between the extremes on both sides, and that it was advisable to proceed slowly; Lord Glentanar, who agreed with Lord Hankey; and Lord Calverley, who thought that the people were being slowly murdered by agene, chalk and chlorinated water.

Replying for the Government, Lord Carrington, Joint Parliamentary Secretary to the Ministry of Agriculture and Fisheries, said that he did not consider the examples to be those of mass medication, but the making-good of insufficiencies in the diet. Chalk had been added to flour because, as had been shown by the National Food Survey in 1952, the average national intake of calcium would otherwise be about 10 per cent below the recommended requirement.

In a number of countries where goitre was common, salt had been iodised for a number of years without any resulting harm; no decision had yet been taken in this country because the Food Standards Committee had not yet made their final report.

As for the fluoridation of water, the Government intended only to raise the fluoride level to 1.0-1.5 ppm. in those districts where it was below this. The toxic effects had been confused with industrial fluorosis, due to the inhallation of fluoride dust. Nowadays it was believed that the Government had a general responsibility for ensuring the health of the people, and they would be failing in their duty if they did not take into account the great benefit to public health which would result, as well as the political scruples which had been raised.

Lord Douglas announced that he had had no intention of carrying the motion to a division, and withdrew it.

Chemical Society AGM

THE 1954 anniversary meeting of the Chemical Society will take place in Manchester from Wednesday, 31 March, to Friday, 2 April.

On the first day a symposium on 'Dynamic Stereochemistry' will be held, followed by a reception at the University, and on the second day the Liversidge lecture, 'Organometallic Compounds Containing Fluorocarbon Radicals', will be delivered by Professor H. J. Emeleus, F.R.S. The anniversary dinner will take place in the evening.

The third morning will be devoted to the 113th annual general meeting, followed by the presidential address, 'Signs of a New Pathway in Reaction Mechanism and Stereochemistry' by Professor C. K. Ingold, F.R.S., and the induction of the president. Luncheon will be by invitation of the Clayton Aniline Co. Ltd., and in the evening there will be a dance by invitation of the Dyestuffs Division of I.C.I.

Visits have been arranged to Shell Petroleum Co. Ltd., British Rayon Research Association, Chloride Batteries Ltd., I.C.I. Dyestuffs Division, Tootal Ltd., Clayton Aniline Co. Ltd., Cotton Industry Research Association, Department of Textile Chemistry, Manchester College of Technology, and the Cotton Board Colour, Design and Style Centre.

Analytical Symposium

Midland Society Issues Programme

A MOST ambitious programme has been arranged by the Midland Society for Analytical Chemistry for the eight day symposium which is to be held at the University of Birmingham from 25 August to 1 September. As well as a large number of lectures there will be an exhibition of apparatus, reagents and scientific literature; demonstrations of new techniques; a special exhibition of historical chemical literature; a number of visits of scientific and general interest; and a number of social functions including a symposium dinner and a civic reception.

The lectures will consist of original papers as well as addresses on recent advances in industrial application and special techniques. The original papers will be presented by A. Smales, G. Beck, R. Pribil, C. Duval, P. N. West, F. Buriel, E. Ranke-Madson, A. Ringbom, H. Flaschka, F. Lucena, A. Lacourt, J. King, A. Wilson, J. R. Randles, Sheridan, T. B. Smith, R. Belcher, K. Gardner, P. Hersch, E. Bishop, H. Thomas and R. J. P. Williams.

B. Bagshawe will discuss recent advances in industrial application in the iron and steel industry; G. W. C. Milner in the non-ferrous metals; R. A. Mott, coal and coke; T. A. Vaughan, coal tar; C. Whalley, paints and varnishes; H. Bennett, ceramics; D. Dickenson, food; and J. Haslam, plastics.

The lectures on recent advances in special techniques will be given by F. H. Pollard (inorganic chromatography), J. Robb (mass spectrometry), W. Cule-Davies (polarography), R. L. Mitchell (spectrography), W. N. Aldridge (absorptiometry), Garfield Thomas (biochemical analysis), G. Holness (quantitative analysis) and G. H. Osborne (ion exchangers).

In addition there will be three plenary lectures given by speakers of international repute whose names have not yet been announced.

Gypsum in Sussex

East Sussex County Council are to ask the Government to decide whether or not gypsum mining should be allowed in Ashdown Forest. The County Planning Committee have decided to refer the matter to the Minister of Housing.

Fire Protection Built into Refineries

by A. G. THOMSON

AMONG the most outstanding achievements of the petroleum industry is the high degree of safety consistently maintained in processing and handling materials which, because of the very properties which render them commercially valuable, present formidable fire and explosion hazards. While these hazards cannot be entirely eliminated, the precautions taken in designing and operating oil refineries ensure maximum safety throughout the plant. It is with the designer's contribution to refinery safety that this article is primarily concerned.

In laying out a refinery the contractors work in close collaboration with the customer to ensure that fire hazards are minimised. The first safeguard is to allocate as much space as possible to each unit, as at the Esso refinery at Fawley, so that if a fire or an explosion occurs the firemen may have reasonable prospects of localising the outbreaks should conditions be favourable.

Flame stacks are raised as high as possible, both to ensure that the flame is exhausted safely into the atmosphere and also to disperse smells without inconvenience.

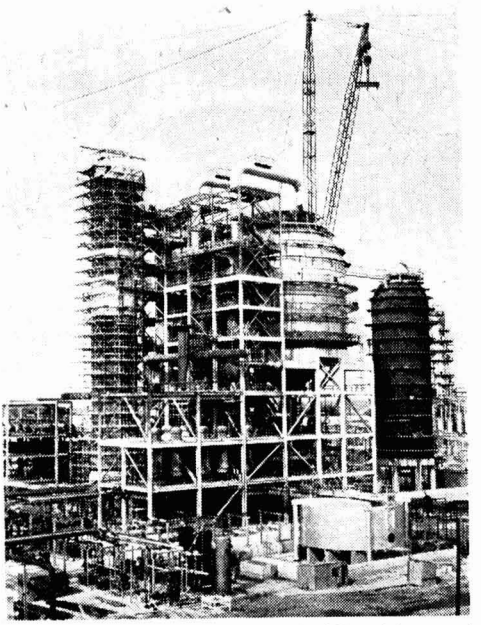
Roads are lined with deep ditches as a protection against spillage of oil and are kept unobstructed to ensure that fire-fighting traffic will not be delayed. By careful planning the drainage system can be so designed that abnormal spillage resulting from an emergency will be confined to a small area. Drains constitute one of the biggest hazards in an oil refinery and it is important that the inlets of all manholes should be trapped in order to avoid flash-back. Since oil floats on water, the effect of trapping the outlet would be to allow oil to accumulate on the surface, thereby aggravating the fire hazard instead of reducing it. Some operating companies require their drainage scheme to be fully flooded with all piping full of water, even under no-flow conditions, in order that pockets of explosive vapour will be avoided.

By safeguards introduced during the design stage, much can be done to reduce the fire risks inherent in units processing and refining crude oil, and to prevent any outbreak from spreading to other sections of the plant. Opinions differ as to the types of protective treatment which give the best results.

It is normal practice for all load bearing structural steel to be fire-proofed from ground level upwards. In general, all load bearing members are encased in 2 in. to 3 in. of concrete, reinforced with steel fabric (BRC type or similar). This system of protection is frequently extended to the structural steelwork on which the racks of piping are supported. Some oil companies favour 'Gunite,' a heat-resistant concrete of cellular rather than homogeneous composition, which is stated to give satisfactory results.

The vessels themselves are frequently carried on steel skirts which are lined internally and cased externally with either concrete or brick.

Particular care is taken to isolate the the principal sources of danger. Heaters, furnaces or pipe stills—as they are variously termed—are particularly hazardous because of the presence of a naked flame. A distil-



[An 'Esso' photograph

The cat-cracker at Fawley in course of construction. Fire-proofing of the structural steelwork can be seen

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lation heater, for example, is therefore located at a considerable distance (50 ft. to 100 ft.) from the column which it serves.

All safety valves should be checked to ensure that satisfactory pressure relief is given under fire conditions; the contents will often evaporate at abnormally high rates under these conditions.

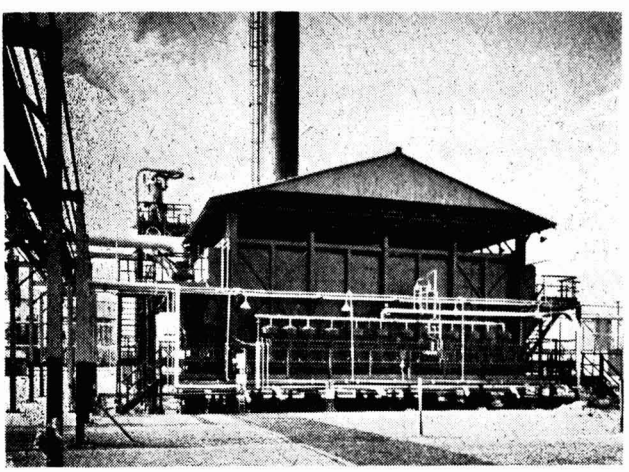
Oil refineries are always adequately supplied with the usual water hydrants. In addition, it is necessary to provide steam hose connections, so that any outbreak of fire can be smothered or limited with a steam blanket until the fire tenders, etc., are mustered. For fixed fire-fighting installations there are available on the market special fog nozzles and foam equipment manufactured by specialist firms, who should be consulted regarding their application.

Fixed snuffing steam connections are usually provided in both the radiant and convection sections and header boxes of fired oil heaters, with remotely operated controls and oil blowdowns. By this means steam can be forced into the equipment at such a rate that air is excluded. The controls are usually situated from 50 ft. to 100 ft. away from the plant. The oil pressure inside a heater, depending on the process, can be 1,000 to 2,000 psi., so that even a small fracture in a tube could have serious consequences. In the event of a fracture therefore, snuffing steam is released into the heater, process feed stopped, burners are shut off, dampers closed and the blow-down valves opened in order to depressurise the heater to prevent the entry of air which would promote combustion. The blow-downs which usually need to be remotely operated are taken off all low points in the heater piping.

Opinions vary regarding the types of electrical equipment to be employed in refinery plant. Totally enclosed motors have been extensively used in countries where local statutory regulations are not stringent, and the flash points of process materials in the vicinity are not low, but in the United Kingdom the regulations require the use of Buxton certified Group 2 equipment, unless adequate alternative precautions are taken.

This alternative safeguard usually consists in housing the electrical equipment in a building and providing positive ventilation with an air inlet situated at a height of not less than 50 ft. above ground level. A positive pressure of $\frac{1}{4}$ in. to $\frac{1}{2}$ in. W.G. should be maintained in the enclosed space and no piping carrying hydrocarbons should pass into it; instruments should therefore have either electric or pneumatic transmission. This principle is extensively employed in control and switchrooms of refineries and usually results in a reduction in capital expenditure. Careful investigations are essential and agreement must be reached with local bodies when such schemes are developed.

Plants handling light hydrocarbons such as propane are usually provided with relief valve header schemes, which ensure the discharge to atmosphere of the light vapours at a point well away from the process unit.



Photograph by Elwood M. Payne

A light ends distillation plant heater, located at some distance from the installation it serves

A scheme of this nature is normally associated with a stack, which may be of either the burning or non-burning type.

Whether they contain crude oil or the more flammable refined products, large storage tanks are usually provided with a retaining wall. The bunding is so spaced and of such a height that if the tanks leak or collapse, the entire contents will be retained.

A floating roof is often used on light product tanks to reduce fire hazards so that large quantities of inflammable vapour will not be contained when the tank is only partially filled.

It is evident that very stringent precautions are required when constructional work is in progress at an existing refinery. By arrangement between the contractors and the oil company, a general permit is required before plant can be constructed in a particular area. This permit must be approved by the customer every morning, in case the safety requirements might be affected by some new conditions, such as an escape of gas from other units.

In addition to this general permit, specific permits are required for such operations as welding by arc or oxy-acetylene, which would cause a flame either on the ground or on structures above ground. These permits must be approved by the oil company for a fixed period of time. Should it be considered necessary, a fire guard or a fireman may be posted at or near the point where the work in question is being undertaken.

When construction or maintenance work involving a fire hazard is taking place extensive use is made of suspended blankets saturated with water for isolating the working area.

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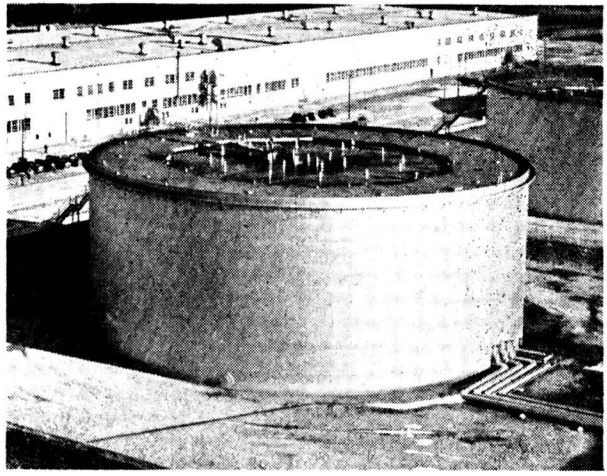
Should buried electrical cables be encountered during excavations, it is possible that accidental contact might cause a fire by flash. Therefore, before any excavation can be started, a permit for the work must be supplied by the oil company. Underground electric cables are frequently encased in conduit reinforced by concrete in hazardous areas.

When work is carried out on an oil-line, it is essential that before dismantling any section, valves should be closed and blank flanges connected, the purpose of these precautions being to prevent a rush of oil or gas in the event of a valve being opened by some unauthorised person. In addition the lines should be thoroughly blown through with steam to ensure safe clearance of hydrocarbons.

While no safeguards can afford complete protection against all possible contingencies, especially where the human element is involved, it is evident that by designing for safety and subjecting the constructional work to very close control, great progress has been made in reducing the fire and explosion hazards associated with oil refineries.

Acknowledgement is made to Foster Wheeler Ltd., for the information on which this article is based and for permission to reproduce the accompanying photographs.

[*An 'Esso' photograph*



A large storage tank with floating roof and retaining wall

Precautions in Use of Pressure Vessels

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

PRESSURE vessels have been used in the chemical industry for many years and, with the increasing use of high pressure techniques, they are likely to become far more common with the passage of time. Moreover, the pressures developed inside them are likely to increase considerably.

The first essential for a pressure vessel is that it shall be correctly designed to withstand pressures that are likely to develop and, to do this adequately, it is necessary to know the properties of the material of construction at the operating temperatures. The most important feature to watch is the possible weakening of the structure, as this will tend to cause premature collapse or burst, and the results of such an incident could be very serious.

There are numerous codes of practice available as guides for the design of pressure vessels; for example, there is the British Standard Code for the design of Fusion-Welded Pressure Vessels (BSS. 1500). Insurance companies who specialise in boiler work, and other similar matters, will usually give guidance; indeed, it is probably desirable that their advice be sought, as they are likely to have to meet a claim should an accident occur. One thing is certain—that, having decided which code to adopt, it is advisable to stick to it. The requirements do not differ significantly one from another, but there are minor differences generally in testing technique.

Determining Free Space

Another point in the operation of pressure vessels is to leave an adequate free space to ensure that excessive pressures are not allowed to develop. From time to time, articles on the use of pressure vessels and descriptive matter on various processes suggest that a given percentage of the volume, which may vary from 5 to 30, is left as a free space. Much of this appears to be in the nature of intelligent guessing, whereas there seems no reason why this factor should not be determined by direct calculation. It would, of course, be desirable to allow a factor of safety of possibly 1.25 to 1.5 when deciding on the final volume to be left.

Care is necessary when closing the vessel, and the bolts should not be strained unduly. It is not generally realised that bolts up to $\frac{1}{2}$ in. or $\frac{3}{4}$ in. diameter, when used in close proximity round the periphery of the lid of a reaction vessel, can be strained above their elastic limit by ordinary hand-tightening. The sole purpose of the action of tightening is to prevent leakage, as there should be enough bolts round the periphery of the vessel to ensure that the pressure inside will not strain them excessively. Spanners used for tightening the covers should not be assisted by the use of a tommy-bar or other similar gadget, and should preferably be of spring-loaded type, so that under no circumstances could the tension on the bolt be exceeded.

Proper Purging Necessary

If the reaction which is to take place is to be done in an inert atmosphere, the free space must be properly purged before any heat is applied, and the pressure vessel must be suitably designed to carry this out. Even if this is not the case, it is desirable that arrangements be made to displace any air which is present. If this air is replaced by, say, a solvent vapour, then when the reaction is completed and the liquid cooled, the vapour will condense and a partial vacuum will be created. It is, therefore, important in such cases that the vessel is stiffened inside to ensure that it will not collapse under this pressure difference. This is a matter for design and should be known before the vessel is actually ordered. If a partial vacuum is created, air will rush in when the valve is opened, and it may provide the necessary oxygen for the ignition of a pocket of vapour.

The legal requirements relating to pressure vessels are fairly clearly set out in Section 31 of the Factories Act, 1937, and this section lays down what must be on such a vessel in the way of outside fittings. These are an automatic safety valve, a drain cock, a pressure gauge, and an opening of sufficient size to enable the inside to be inspected. This represents the minimum and it is usually required that any gases which may escape, should the safety valve

blow, will, if they are either toxic, inflammable or corrosive, be vented into some place where they will be harmless.

The 1948 Factories Act has an additional requirement in that, when any person has to go inside a vessel for any purpose, arrangements must be made for a continuous supply of uncontaminated air to be passed into the vessel, so that there is no likelihood of his being overcome by toxic fumes.

The Bursting Disc

Another form of pressure relief is the bursting disc and the use of this device is becoming increasingly popular. Discs can now be obtained in a variety of metals covering almost all required pressures. The advantage of a bursting disc is that it almost invariably fails to safety; that is to say, that any rough usage or irregular handling which it receives will tend either to reduce its thickness or to mark it or score it in some way, and this will tend to reduce the pressure at which it will operate.

Pressure reliefs of this type and safety valves should be so arranged that they cannot be tampered with, as it may so happen that a slight increase in pressure may increase the yield, and there is a tendency, or a temptation, to install a slightly thicker bursting disc, or alter the settings of the safety valve. In the case of bursting discs, this could be avoided if these discs are maintained as a store item and each one, as issued, be given a number so that a record can be kept.

In the case of safety valves, either deadweight or spring-loaded, it may be necessary to seal the position or settings of the spring or weight, so that it cannot be tampered with. In one German code in the writer's possession, it forms part of the duty of the person carrying out the inspection of the safety valve of the pressure vessel to set and seal the pressure relieving device. A procedure such as this has very much to recommend it.

Planned maintenance in the case of pressure vessels is an essential and no opportunity should be lost to carry out an examination of the interior of any such vessel. There is a requirement under the Factories Act that they should be inspected at intervals of not more than 26 months by a competent person, and this inspection is preferably done by somebody who can be regarded as independent. The systematic

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inspection of vessels of this sort should start before they leave the manufacturer's works, and any photographs or measurements on the inside should be carried out before the vessel is put into service.

A properly planned record of each vessel should be kept and the opportunity taken at every shut-down to examine the interior of the vessel for signs of corrosion. Where there are such signs, e.g., inter-crystalline cracking, it should be remembered that the strength of the vessel will be decreased accordingly and, by watching the increase in depth of a corrosion pit as measured by the thickness of the vessel, it may be possible to foretell the extent of its active life at the pressure for which it was specified, and also to get some idea as to when it may be necessary to transfer this vessel to some process which does not require the same pressure, but can be operated at a lower one.

In dealing with this inspection, it should be pointed out that the operative word is 'inspection' and not 'test.' The Factories Act only permits a hydraulic test to be substituted for an inspection when the latter is regarded as impracticable, although it will often be inconvenient.

In dealing with vessels of non-ferrous alloys, the use of hydraulic testing should not be allowed to supersede inspection, as a test pressure of 50 per cent in excess of the working pressure is quite a normal requirement, and the regular pressurising of some of these vessels to this extent may provide a degree of cold-working which will render them brittle and liable to fragmentation in the event of a burst. It will probably, in addition, do far more to reduce their working life than the actual operation performed in them.

Careful Maintenance

In covering this inspection and examination, it need hardly be said that all pipelines, valves and other ancillary apparatus which are subjected to pressure will need to have the same care in maintenance as the vessels themselves. Adequate records must be kept. Should a hydraulic test be necessary, it should be done by liquid pressure, as the effects of a burst are a good deal less serious than if pressure is used.

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Another aspect of pressure vessel working which does not often receive the treatment which it deserves is the question of glands for stirrers. It is very important that the gland of a stirrer is correctly designed, or else there may be considerable leakage past it. This may not be very serious with pressure vessels, but it could become serious when vacuum vessels are under consideration, as then there is a possibility of the ingress of air by leakage into a reaction from which it may be desirable that air be completely excluded. The choice of lubricant is important as, if there is any leakage down the shaft of the stirrer, it may possibly contaminate the mixture.

Removing Pressure Doors

Care needs to be exercised when removing the cover or door of a pressure vessel, and this is equally important whether the vessel is vertical or horizontal. It is important that the pressure is reduced to atmospheric and that no attempt be made to open the door until this is the case. The removal of the last trace of pressure or vacuum will be a little bit slow, but can be facilitated by slackening the bolts and easing up the cover. Under no circumstances should the fastening be completely removed until the pressure has been equalised, as there is often sufficient force to throw the cover, be it large or small, into the air with considerable power, which could cause a serious accident. The circumstances of one such incident may be worth describing.

In this particular case, the manhole cover had been sealed with luting before bolting down, and the nuts and bolts were removed, leaving the luting to hold the cover in position. A bar was placed between and the lid prized up. As soon as the seal was opened, the manhole cover was blown violently into the air, causing serious injuries to two workmen who were near. The use of a crow-bar for this purpose is often necessary, but the accident which occurred would not have happened had the removal of the bolts been the last operation instead of the first.

There are pressure vessels available in which the whole door fits against the end of the vessel and is rotated by means of a breech-block mechanism, so that the tension is applied evenly all the way round. One of these types which came to the writer's notice recently was so equipped that the door could not be rotated to open until there was no difference in pressure between the inside and outside of the vessel. This vessel was to be used on a wood-preservation plant where it was being required to operate under both pressure and vacuum. A device of this sort is extremely useful, as serious accidents have occurred by the loosening of a manhole before the pressure has been properly balanced.

The maintenance of pressure vessels should include the periodic calibration of pressure gauges. A pressure gauge normally tends in wear to give a low reading and this is a state of affairs which should be avoided. It is not suggested that such calibration should be elaborate and necessitate the use of dead-weight testers and other more complicated means. A comparison with a standard gauge which is kept for the sole purpose of calibration and which can be checked for accuracy by a gauge-maker at any time is all that is necessary and such a test would be very simple.

Valve seatings should be examined at frequent intervals, and normally should not be tinkered with. In some forms of reducing valves, the shape of the seat is critical and there is often a temptation to alter these slightly in the hope that more economic conditions may arise. Any such alteration should only be undertaken under the instructions of some person whose competence in the matter of valve adjustment is without question.

ELEVEN men were injured recently in an explosion which occurred in dust extraction plant at the Tyseley factory of Bakelite Ltd. All were taken to hospital, but only two were detained. About 2,000 people were employed at the factory.

The explosion, which happened at night, is believed to have been caused by accumulated dust becoming ignited. Part of a metal duct system stretching from one building to another, was torn to the ground. An official of the firm stated that the duct was used for extracting powder from the air in the factory.

Night-shift workers helped to rescue the injured men and the works fire brigade quickly tackled a fierce fire which followed the explosion.

THE text was published on Tuesday of a private member's Bill which proposes to introduce accident prevention machinery in industry—based on co-operation between employers, employees, and official inspectors —to reduce the rate of occupational accidents and minimise the hazards of employment.

It is the Safety in Employment (Inspection and Safety Organisation) Bill, which has been introduced in the House of Commons by Mr. W. T. Paling, Labour M.P. for Dewsbury, and is to come up for second reading on 26 February.

The Bill provides for the annual election of 'safety' delegates at a place of employment where more than five persons are employed, with statutory power to inspect the place of work, to draw the attention of the management to unsafe conditions, and to report to any official inspector when proper precautions are not taken.

Where 50 or more persons are employed the Bill provides for elected safety committees, with workers' and employers' representatives having power to inspect and report unsatisfactory conditions at the place of work. The Bill also provides the basis for the institution of a National Occupational Safety and Health Committee to co-ordinate accident prevention and to recommend research and new legislation.

* * *

INFORMATION on the safe handling, storage and use of butadiene is given in Chemical Safety Data Sheet SD-55, recently published by the Manufacturing Chemists' Association, 246 Woodward Building, Washington 5, D.C. Hazards in handling butadiene are not considered serious, but exposure to its vapours may cause minor irritations to eyes, nose, throat and lungs, and because of rapid evaporation it can cause frostbite when brought into contact with the skin.

Fire and explosion hazards are created in handling butadiene as a result of its physical properties (boiling point 4.7° and explosive limits 2-11.5 per cent by volume in air). Air vapour mixtures can result in peroxide formation, which may cause an explosion.

Complete recommendations for safety procedures to be followed in unloading, loading, handling and waste disposal are given in the data sheet, which also includes a section on health hazards and their control, describing proper personal protective equipment and first aid measures to be taken in the event of burns. Copies of the data sheet (25 cents each) are obtainable from the MCA at the address given above.

Industrial Safety

* * *

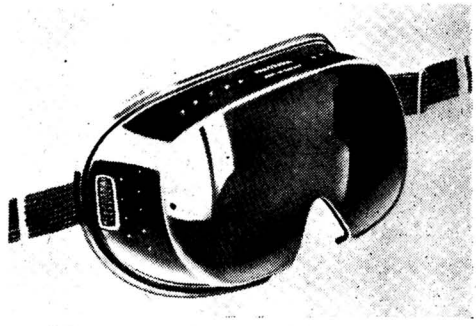
A NOVEL method of making employees 'safety-conscious' has been adopted at the Derby factory of I.C.I. Ltd. (Dyestuffs Division). Work was stopped for one minute each day during a recent week to enable employees to look for possible causes of accidents. About a dozen potential dangers were noted during the first day's break.

* * *

IT has been announced by Stratford Products Safety Service Co., Ltd., 53, Old Kent Road, London, S.E.1, that they are now producing for the first time a gas welding goggle suitable for operations both with and without flux. By combining the requirements for flux welding in all goggles, the danger of injury arising from the issue of goggles without this protection is removed.

The 'Panorama' 303 goggle is the first gas welding goggle to be made entirely from a single moulding of 'Perspex', it is claimed, and although there is as yet no British Standard Specification for plastic goggles, the 'Panorama' is made in four shades of green to conform to existing specifications.

The goggle can be worn with most types of spectacles, is adequately ventilated, and gives the same impact protection as the 'Panorama' 217 heavy duty goggle. Pitting of the surface is slow, and the need for cover glass or windows is eliminated. The goggle weighs only two oz., and has a wide elastic adjustable head band.

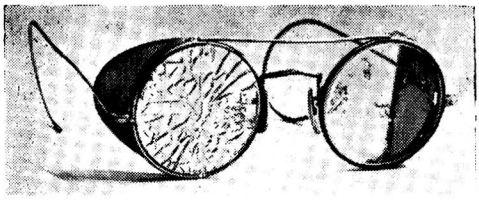


'Panorama' 303 welding goggle

Industrial Safety

IT has become necessary under the Iron & Steel Foundries Regulations, 1953, which came into force on 1 January last, for certain foundry workers to be supplied with suitable eye protection. Of particular interest in this connection is the accompanying untouched photograph, showing a pair of spectacles, fitted with Armorglas toughened lenses, which were being worn by a man when tapping metal from a cupola. The spectacles were suddenly struck by a piece of metal which flew from the tapping hole and although the heat and the impact were sufficient to fracture the Armorglas in the right lens no fragments were displaced. The wearer escaped injury, whereas without suitable eye protection he might easily have lost his sight in at least one eye.

All reputable manufacturers of safety goggles seek to produce articles which will give adequate protection and be comfortable to the wearer, but it is not often that their efforts are shown to be so strikingly successful. The spectacles illustrated are now in the possession of the manufacturers, Fleming Safety Goggles (Division of J. & R. Fleming Ltd.), 146 Clerkenwell Road, London, E.C.1, who will be pleased to supply on request the name of the company concerned in the incident described above.



Fleming safety goggle No. 3119

A LARGE part of the soap factory of Wilkinson and Akeroyd, Ltd., Mirfield, was destroyed by fire recently. Extensive damage amounting to several thousand pounds was caused. Some fifty firemen fought the flames for nearly two hours and prevented the blaze from spreading to some oil tanks, an adjoining cotton spinning mill and a maltster's premises. This was the third large fire in the district within a month, the previous one being at the adjoining premises of Squire Radcliffe and Sons, Ltd., oil refiners.

DESCRIBED as the most dangerous which had occurred at Middlesbrough for many years, a fire which occurred in a naphthalene refining plant at the chemical works of Sadler & Co. Ltd., caused damage estimated at £75,000. The refining plant was burnt out, together with other buildings and plant within an area of 100 yards square.

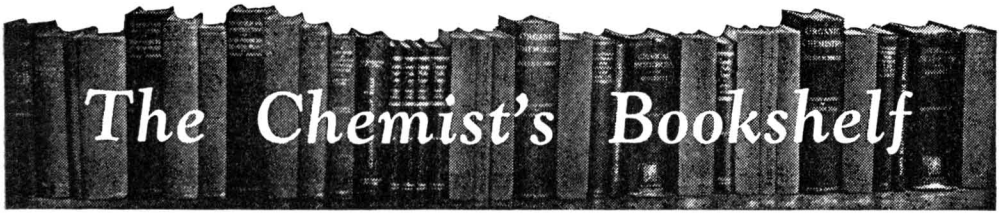
Four men were working in the refining plant when a sudden burst of flame raced from one end of the building to the other and all they could do was to escape quickly and give warning. Firemen were speedily on the scene and they succeeded in preventing the flames from reaching a building in which 72,000 gal. of motor spirit were stored. Several large tanks of creosote were also saved. It took three hours to get the blaze under control and for some time afterwards the firemen were still dealing with sporadic outbreaks. Mr. C. N. Sadler, managing director, stated that the cause of the outbreak was unknown.

* * *

A MINISTRY of Transort and Civil Aviation circular, issued last week, calls attention to regulations concerning the carriage of dangerous goods in aircraft of all nationalities in or over the United Kingdom.

The International Air Transport Association recently adopted regulations providing for the carriage in aircraft of various classes of goods if they are packed in suitable containers, in limited quantities, as specified in the regulations, and the Ministry of Transport and Civil Aviation now give notice that they will consider applications from air transport operators for general permission to operate in or over the United Kingdom in accordance with these IATA regulations.

Under such general permission, no explosives, including fireworks, may be carried, other than articles in the current list of authorised explosives issued by the Home Office. Among other items which may not be carried are ammonium permanganate, ethyl nitrate, magnesium scrap, motion picture films, and compressed air of more than a specified pressure. A number of items may not be carried without the prior permission of the Minister. These include certain corrosive liquids, oxidising materials, compressed non-flammable gases, flammable solids, and liquid peroxides.



THE FIRST FIFTY YEARS, 1903-1953. Edited by F. I. G. Rawlins. The Faraday Society, London. 1954. Pp. 85.

This is a light-hearted history of the Faraday Society written in the form of a birthday book with contributions from some 15 eminent members. One of the original objects of the Society was to foster the study of sciences lying between chemistry, physics and biology, and in many cases the history of the development of these sciences. Because of this close relationship, many of the contributors have felt constrained to include short reviews or thumb-nail sketches of the science in which they are a recognised authority. An example of this is the chapter by A. H. Cottrell which examines the origin and growth of metallography, showing the relationship between the microstructure of metals and their mechanical properties. The consequent advances in metallurgy are reflected in the Discussions held by the Society in such allied subjects as refractories, the laboratory production of high temperatures and pyrometry.

One of the most valuable aspects of the Society's work has been the holding of Discussions at which eminent scientists from many countries have met to present and discuss papers upon the problems of their subject. In some cases, the occasion of a Discussion has marked a turning point in the development of the theory of a science. Such an occasion is described by C. W. Davies; the Discussion held at Oxford in 1927 on 'The Theory of Strong Electrolytes' at which the Debye-Onsager limiting equation came to be accepted.

The preface is written by the president for 1952-1953, H. S. Taylor, and this is followed by some personal reminiscences of one of the founder members of the Society, F. G. Donnan, who recalls the foundation and some of the livelier Discussions held by the Society.

Among the other contributions are an account of the incorporation of the Colloids Committee into the Society and its subsequent activities by E. K. Rideal and a witty essay by the editor on 'Surface Chemistry' in which he compares the processes of crystal growth to those of town planning.

The text includes a list of the members of the first and present Councils and also lists of the past presidents, honorary life members and secretaries. At the end of the book there is an appendix which gives the date, place and title of all the Discussions held since the foundation of the Society.

The illustrations in the book include portraits of many of the eminent members, a reproduction of the famous picture showing Michael Faraday lecturing at the Royal Institution and an engraving of the former offices of the Society at Grays Inn.—J.R.M.

SELECT METHODS OF METALLURGICAL ANALYSIS. Second Edition Revised. By W. A. Naish, J. E. Clennell and V. S. Kingswood. Chapman and Hall Ltd., London. 1953. Pp. 660. 75s.

This is the second edition of a book which was first published as early as 1929. The present text retains a few of the features of the first edition, in particular a self-contained section detailing the essential chemistry of the methods given. The methods of analysis have been revised on more specialised lines and have been contributed by a select panel of experts. Despite the number and different stations of the contributors a surprising degree of uniformity of style has been achieved. The reader will not be confused by some of the essentially industrial expressions introduced, although the continual and wrong usage of the word 'estimation' has always exasperated the reviewer.

The experts show themselves to be such masters of their subjects, that the occasional slip-up may almost be regarded as permissible. The apparatus for the determination of total carbon in iron and steel (p. 418) is obsolete, and anyway why dry the oxygen

and then wet it again? The formula for the complex between nickel and dimethylglyoxime (p. 449) is erroneous and could well have been omitted.

The always arduous task of proof reading has not in general been done meticulously, and there is evidence that the book has been too long in the printers' hands.

But this is a book which unquestionably fulfils the need for a good text on the analysis of non-ferrous (and ferrous) materials. It will certainly prove of interest to metallurgical chemists and to advanced students. In view of the vast amount of useful information included in the 660 pages, the price is most reasonable.—A. J. NUTTEN.

QUANTITATVE PHARMACEUTICAL CHEMISTRY. 4th Edition. By G. L. Jenkins, J. E. Christian and G. P. Hager. McGraw-Hill Book Co., New York and London. 1953. Pp. x + 534. 52s.

This laboratory manual is arranged in three parts, (1) general gravimetric, volumetric and gasometric analysis, (2) special pharmaceutical analyses, and (3) physicochemical methods used in testing pharmaceutical substances. It opens with a chapter on general operations such as sampling, weighing, transfer, filtration, drying, etc., including also some theoretical aspects such as error and significant figures, down to the importance of honesty and integrity in the analyst. Two chapters then follow on the principles of gravimetric and volumetric analyses.

All subsequent chapters consist of a brief theoretical statement followed by selected practical exercises carefully set out with regard to quantities, apparatus, equations and calculations. The procedure is quoted from the US Pharmocopœia. A table is then usually given of official substances in the USP (14th edition) and the National Formulary (9th edition) requiring similar assay. Numerous questions and problems on theory, procedure and calculation follow each exercise. This detailed treatment is systematically maintained throughout the book.

As well as the determination of physical constants such as specific gravity, melting and boiling point and solubility, the third part covers among other items *p*H measurement, colorimetry, optical rotation, viscosity and spectrophotometry, the last rather summarily. Electrolytic methods are little more than mentioned. There are several good photographs and diagrams, but there might well be more, of instruments such as refractometers and polarimeters.

Naturally enough, biological methods are not discussed, but several assays of enzyme containing substances are included. Apart from a short description of turbidometric limit tests for chloride and sulphate the assay of major constituents of official substances alone is considered. Tests for contaminants and adulterants are not given. The omission of methods of determining small amounts of lead and arsenic seems strange in a book of this title. The inclusion of lists of standard works on analysis is a pleasing feature.

Excellent scientific books are coming from the United States in ever increasing numbers. They are most welcome, much as we deplore the substitution of American ways of thought and nomenclature for our own traditional ones. In the case of this book there is little such danger for, admirable though it must be for the American pharmaceutical student as proved by the fact that this is the fourth edition in 17 years, it is not possible to recommend it for general use among students in this country for obvious reasons of pharmacopœial differences concerning assays, official substances and names. The assay of Kola, for example, will seldom be required here.

Taking the measurement of viscosity to illustrate differences, neither the Ostwald nor falling-sphere viscometer is mentioned. It is stated that any suitable viscometer may be employed. A description is given of the most commonly used type, the Saybolt universal viscometer, which resembles the Redwood. American spellings such as 'distill' are of course already in frequent use among our students albeit unwittingly. It is odd to find just once our spelling 'distil' on page 252. The contraction 'Gm.' is consistently given a capital letter—reserved for prescriptions only here—whereas 'mg.' and 'cc.' are not. Our exclusive use pharmaceutically of ml. does not appear to be shared by the Americans.

Teachers will find the book interesting and helpful in subject presentation and in the organisation of practical courses. It is clearly printed on very high quality paper but the price is most discouraging.—M.C.

Canadian Industrial Chemicals

'Future Can be Faced with Confidence'

IN a review of the Canadian industrial chemicals industry, Mr. H. Greville Smith, president of Canadian Industries, Ltd., states that growth in the production of industrial chemicals, evident during most of the past 20 years, continued for the greater part of 1953. Figures for the year are not yet available, he writes, but it is believed that the value of the output of chemicals and allied products was about 5 per cent higher than for the preceding year, which amounted to $806,000,000.

Sales of industrial chemicals to Canada's primary industries were maintained at a high level during 1953. Consumption of chemicals by the pulp and paper industry nearly reached a record as the output of newsprint continued to expand. Output of the mining industry, another large consumer of chemicals and related products, has not yet been seriously retarded by the unbalanced market for lead and zinc, but labour disagreements led to some curtailment in gold production and were responsible for slightly lower requirements of explosives and other chemicals. Sales of agricultural chemicals were little changed from the large volume reached during the preceding year.

High Consumer Expenditure

In common with most other industries, producers of chemicals benefited substantially from the high level of consumer expenditure during 1953. The automobile industry, which uses considerable quantities of finished and other chemical products, enjoyed a record year. There was, however, some evidence of market saturation in consumer durable goods during the last quarter of 1953. A change in the class of work undertaken by the construction industry reduced the demand for some chemical products. The extent of the recovery in chemical sales to the textile industry proved disappointing as textile producers in Canada were faced with intensified foreign competition.

The most important single contribution to the higher volume of chemical production for 1953 was the output from new plants, states Mr. Greville Smith. Chemical products which had not previously been made in Canada included pentaerythritol, *iso*propyl alcohol, citric acid, polyethylene, nylon intermediates, carbon black, new solvents and plasticisers, and liquid sulphur dioxide.

Additional capacity was provided for the output of ethylene glycol and ethylene oxide, formaldehyde, acetone phenol, chlorinated solvents, styrene, cellulose acetate, transparent cellulose film, synthetic resins, sulphuric acid, ammonium phosphate, caustic soda and chlorine, and phosphorus. In all, a total of 18 per plants and six additions to existing facilities were brought into operation during 1953. Of the total capital outlay of $167,000,000 completed last year, about $140,000,000 was for the manufacture of basic organic chemicals, together with intermediates for making such synthetic materials as fibres, rubber, resins and film.

Petroleum Gases Important

Petroleum gases have become the chief raw materials for organic chemicals and the greater part of the new capacity was consequently erected either in the natural gas area of Western Canada or near sources of petroleum refinery gases in central and eastern Canada. New plants located in Edmonton, Alta., to produce acetate fibres, chemicals and polyethylene, plastics, alone totalled as much as the entire investment in the heavy chemicals manufacturing industry before the war.

As a result of expansion in the chemical industry during the past eight years, involving outlays of almost $500,000,000, Canada now possesses impressive facilities for the output of large tonnage chemicals and is fully capable of supplying the present industrial requirements of such chemicals. Taking the longer view, the rate of growth of the chemical industry, in an economy in which secondary manufacturing is gaining in both absolute and relative importance, is likely to be more rapid than for most other fields of enterprise.

Not only will more chemicals be required for expanding the manufacture of established products, but advances in technology may be expected to open up markets for new types of chemicals.

• HOME •

Shell Acetone Price Reductions

A reduction in the price of acetone of £7 per ton has been announced by Shell Chemicals Ltd., with effect from 1 February. The new price scale ranges from £136 per ton for small lots in 5 gal. drums, to £95 per ton for 50 tons and over in 40/45 gal. drums.

Platinum Costs More

An increase of £3, to £30 per troy ounce of platinum, owing to increased working costs, has been announced by Johnson Matthey & Co. It is stated that this adjustment does not mean any departure from the company's policy of making platinum available at as low and stable a price as possible.

Women's Rôle Explained

Mrs. F. Dickinson, M.Sc., a research chemist and vice-president of Widnes Soroptimist Club, addressed members of the St. Helens Soroptimist Club on 25 January on 'Women in the Chemical Industry.'

Refineries' Increased Throughput

The United Kingdom refineries of the Anglo-Iranian Oil Co. Ltd. processed about 2,500,000 tons more oil during 1953 than during the previous year. The provisional total is 9,100,000 tons, compared with 6,600,000 tons in 1952. At the company's shipping terminals in South Wales, Scotland and Kent, 2,557 tankers were handled in 1953.

News from Harwell

Three unclassified reports have just been issued by the Atomic Energy Research Establishment, Harwell, and are obtainable from HMSO. The first is on 'Fission balance tests in GLEEP,' and describes the method of testing samples of uranium and graphite for use in the piles. The second is a report of a symposium on 'Utilisation of radiation from fission products' held at Harwell on 23 and 24 February 1953, and includes contributions on the preservation of food, sterilisation of pharmaceutical products, long chain polymers and organic high polymers. 'Liquid-liquid extraction' is the subject of the third report, which is a critical survey of the literature.

Insecticides in Bombs

A campaign using BHC or DDT smoke bombs as the weapons against tsetse fly in East and Central Africa is being developed for the Ministry of Supply and the Colonial Office by Tiltman Langley Laboratories Ltd., of Redhill, Surrey. The bombs are to be dropped by parachute and each has a clockwork timing detonator which can be set for any period up to 14 hours.

Chemical Industry & Textiles

The third of the Emsley lectures, commemorating the memory of John Emsley, first fellow of the Textile Institute and a past president, was given at the Textile Institute headquarters on 29 January, by Monsieur L. Pranal, L.es.Sc., of Société Rhodiaceta, Lyon, whose subject was 'The Chemical Industry and Textiles in Europe.'

Electrodepositors' Conference

A preliminary announcement by the International Council for Electrodeposition states that the fourth international conference on Electrodeposition & Metal Finishing, including Organic Finishing, will be held in London from 20-24 April. It will comprise a comprehensive series of technical sessions, works visits and social functions.

Fertiliser Society Meeting

A paper entitled 'Nitrogen & Phosphate Fertilisers in North-West Europe' will be presented by Dr. G. W. Cooke, at a meeting of the Fertiliser Society in the lecture hall of the Royal Society of Tropical Medicine & Hygiene, Manson House, 26 Portland Place, London, W.1, on 25 February at 2.30 p.m.

Short Course in Metallurgy

The Ministry of Education is arranging a short course in metallurgy for teachers in technical colleges, to be held in the County Technical College, Wednesbury, 14-24 July. The course will deal with modern metallographic techniques, mechanical and thermal treatment, modern methods of analysis, and radiographic techniques. Tuition will be free, but a charge of £13 will be made for board and lodging. Further details may be obtained from local education authorities.

· PERSONAL ·

MR. L. G. HARRIS has resigned from the board of British Emulsifiers Ltd.

The Council of the Chemical Society has nominated MR. M. W. PERRIN, C.B.E., F.R.I.C., chairman of the Wellcome Foundation Ltd., to fill the vacancy of treasurer caused by the resignation of SIR WALLACE AKERS, C.B.E., F.R.S., which will take effect from 2 April, the date of the society's annual general meeting.

DR. H. A. KREBS, F.R.S., Professor of Biochemistry at Sheffield University, was the guest of honour of the Friends of the Hebrew University of Jerusalem at a dinner at the Savoy Hotel, London, last week. It was announced that in view of his achievements in the field of research the Friends had decided to raise a fund for the promotion of fundamental research in the faculties of Medicine and Science at the Hebrew University in Jerusalem.

MISS CATHERINE M. FERGUSSON has been appointed women's welfare officer at the Stork Margarine Works of Van den Berghs & Jurgens Ltd., Bromborough, Cheshire. She joined the company in 1952 and was previously assistant personnel officer with a Midland engineering firm, and holds a diploma in social studies from Birmingham University.

Left: Mr. E. M. Fraser, C.B.E., whose appointment as chairman of Plant Protection Ltd. was announced in THE CHEMICAL AGE last week. On the right is Mr. T. Ainslie Robertson, who is retiring on 31 March and whom Mr. Fraser will succeed

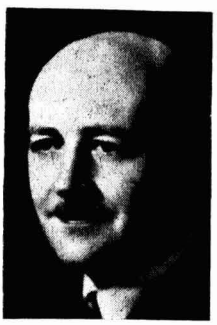
Dr. J. W. Armit, who is retiring on 31 March as chairman of the Wilton Council of I.C.I., and his successor, Mr. C. M. Wright

MR. T. H. HILTON, of Joseph Crosfield & Sons Ltd., soap and chemical manufacturers, Warrington, has left the UK on a four months' tour of the Caribbean area in connection with the sale of sodium silicate, the well known bottle washing detergent Solgon and allied products. Mr. Hilton, who previously visited this area in 1950, will call upon customers and potential customers to offer technical advice and assistance with the object of further expanding the company's export sales. Countries included in the tour are: Jamaica, Barbados, Trinidad, British Guiana, Suriname, Venezuela, Netherlands, Antilles, Panama, Costa Rica, Nicaragua, Salvador, Guatemala, Bahamas, and Bermuda.

DR. WILLIAM E. CHACE, for seven years Director of Information of The National Fertiliser Association, has been appointed Assistant Public Relations Director of the Manufacturing Chemists' Association Inc., Washington, USA.

Thompson Trailer Corporation, Pikesville, Maryland, USA, announces the election of MR. ALLAN HOOVER, son of former President Herbert Hoover, and MR. RICHARD I. GALLAND, chief counsel, Mathieson Chemical Corporation, to its board of directors. Mr. Hoover is a director of Pitney-Bowes Inc., Combined Metals Reduction Co., and Compania Minera de Guatemala.

DR. W. ANGUS MACFARLANE, of the Department of Scientific & Industrial Research and at present director of the UK Scientific Mission in North America, has been appointed general manager of the recently formed National Industrial Fuel Efficiency Service. He will take up his new duties in March.



After graduating at Balliol Dr. Macfarlane spent two years at the University of California, where he gained his Ph.D. Next he joined the Fuel Research Station of the DSIR, from which he took up an appointment as senior chemist of the LMS Railway under his old tutor, Sir Harold Hartley, and the experience he thus gained in the practical and theoretical sides of fuel utilisation stood him in good stead for his later posts at the Ministry of Fuel & Power.

He became the first Director of Fuel Efficiency and held that post until 1948, when he was appointed Director of the UK Scientific Mission in North America and attache for scientific questions at the British Embassy at Washington.

As Director of Fuel Efficiency Dr. Macfarlane was responsible for the development of the organisation from a staff of half-a-dozen to more than 100 engineers and technical men. The success of the work during the war was largely due to his ability to enlist the co-operation and often the enthusiastic help of management and engineers engaged in industry and it is believed that the confidence he engendered then will go far towards ensuring an enthusiastic reception for the new service in technical and business circles.

MR. H. J. HADOW, of the Department of Scientific and Industrial Research, is to succeed DR. W. A. MACFARLANE as director of the UK Scientific Mission in the British Commonwealth Scientific Office in Washington. He will take up this appointment in March and will also be attache for scientific questions to the British Embassy.

MR. T. A. MCKENNA, chairman of the Staveley Iron & Chemical Co. Ltd., and two of the directors, MR. M. R. NORMAN and MR. A. E. PEAK, have resigned from the board of that company by arrangement with the Iron & Steel Holding & Realisation Agency. Their resignations follow the decision of the Staveley Coal & Iron Co. Ltd. not to negotiate for the purchase of the Staveley Iron & Chemical Co. Ltd. from the Holding & Realisation Agency.

Obituary

One of the most prominent figures in the iron and steel industries between the wars, MR. EDMUND JOHN FOX, M.I.Mech.E., formerly managing director of the Stanton Ironworks Co. Ltd., died recently at the age of 80. He joined the Stanton Ironworks Co. in 1917 as managing director and remained with the company until 1942. During that period the company developed into one of the largest manufacturers of cast-iron pipes in Europe and it was under Mr. Fox's guidance that the centrifugal casting process, which completely revolutioned pipe manufacture, was largely developed at Stanton. The success of this process was commemorated by the donation which Mr. Fox gave to the Institute of British Foundrymen in 1936 to provide for the annual award of the E. J. Fox Medal for outstanding work in the field of foundry metallurgy.

In 1931, Mr. Fox assumed also the chairmanship of Davy & United Engineering Co. Ltd. His establishment in 1921 of works committees at Stanton was a pioneering development in employer-employee relationships and he was also a pioneer employer of industrial nursing in heavy industry.

Glaxo Laboratories Ltd. announce the death on 26 January of MR. WILLIAM MCINTOSH, the company's sales manager for Scotland. Mr. McIntosh, who was 60, died in hospital in Edinburgh after a brief illness. In 1912 he joined Glaxo in London and worked in their sales office until the outbreak of war in 1914. He resumed his work for Glaxo in Scotland in March, 1919, and in 1947 was appointed the company's sales manager for Scotland. Mr. McIntosh was a Fellow of the Incorporated Sales Managers' Association and was on the Central Council. He had held the office of chairman of the Edinburgh branch, of which he was a founder member.

Publications & Announcements

SILASTOMER is the registered trade name of a comprehensive range of silicone rubbers marketed by Midland Silicones Ltd. Essential facts regarding Silastomer and some of the ways in which its unique properties are being utilised to provide resilient rubber material in conditions where neither natural nor synthetic rubber can be used are described in an illustrated booklet recently published by the company. Subjects covered include the general properties of Silastomer and its physical, mechanical, chemical and oil resistant properties. Copies of the booklet are obtainable on application to the company at 19 Upper Brook Street, London, W.1.

* * *

YIELD and cost advantages, principal operating features, and economics of a unique process design for ammonia plants are outlined in a booklet issued by the M. W. Kellogg Co. An outcome of Kellogg's wide experience with ammonia production, the present process includes a number of additional design innovations developed in the company's own semi-commercial plant. They are being incorporated in two new units now under construction by Kellogg in the US. Among the unusual features of the process is a reforming step which takes advantage of the high pressures at which natural gas is available. By conserving the potential energy of the feed and producing synthesis gas at relatively high pressure, savings in compressor horsepower of 25 to 35 per cent are claimed to be obtainable. Copies of the booklet may be obtained from the Chemical Process Division, the M. W. Kellogg Co., 225 Broadway, New York 7, New York.

* * *

A VALUABLE publication issued monthly by Foster D. Snell, Inc., of New York, *Chemical Market Abstracts,* can now be supplied in this country, and full particulars can be obtained from Dr. M. A. Phillips and Associates, 14 Western Road, Romford, Essex.

* * *

BDH announce that, by arrangement with T. B. Ford Ltd., manufacturers of the standard coloured absorbent paper used and proprietors of the trade name 'Fordisc,' they are preparing and issuing sterile discs (not impregnated) for use in the assay of antibiotics in body fluids, as in the Edinburgh standard disc diffusion test. The discs are available in five colours; red, white, green, yellow and orange; and a booklet on their application is available free. Other new BDH products include allyl acetate, germanium dioxide, triethylene tetramine, and grades of lead oxide and tin metal suitable for use in carbon estimations.

* * *

THE December issue of 'BASF,' the journal of the Badische Anilin und Soda Fabrik, contains an article, illustrated in colour, describing some recently erected laboratories. Other articles include one on 'Problems of Costing' and one on 'Hæmoglobin, Chlorophyll and Phthalocyanine.'

* * *

IN response to many requests, A.E.G. Electric Co. Ltd., 131 Victoria Street, London, S.W.1, have produced a leaflet giving details of part of their range of AC and DC motors up to 250 h.p. All these machines are British built to British Standards and, the manufacturers point out, have been extensively field-tested in recent years in overseas markets. Copies of the leaflet, also of the company's Export Price List No. N.53, for fractional h.p. electric motors and induction motors, are obtainable on application to the company.

* * *

IN addition to the usual requirements of adequate mechanical strength, springs must often be used in conditions which add further problems in specifying the material which will give the required properties. Such requirements may include resistance to corrosion to minimise failure due to corrosion-fatigue, or resistance to high-temperature conditions. Sometimes a special characteristic is required, such as amagnetism at temperatures in the sub-zero range, or low or high electrical or thermal conductivities. Such properties and characteristics are claimed to be available in the wide range of high-nickel alloys, and a recent publication, 'Nickel Alloy Spring Materials,' issued by Henry Wiggin & Co., Ltd., Thames House, Millbank, London, S.W.1, presents in convenient form, data to assist

the designer to make the correct selection of materials. First published two years ago, this revised edition now contains data on Nimonic 90, an alloy which is rapidly winning acceptance for springs operating at high temperatures.

* * *

THE 1954 catalogue of books on chemical industry published by H. K. Lewis and Co., Ltd., 136 Gower Street, London, W.C.1, has just been issued. It consists of more than 40 pages and is conveniently sectionalised. The publishers point out that in addition to the catalogue, bi-monthly lists are issued and sent free on application.

* * *

THE Bisol range of low-temperature plasticisers, hitherto mainly represented by the adipates and sebacates, has been extended by the addition of Bisoflex 102 (triethylene glycol dicaprylate), which is fully described in 'Bisol Technigram' No. 5/54, published by British Industrial Solvents, 4 Cavendish Square, London, W.1. When used as a relatively non-volatile plasticiser with a variety of commonly used polymers, Bisoflex 102 is stated to impart valuable low-temperature properties, which are outstanding in the case of synthetic oil-resistant rubbers of the butadiene-acrylonitrile type. Reference is made in the 'Technigram' to the moderate price of this material; the prices per lb. (delivered UK) range from 4s. 6½d. for 1-ton lots in returnable 45-gal. drums to 4s. 10¾d. for 5-gal. lots in non-returnable cans.

* * *

AMONGST the articles in *Resin Review* No. 10, published by the Rohm & Haas Co., Philadelphia, are some notes on the formulation of acrylic resin emulsion paint, a study of catalysts employed in urea-formaldehyde adhesives, and some data on the 'Paraplex' polyester resins. Copies of the publication may be obtained from the company.

* * *

MONTECATINI'S unique 'ammonia-saturated' process for producing urea is the subject of a new eight-page booklet published by The M.W. Kellogg Co., 225 Broadway, New York City. The new urea process is stated to have demonstrated distinct advantages in lower operating costs, reduced initial investment, higher yields, high on-stream efficiency, and high product purity. Without further purification steps, the urea produced is suitable for either resins or feed supplements. The process is a partial re-cycle system which utilises an unusual expansion-condenser unit to recover nearly 75 per cent of unreacted ammonia and carbon dioxide. The latter are re-cycled as a solution in fresh ammonia and steam condensate—a feature that makes for greatly reduced compressor requirements as compared with other partial re-cycle processes. Excess ammonia in the re-cycle stream is also instrumental in reducing corrosion problems usually associated with urea manufacture.

* * *

BOILING dry of electric sterilisers in hospitals has often caused irreparable damage, but it is hoped that an instrument developed by Buchanan Brothers Ltd.—the 'Clyde' depth switch—will henceforth prevent this accident. The principle of the switch is such that at least 2 in. of water must be in the tank before it will allow current to pass. As the water boils away, the switch breaks contact when the level has fallen to 1½ in., and cannot be re-set until the water has once more been raised to 2 in. The instrument can be adapted to give automatic liquid level control, by connection through the switching mechanism of pumps supplying the liquid. Further details may be obtained from the manufacturers at 80 and 80a Commerce Street, Glasgow, C.5.

'Bisol' Price Reductions

WE are informed by British Industrial Solvents that the prices of 'Bisol' acetone and methyl acetate (80 per cent ester) and of the 'Lobosol' range of low-boiling solvent mixtures have been substantially reduced with effect from 1 February.

'Bisol' acetone is reduced by £7 per ton throughout the schedule, the new prices (delivered UK) ranging from £95 per ton for 50-ton lots, spot or contract (in drums returnable at sellers' expense), to £136 per ton for 5-gal. lots (in non-returnable cans).

For the remaining materials, the new 10-ton prices, spot or contract, delivered UK in drums returnable at sellers' expense, are:

Methyl acetate (80 per cent ester)	£128 per ton	(£ 5 reduction)
Lobosol F.S.	£128 ,,	(£ 5 ,,)
Lobosol M.A.	£ 86 ,,	(£10 ,,)
Lobosol M.T.S.	£ 85 ,,	(£10 ,,)
Lobosol S.S.	£107 ,,	(£ 4 ,,)

Corresponding reductions have been made for smaller quantities. In all cases, bulk delivery allowances remain unchanged.

Law & Company News

Commercial Intelligence

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

Satisfactions

BRITISH COAL UTILISATION RESEARCH ASSOCIATION, Leatherhead. Satisfaction, 7 January, of second debenture registered 15 April, 1947, to the extent of £15,000.

COMTESSE LABORATORIES LTD., London, E. Satisfaction, 6 January, £1,000 registered 25 February, 1952.

New Registrations

E. W. Boulton & Co. Ltd.

Private company. (528,536). Capital £300 in £1 shares. Manufacturers of equipment for the chemical and allied industries, chemical and gas engineers, etc. Directors: E. W. Boulton and V. S. Talbot. Reg. office: 74 Beechwood Road, Newport, Mon.

Okura Trading Co. Ltd.

Particulars filed pursuant to Section 407 of the Companies Act 1948. The total number of shares to be issued by the company shall be 8,000,000 shares of par value stock of 50 yen each. Registered in Japan. To carry on the sale of merchandise, machines and instruments for weighing and measuring medicines and industrial chemicals, alcoholic beverages, fertilisers, etc. British address: 28 Bishopsgate, E.C.2.

Company News

Reckitt & Colman Holdings

An announcement by Reckitt & Colman Holdings states that acceptances have been received from the holders of over 90 per cent of the issued capital of Reckitt & Sons, and from the holders of over 90 per cent of the issued capital of J. & J. Colman. Accordingly the offer to the stockholders of the two companies has become binding, and forms of transfer will be sent to accepting stockholders as soon as possible. Reckitt & Colman Holdings was formed with the primary object of effecting and completing the amalgamation of Reckitt & Sons and J. & J. Colman, manufacturers of mustard, starch, etc. Acceptance of the offer means that the issued capital of the holding company will be £18,897,895, of which about 84 per cent will be ordinary.

English China Clays Ltd.

Higher profits for the year ended 30 September last than for the previous year have been announced by English China Clays Ltd., and a final dividend of 4⅜ per cent, making 6¾ per cent for the year, tax free, as compared with 5¼ per cent net previously. After allowing tax provision of £874,465 (against £667,865), the group net profit is £462,793, which is £83,415 higher than for the previous year. Of this balance, £363,146 is attributable to the parent company. In 1932 the company transferred its china clay business to English Clays Lovering Pochin & Co., which it controls. This operating company is also raising its distribution—from 5 per cent to 6 per cent, tax free, with a final of 4 per cent net.

Harwell Electronics Course

APPLICATIONS are invited by the Atomic Energy Research Establishment, Harwell, from physicists and electronic engineers holding a degree, or equivalent qualification, who wish to attend the eighth specialised course on the design, use, and maintenance of electronic instruments used in nuclear physics, radiochemistry, and in work with radioisotopes.

The course, to be held at the Isotope School, Harwell, from 5-9 April, is limited to 12. It will include lectures and practical work concerned with counters, DC and pulse amplifiers, coincidence units, scalers and ratemeters. The lecturers and demonstrators will be AERE specialists.

The fee for the course is 12 gns., and living accommodation can be arranged locally at a charge of about five gns. Application forms can be obtained from the Electronics Division, AERE, Harwell, near Didcot, Berks.

Next Week's Events

MONDAY 8 FEBRUARY

Society of Chemical Industry

London: Royal Institution, Albemarle Street, W.1, 6 p.m. Joint meeting of London Section and Agriculture Group. Jubilee Memorial Lecture, 'The Production & Use of Fertilisers—Some Current Trends & Problems,' by Dr. E. M. Crowther.

Institute of Metals

Glasgow: 39 Elmbank Crescent, C.2, 6.30 p.m. W. Dunlop: 'Some Practical Hints on the Production of Non-Ferrous Castings.'

Incorporated Plant Engineers

Dundee: Mathers Hotel, 7.30 p.m. Film show.

North East Metallurgical Society

Middlesbrough: Cleveland Scientific & Technical Institute, 7.15 p.m. Dr. F. R. Himsworth: 'Protection of Steelwork from Atmospheric Corrosion.'

TUESDAY 9 FEBRUARY

Chemical Society

Nottingham: The University, 4.45 p.m. Joint meeting with University Chemical Society. Professor J. M. Robertson: 'Recent Advances in the X-ray Study of Complex Molecules.'

Society of Chemical Industry

London: Geological Society's rooms, Burlington House, Piccadilly, 5.30 p.m. Chemical Engineering Group meeting. N. P. Inglis: 'Non-ferrous Metals for the Chemical Engineer.'

Society for Analytical Chemistry

London: Chemical Society's rooms, Burlington House, Piccadilly, 7 p.m. Physical Methods Group meeting. E. Bishop: 'The Principles of Coulometric Analysis'; N. Bett: 'An Automatic Coulometric Titrimeter'; G. Packman: 'Some Apparatus & Techniques for Semi-Micro Coulometric Analysis.'

WEDNESDAY 10 FEBRUARY

Royal Institute of Chemistry

Walthamstow: S.W. Essex Technical College, Forest Road, E.17, 7 p.m. Joint meeting with College Chemical Society. Dr. G. L. Miller: 'The Production & Properties of Zirconium & Titanium.'

Society of Chemical Industry

Cambridge: Low Temperature Research Station, Downing Street, 2,15 p.m. Joint meeting of Food and Microbiology Groups. Symposium: 'The Preservation of Food with Ionising Radiations.'

Falkirk: Lea Park Rooms, Callendar Road, 7.30 p.m. Joint meeting with RIC. M. Stacey: 'Fluorocarbons.'

Incorporated Plant Engineers

Nottingham: Gas Showrooms, Parliament Street, 7 p.m. A. Peel: 'Air Conditioning.'

THURSDAY 11 FEBRUARY

Chemical Society

Dundee: University College (Chemistry Department), 5.15 p.m. Dr. J. W. Linnett: 'The Structure of Flames.'

Sheffield: The University (Chemical Lecture Theatre), 7.30 p.m. Joint meeting with University Chemical Society. Dr. R. N. Haszeldine: 'Modern Fluorine Chemistry.'

Society of Instrument Technology Ltd.

London: Manson House, Portland Place, 6.30 p.m. J. C. Farquhar: 'Automatic Combustion Control.'

Liverpool Metallurgical Society

Liverpool: The Temple, Dale Street, 7 p.m. A. D. le Claire: 'Diffusion in Metals.'

Incorporated Plant Engineers

Newcastle-on-Tyne: Roadway House, Oxford Street, 7 p.m. J. Rolston: 'Metallurgy.'

FRIDAY 12 FEBRUARY

Royal Institute of Chemistry

Brighton: Technical College, 6.30 p.m. Joint meeting with College Chemical Society. M. A. Phillips: 'Synthetic Counterparts of Natural Products.'

Chemical Society

Southampton: The University (Chemistry Department), 5 p.m. Joint meeting with RIC and University Chemical Society. Professor R. G. W. Norrish: 'Photochemical & Spectroscopic Methods of Studying Fast Reactions.'

Society of Chemical Industry

Cardiff: University College, 7 p.m. Joint meeting of South Wales Section with RIC. Display of scientific films.

Institute of Fuel

Leeds: The University, 6.30 p.m. G. Nabarro, M.P.: 'Aspects of a National Fuel Policy.'

[continued on page 390

Next Week's Events

continued from page 388

Institute of Welding

London: Holborn Restaurant, 218 High Holborn, W.C.2, 7 p.m. London branches' joint dinner.

SATURDAY 13 FEBRUARY

Royal Institute of Chemistry

Reading: The University (Zoology Lecture Theatre), 2.30 p.m. Joint meeting with Society of Clinical Biologists. Symposium: 'Physical Methods in Biochemistry.'

Society of Chemical Industry

Liverpool: Radiant House, Bold Street, 2.30 p.m. Joint meeting of North West branch with ICE. G. H. Reman: 'Mixing of Solid Particles & Gas in a Fluid Bed.'

Market Reports

LONDON.—Market conditions are fairly steady in most sections and reports indicate a more active call from the textile and plastics industries, and paint raw materials are receiving a better inquiry. The price position generally is firm with rates held at recent levels, but there are one or two exceptions, notably Bisol acetone, reduced by £7 per ton, and methyl acetate (80 per cent ester) by £5 per ton. The changes came into effect on 1 February. Among the chemical compounds of lead there was an increase in the price of white lead, red lead and litharge on 28 January, the revised basis prices being dry white lead £121 5s. and ground £128 10s. per ton; red lead and litharge £116 10s., red lead ground £138 10s. per ton. Business in the coal tar products has been good, with pitch continuing active both for home and export account. Creosote oil and cresylic acid are in good request and the demand for shipment is reported to be better.

MANCHESTER.—The chief price movements of any consequence on the Manchester chemical market during the past week have been a reduction of £7 a ton in acetone and cuts of varying extent in methyl acetate and certain other solvents. The demand for the heavy products has been on steady lines and a fair number of fresh enquiries, including some for export, have been dealt with. Movements of most descriptions of fertiliser materials have continued to show a further slight improvement and this is expected to develop steadily, while a fairly good demand for most of the light and heavy tar products has been reported.

GLASGOW.—Another satisfactory week's trading has been experienced by most sections of the chemical industry. Prices have again been fairly steady and the drop of £7 per ton in acetone with effect from 1 February is welcomed. On the whole the position is very sound.

Cellulose Textiles

DR. D. A. CLIBBENS, B.Sc., Ph.D., F.T.I., has accepted an invitation from the Council of the Textile Institute to deliver the 1954 annual Mather Lecture following the Institute's annual general meeting at Queen's University, Belfast, on 30 April.

The title of the lecture is to be 'Cellulose Chemistry and the Textile Industry.' Dr. Clibbens, an honorary fellow of the Institute, was until recently head of the Chemistry Division of the British Cotton Industry Research Association.

The Mather Lecture, first delivered in 1919, is in memory of Sir William Mather, Institute president from 1915 to 1917.

CLASSIFIED ADVERTISEMENTS

SITUATION 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.

PYRETHRUM BOARD OF KENYA. CHEMIST required to take charge of chemical laboratories in Nakuru dealing with the analysis of pyrethrum flowers and with chemical investigations in connection with the growing, preparation and marketing of the material. Applicants should have University Degree with first or second-class honours, chemistry as principal subject, or an equivalent qualification, or possess high professional attainments. They must also have had considerable experience in directing the investigation of raw materials of plant origin, for preference experience with pyrethrum. Basic salary within the commencing range, £1,200/£1,300, according to qualifications and experience. The post provides for a cost-of living allowance, provident fund and free passages. Application forms can be obtained by writing to **BOX "JA/152" c/o 95, Bishopsgate, E.C.2.**

FOR SALE

CHARCOAL, ANIMAL AND VEGETABLE horticultural, burning, filtering, disinfecting, medicinal, insulating; also lumps ground and granulated; established 1830; contractors to H.M. Government.—**THOS. HILL-JONES, LTD., "INVICTA" WORKS, BOW COMMON LANE, LONDON, E. TELEGRAMS: "HILL-JONES, BOCHURCH LONDON." TELEPHONE 3285 EAST.**

ECONOMIC BOILERS, 10 ft. Danks. 12,000 lb. evap, 250 lb. pressure; 8 ft. diam. by 14 ft. Paxman. 180 lb. w.p. Twenty others, all sizes.
Whessoe Open Top Riveted Steel **MIXING TANK** 13 ft. diam., by 15 ft. deep, 9/16 in. plate.
NEW GALVANISED PIPING. Immediate delivery.
TWO 35 ft. long by 9 ft. diam. Lead-lined **TANKS.**
ONE Stainless **CONICAL HOPPER,** 7 ft. 3 in. diam., overall depth, 7 ft. 6 in.
TWO Broadbent **WATER-DRIVEN CENTRIFUGES,** 30 in. diam., 12 in. deep, 1,150 r.p.m., 150 lb. pressure.
SIX O.T. TANKS, 7 ft. diam., 14 ft. deep, rubber and brick lined.
Six Aluminium **CONDENSERS,** 14 ft. long by 2 ft. 6 in. diam. 386 Tubes, ¾ in. o.d.
FORTY Riveted **RECEIVERS,** 8 ft. 6 in. long, 5 ft. 6 in. diam., 75 lb. w.p.
CAST-IRON PIPES. 800 yds. 6 in.; 400 yds. 8 in. **NEW.** Also most other sizes.
VALVES in Stainless, Gunmetal, Enamel Lined.
Free Catalogue. "Watkins Machinery Record," **available**

FRED WATKINS, (BOILERS) LTD., COLEFORD, GLOS.

ONE TORRANCE MICRO TWIN-ROLLER MILL. Cast rolls, 14 in. by 8 in. Water cooled. Fast and loose pulley-drive.
TWO DE LAVAL SEPARATORS, VEE-BELT DRIVE. Good condition.
THOMPSON & SON (MILLWALL), LIMITED, CUBA STREET, LONDON, E.14. TEL. EAST 1844.

FOR SALE

C. BARBER, LTD.

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

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

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

RICHARD SIZER, LIMITED, ENGINEERS, HULL.
Telephone: 31743.

975 UNUSED PLYWOOD DRUM CONTAINERS, 18 in. diam., 26½ in. high, complete with lids and fixing rings and separate bituminised paper lining bags. Price 12s. 6d. each. **LAWTON ENGINEERING CO., CORRINGHAM, ESSEX.** 'Phone: Stanford-le-Hope 3206.

NEW 30 ft. by 9 ft. Horizontal Cylindrical Welded ¼ in. plate **STORAGE TANKS** available for despatch in 2 to 3 weeks.
Also all other types—Petrol, Oil and Water Tanks from 100 to 10,000 gallons.
WILLIAM R. SELWOOD, LIMITED, CHANDLER'S FORD, HANTS. 'Phone: 2275.

FOR SALE

STAINLESS STEEL PLATE HEAT EXCHANGER by **A.P.V. CO., LTD.** Type HH. 76 plates 43 in. by 16 in., total projected area 346 sq. ft. Hydraulically operated opening and closing gear.

STAINLESS STEEL CRYSTAL DRIER by **MITCHELL,** 3 ft. 6 in. diam. by 1 ft. 6 in. deep. **STEAM JACKETED** flat bottom with two S.S. paddles underdriven through bevel gearing from direct-coupled 1 h.p. 400/3/50 geared motor. Jacket working pressure, 15 lb per square inch.

M.S. SPIRIT EXTRACTION PLANT, comprising 3 ft. diam. by 5 ft. deep extractor with dished bottom jacketed for 5 lb. per square inch working pressure, condenser, separator, storage tank.

KESTNER HORIZONTAL TUBULAR EVAPORATOR, having six turns copper tube 1¼ in. bore by 6 ft. long, complete with copper reception pot.

STEAM JACKETED COPPER STILLS, 150 gallons capacity. Fitted swan-neck, sight and light glasses, etc., and complete with copper coil condenser. Jacket working pressure 40 lb. per square inch.

STEAM JACKETED COPPER BOILING PAN, 100 gallons capacity. Bolted-on cast-iron jacket suitable for 40 lb. per square inch working pressure.

DOUGH MIXER, having " U " trough 1 ft. 5 in. by 1 ft. 7 in. wide at top by 2 ft. deep. Sheet brass trough, cast-iron ends, G.M. agitator. Belt driven and arranged for hand tilting.

M.S. HORIZONTAL " U " TROUGH MIXER, 3 ft. by 1 ft. 9 in. by 2 ft. deep. Fin-type agitating gear belt driven through helical gearing from fast and loose pulleys. Arranged for hand tilting.

Cast-iron **VACUUM DRYING OVEN** by **TAYLOR,** 4 ft. by 2 ft. 10 in. by 4 ft. 6 in. front to back, having ten steam-heated M.S. platens pitched at 3 in. Hinged door at each end. Steam working pressure 15 lb. per square inch.

HARRISON-CARTER DISINTEGRATORS, sizes 2½ and 00. Belt driven.

PROCESS & CHEMICAL ENGINEERING CO., LTD.,
6/8, NORTHUMBERLAND PARK,
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Phone : **TOT**tenham 2436 (3 lines).

FOR Sale. 300 Tons Grease. Accept low price for whole lot ex-site Middlesex. 100 Tons Crude Drained Naphthalene ex-Scunthorpe. Suitable for fire lighters. Also Refined Flake and Ball Napthhalene. **KERSHAW, DALE CHAMBERS, BRADFORD, YORKS.**

MORTON, SON AND WARD LIMITED,
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MIXERS

"**M**ORWARD" "**U**"-shaped Trough Mixers in any size up to 3 tons.

MIXERS, Horizontal or Vertical. Jacketed or unjacketed, made to requirements. Several in stock.

3-cwt. Trough **MIXERS** by **CHALMERS** and **GARDNER.** Stainless steel lined troughs.

JACKETED PANS

In stainless steel or mild steel. With or without mixing gear.

500g. Jacketed **AUTOCLAVE** with detachable cover. 150 lb. in jacket.

500g., 300g. and 200g. **AUTOCLAVES** in mild steel riveted construction with detachable covers.

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

PUMPS

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

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MORTON, SON AND WARD LIMITED,
WALK MILL,
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600

MIXERS

FOUR **SIFTER MIXERS** by Young. Mild steel mixing trough, 64 in. by 21 in. by 22 in. deep. Blending chamber feeds material to positive action brush sifter. Fast and loose pulley drive.

TROUGH MIXERS—49 in. by 41 in. by 31 in., with twin " Z " mixing blades fitted counter-balance lid. Motorised 50 h.p. 415/3/50 through reduction gear. Quadrant power tilting gear driven by 5 h.p. motor.

TWO Horizontal Trough **PUG MIXERS** — 3 ft. 10 in. by 2 ft. 6 in. by 2 ft. 6 in. deep. Mild steel construction. Spiral scraper-type agitator, 6 in. outlet worm operated. Hinged steel cover. Fast and loose pulley drive through spur gearing.

Horizontal **DOUBLE TROUGH MIXER** with mild steel welded trough 40 in. sq. by 36 in. deep. " Z"-type agitators, double geared, motorised 400/3/50. Power-operated tilting.

SIFTER MIXER—size G. Mixing chamber 60½ in. by 17 in. by 21 in. deep with brush sifter mounted over. Spiral type agitator. Mixer and sifter motorised 400/3/50. Timber feed hopper to sifter, 20 in. by 18 in. by 12 in. deep.

Powder **SIFTER MIXER** by Geo. Porteous—size 6, Capacity 560 lb. Mild steel trough 60 in. by 27 in. by 31 in. deep, 4 in. sq. centre outlet. Timber hopper feeding sifter with 20 mesh screen. Reject chute for oversize material. Broken scroll agitator driven through spur gearing by motor 415/3/50.

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

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STORAGE AND MIXING VESSELS

SEPARATORS, ETC.

DISH-ENDED WELDED STEEL TANKS, 30 ft. by 8 ft diam., ½ in. plate. In excellent condition. Supplied ready for use.

2—**DITTO,** lead lined.

2—**VERTICAL ALUMINIUM TANKS,** each 9 ft. diam. by 10 ft. deep, fitted with stainless steel covers.

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