

THE Chemical Age

VOL. LXXIII

13 AUGUST 1955

No. 1883

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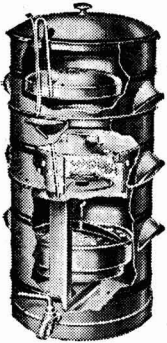


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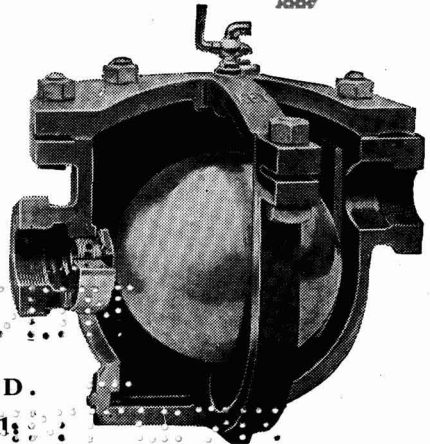
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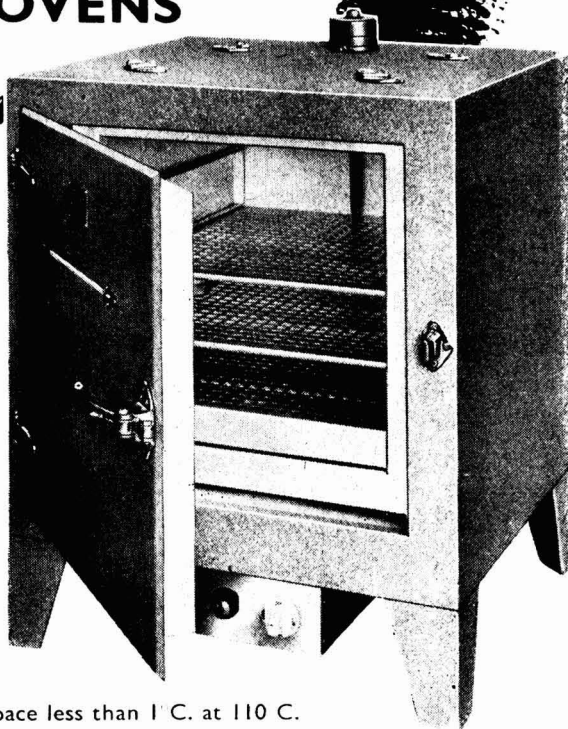
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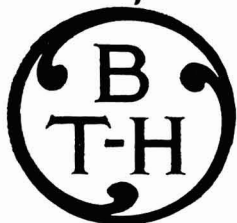
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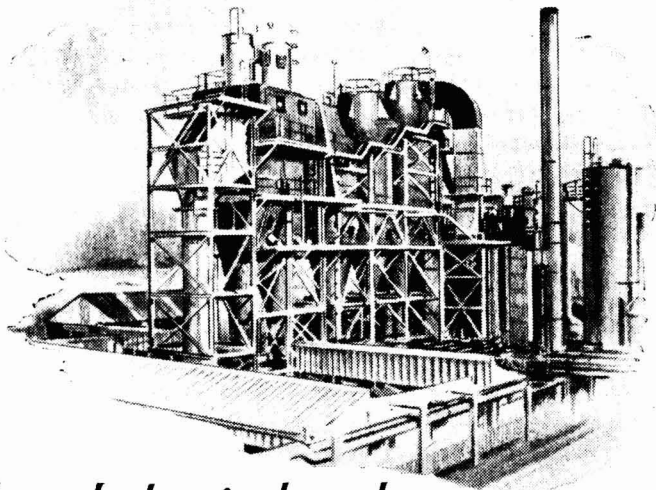
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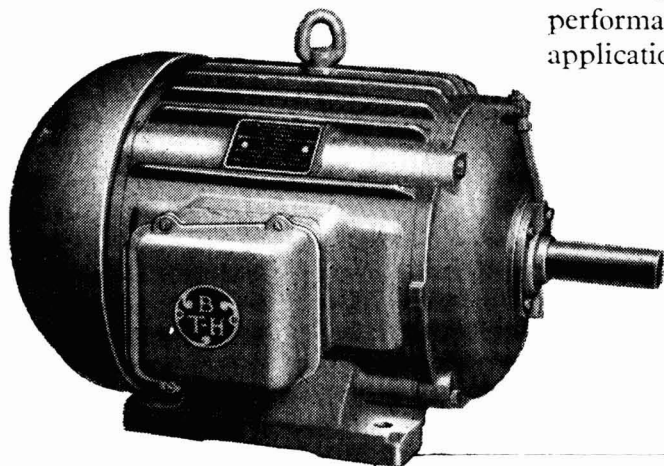
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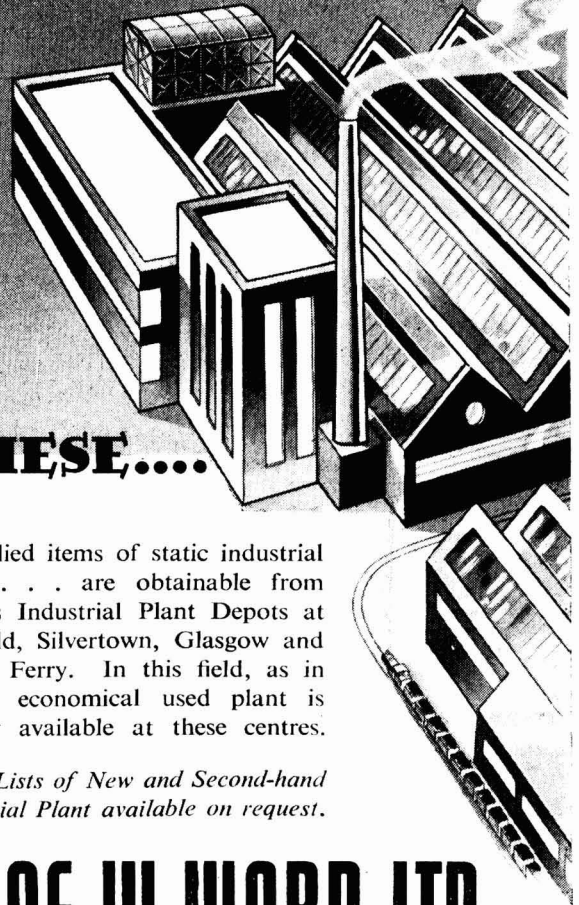
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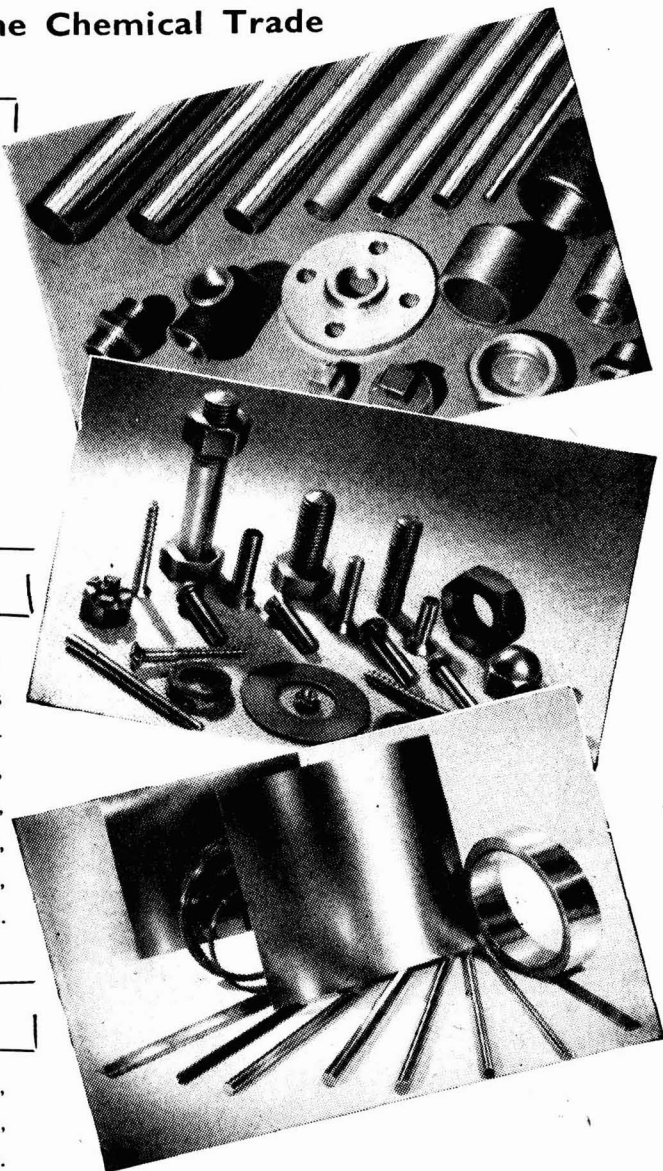
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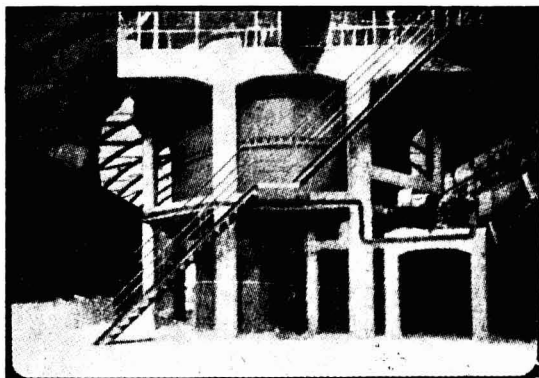
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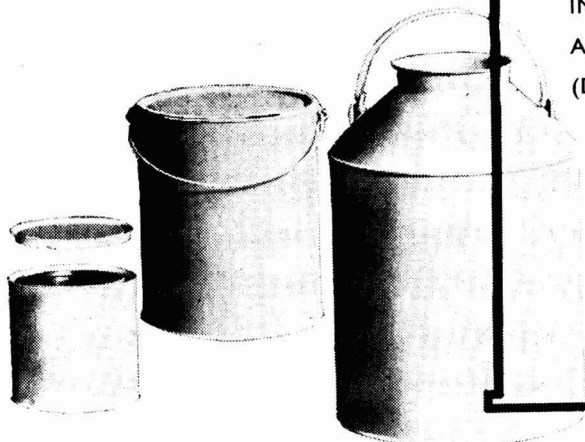
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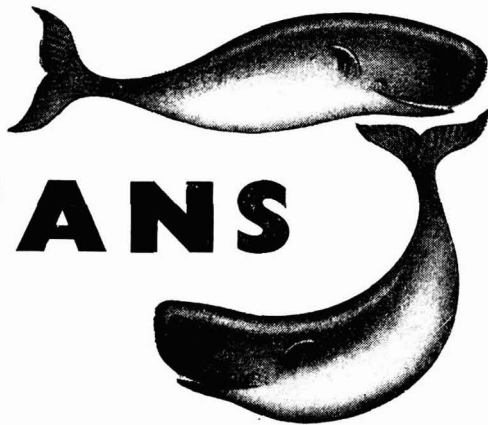
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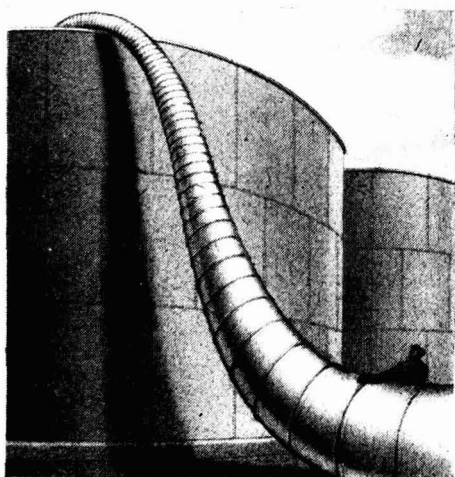
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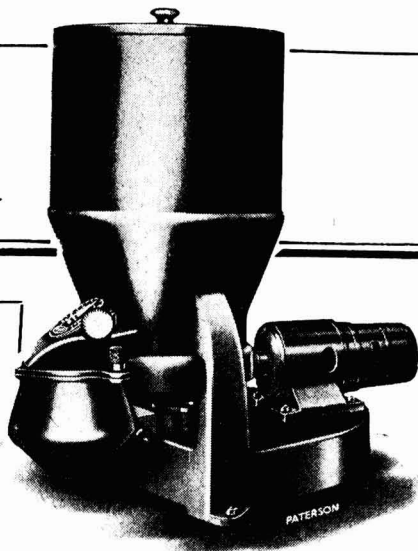
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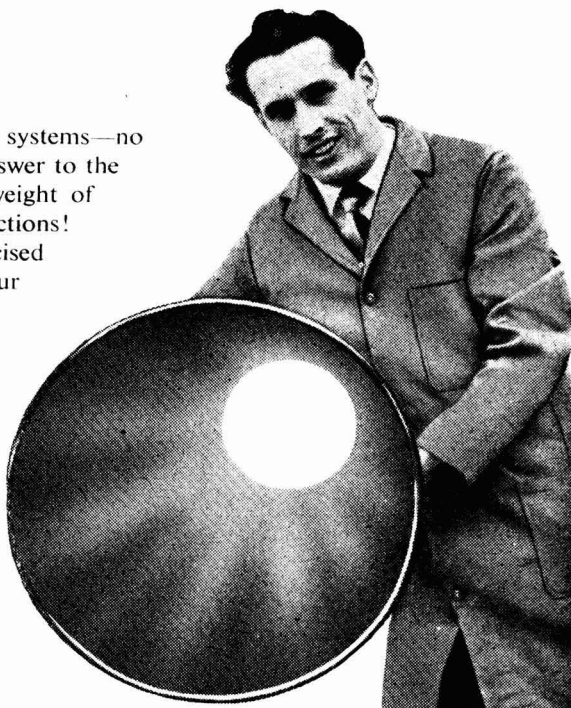
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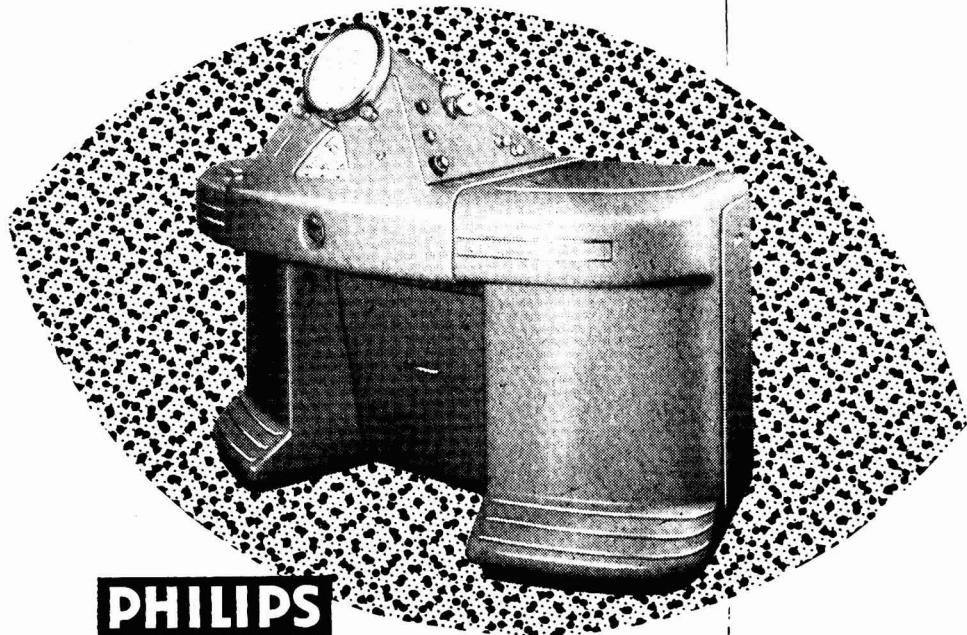
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Plastics & Plant

THE chemical industry as a producer of plastics is a topic that has become almost tritely familiar. To arrest notable and new attention, a plastics substance must be one with exceptional properties or it must be given some remarkably novel and unexpected use. The chemical industry as a consumer of plastics is in most senses a much less over-worked topic. Indeed, as a broad theme it is seldom discussed and most of the introductions of plastics substances into chemical factories have taken place somewhat haphazardly, not as part of a continuous front of progress, but as individual bridgeheads. Only in recent years has it become apparent that these bridgeheads are both numerous and established enough to be crosslinked and regarded as a new technological invasion. A great deal of knowledge about plastics substances as constructional materials for chemical plant has emerged, but it is still very scattered.

At the last general meeting of the American Chemical Society a symposium of papers was devoted to this subject, and the most striking conclusion to be drawn from the papers (all now published in *Industrial and Engineering Chemistry*, 1955, **47**, 1292-1367) is the vast amount of new knowledge that was available for collation and collective treatment.

Very often the *modus operandi* of

introducing a plastics material into a chemical plant's construction has a 'last resort' conception. When it becomes clear that no established material is likely to meet the working conditions adequately or durably, the quest for a suitable plastics substance begins. This means that many advances of plastics have sprung from the limitations of conventional materials rather than from a clear appreciation of plastics' possibilities. Yet fundamentally plastics substances, especially the newer varieties, offer qualities in unique combination for many requirements of chemical-handling plant. Lightness of weight, resistance to corrosion that can in some cases be called reactive inertia, ease of fabrication into complex shapes; this is a trinity of virtues that cannot be equalled for many purposes by other materials.

There are, of course, various limitations. An ideal resistance to specific corrosion is not always matched with high temperature resistance or immunity to weathering corrosion. Physical strength is not always combined with physico-chemical perfection. But where the virtues of plastics have a fairly general suitability for solving difficult chemical plant problems the limitations tend to be specific or individual. In considering long-known materials such as metals or wood, chemical plant designers can draw upon an established reserve of experience that

on the whole is well collected. It is far more difficult to assess the potentialities of the plastics range, let alone to assess the variations of potentiality offered by the 'same' plastics substance for variations in polymerisation or filler-formulation.

It may sometimes be apparent that an otherwise suitable plastics introduction is defeated by economic considerations. But this bar to plastics expansion in the industry is definite only when the economic disparity with other possible materials is obvious to the point of being overwhelming. Only when the virtues of a plastics material can be fully estimated in advance, especially its durability, is it possible to decide whether a small or moderate price disparity is a genuine objection to use. Moreover, plastics technology is constantly changing and widening, and a decision to reject plastics in 1955 may be invalidated by 1960.

'It is significant that plastics frequently make their entry into an operating plant through the maintenance section, whose task it is to keep the plant operating. When other materials of construction prove inadequate, maintenance engineers may turn, in desperation, to plastics to keep the wheels turning. Designing plastics into new plants, however, requires engineering data, ensured sources of supply, and specifications—all well established for metals, ceramics, and concrete, but in early stages of development for most plastics. Designers of chemical plants cannot wait for these to be completed. They must specify conventional materials, realising that they may be doomed for early replacement, while properly chosen plastics would be permanent and frequently lower in cost This extract from the introduction to the ACS symposium of papers could hardly present the plastics problem more fairly and squarely. It suggests that it is almost entirely a problem of infancy and early growth, that a time of maturity is within reasonable sight when the extent to which plastics are used in chemical plant today will be trivial in comparison with the extent then.

The outstanding advantage of plastics substances in the chemical industry is their general resistance to corrosion. In

no other industry is resistance to corrosion such a dominant consideration. On the other hand, the introduction of plastics is largely limited by temperature resistance. A general asset tends to be offset in many potential applications by a general defect. So far the defect has probably been excessively feared. Glass and steel are likely to remain unmatched for heat resistance, but the range of thermal properties offered by plastics substances includes equality with rubber and wood and comparability with some of the copper and aluminium alloys. Plastics have a low thermal conductivity which is advantageous unless heat requires to be conducted away from the site of use. They generally have a high coefficient of thermal expansion, but recognition of this property enables good design to overcome its undesirable consequences in many utilisations. The use of plastics for pipelines, valves, pipelinings, process containers, etc., has enormous potentiality. In these uses the thermal and mechanical requirements can be fairly accurately estimated and they are frequently well within the known range of plastics properties.

The best of the corrosion-resistant plastics are those which tend to be the most costly—broadly, the halocarbon class—but initial cost is not the true measure of expense. A plastics substance may seem costly per pound in comparison with a more conventional material, but the weight required for construction may be lower and the cost of fabrication into the required shape may prove to be as much as 50 per cent lower; furthermore, the working-life may be two or three times longer, showing not only a large reduction in replacement costs, but also in many installations an even more important economy in saving losses of plant-operating time.

This 'flowline' field of utilisation, ever more significant in the industry for its intimate connection with continuous processing and modern automation, would seem to be the most impressive in the next few years. In one of the ACS papers it is observed that the development of plastics which maintain their mechanical properties above 100° C would 'greatly multiply their use.'

Notes & Comments

Indian Research

TWO papers in the latest issue of the *Journal of Scientific and Industrial Research* (1955, **14B**, 6) admirably typify the modern progress of applied research in India. One of these, from the National Chemical Laboratory at Poona, concerns the long realised possibility of extracting titanium dioxide from residues from Indian bauxite treatment. A fresh attack on this problem has enabled 80 per cent extraction-yields of TiO_2 to be obtained, and the old difficulty of dealing with interfering excesses of alumina in the bauxite sludge residues seems to have been overcome. Now the sludge is initially up-graded by leaching out a portion of the iron oxides and alumina with hydrochloric acid; most of the alumina still left is then removed after the usual treatment with sulphuric acid, the removal being in the form of potassium alum (by adding potassium sulphate). Potassium alum is a useful by-product so that the cost of this stage in the process is at least recoverable. The residual solution is largely composed of titanium sulphate which can then be converted into titanium dioxide by conventional method. A pigment-suitable product is likely to be obtained though judgment on this point has to be qualified as yet by further research and larger-scale operations. Previous efforts to obtain a pigment quality product from the titanium in bauxite sludges have been defeated by the heavy amount of sulphuric acid consumed by the alumina and by the poor quality, especially in regard to aggregation, of the final titanium dioxide.

Impregnating Jute

THE other paper deals with putting into practice the idea of impregnating jute bags with gamma-BCH insecticide. The protection that this gives to contained foodstuffs against insect pests is well enough established, but the actual impregnation of the jute is not a simple 'press-button' job. Jute has a

very strong affinity for BHC emulsions and this leads to excessive and uneven impregnation. Pre-soaking the jute in water was tried but this did not reduce the affinity influence; pre-soaking in a one per cent aluminium sulphate solution did considerably reduce the affinity but, as a commercial procedure, this was likely to be heavily time-absorbing. It was decided to approach the problem from a totally different angle and to try to reduce the mobility of emulsion particles. Agar-agar added to a 0.1 per cent level was successful, the very slight reduction caused in the activity of the insecticide proving to be insignificant in practice. Casein or gelatin additions were rejected as they affected the stability of the emulsion.

Representative Samples

THESE two papers are not selected for comment because they are in any way more interesting or ingenious than other papers published in recent Indian journals. They are indeed representative samples of the modern pattern of Indian research. India's science was always to be respected for its fundamental or theoretical contributions although the number of workers and centres was limited. Today the quality of applied research is most impressively catching up. The opening of new centres for applied research, a marked feature of the Nehru era, is beginning to display a ripening harvest.

Aldrin-Fertiliser Mixtures

WHATEVER controversy there may be on fertiliser-pesticide mixtures in general—and there is plenty—one particular blend, of aldrin with potato or cereal fertilisers, is a 'natural'. Aldrin is an excellent wire-worm killer and repellent and it is far less handicapped than similar insecticides have been by any crop-tainting side-effects. Sound opinion in the United States believes that aldrin-fertiliser combinations will eventually be used more

than any other insecticide-fertiliser mixtures; at least one well-known manufacturer in Britain is regularly manufacturing a complete fertiliser containing aldrin for wireworm control. Availability tends to create demand so far as effective products are concerned. Although many fertiliser producers do not want to involve themselves in the pesticide business, market demand may oblige them to handle aldrin.

Difficulties Involved

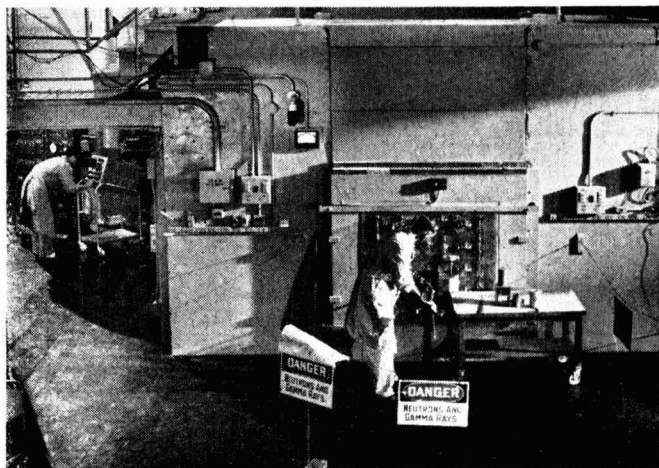
MIXING small amounts of a potent insecticide with proportionally much larger amounts of fertiliser is not an easy operation for large-scale output. The fact that most mixed fertilisers now pass through a final granulation process involving wetting and heat drying is another cause of trouble. Yet for effectiveness the ultimate product must contain a uniform amount of aldrin, a matter of a few pounds in each ton. With granulated fertilisers the method most favoured is the spraying of a solution of aldrin (about 40 per cent in strength) on to the flow of granules at some post-granulation stage of manufacture, i.e., impregnation rather than dry mixing. In a recent paper on the subject published in America (*Journal of Agricultural & Food Chemistry*, 1955, 3, 619), this is not the only technique discussed.

Aldrin Granules

ANOTHER method would seem to be much more attractive in small fertiliser works where new and additional types of processing are difficult to introduce for relatively minor proportions of output. This is the use of aldrin in granules, said in the paper to be 20 per cent aldrin in content. It is not likely to be difficult for even the smallest of fertiliser production units to mix aldrin granules with fertiliser granules, for mixing is a process that is only too well known for this industry. If the two kinds of granules are of closely similar size, post-mixing segregation will not be a source of trouble. However, aldrin granules of five per cent or 10 per cent strength would surely be preferable for ensuring a 'good' mix of a little with a lot. This US paper seems one of unusual interest to British manufacturers. A new development whose details have not been noticeably published here is very thoroughly discussed.

Israel Buys German

The Israeli Shilumim Co. has ordered industrial equipment to the value of D.M.7,000,000 from Germany. Included in the order is equipment for the electrochemical industries now being established near Acre.



The 'Water Boiler' at the University of California's Los Alamos Scientific Laboratory was the first homogeneous reactor ever developed. It is used as a source of neutrons and for irradiation studies. Its fuel is uranyl nitrate enriched in uranium 235 and it operates at a power level of 35 kilowatts. Five more reactors are being designed or built at Los Alamos

German Chemical Industry

Developments in Synthetic Rubber & Potash

LARGE-Scale production of synthetic rubber in the Federal Republic will start in 1957, according to details of the project now released by Bunawerke Hüls GmbH, the new company which will be in charge of the plant to be erected at Marl, near Recklinghausen, close to the existing works of Chemische Werke Hüls AG. Production will be at the rate of 45,000 tons—not 30,000 tons as originally planned—and this increase of capacity is expected to lower production costs to a level permitting the product to be sold at approximately the c.i.f. import price of US synthetic rubber.

Nevertheless the founders of Bunawerke Hüls GmbH are attaching great importance to securing a Government guarantee for part of the financial risk involved; negotiations to this end are now proceeding with the Federal Government and the North Rhine-Westphalia Government, and construction work is to begin at once when these have been concluded. The Federation of the German Rubber Industry, which represents rubber manufacturers, has given a guarantee to share in any losses arising during the starting-up period but no German rubber manufacturer is directly participating in the venture.

Capital Requirements

The total capital requirements are put at DM.140,000,000 of which DM.16,000,000 are attributable to new plant to be erected by Chemische Werke Hüls AG for supplying raw material to Bunawerke Hüls and DM.24,000,000 to operating capital needed by the latter company. This leaves DM.100,000,000 for capital expenditure on the butadiene and synthetic rubber plant to be set up by Bunawerke Hüls GmbH. Of the raw materials, *n*-butane will be obtained from various German and other West European refineries including Esso and BP Benzin- und Petroleum-GmbH in Hamburg which are under contract to supply three-fifths of the total requirements, and styrene will be obtained from the adjoining Chemische Werke Hüls plant at Marl.

The capacity of 45,000 tons a year, which is substantially larger than that of the synthetic rubber plants now under construction

at Le Havre, France, and in the Po Valley in Italy, has been decided upon partly for economic reasons and partly because it is intended that the synthetic rubber production should make a substantial contribution to meeting German home market needs. The latter are expected to expand steadily over the next few years and may reach 150,000 tons a year by 1957/58. Assuming that part of the synthetic rubber output is exported, the plant would cover about one-quarter of total domestic consumption. Part of the butadiene production at Marl will be passed on to Farbenfabriken Bayer AG for converting into Perbunan.

Labour Shortages

Reports by the leading German potash producers indicate the effect of labour shortages on the production and sale of potash salts. Despite some disappointment in the early part of last year and again this year production and sales have been increasing ever since the war, but the pace of expansion has been slowing down, and all producers now endeavour to lower producing cost by mechanising operations. Salzdettfurth, the largest producer in the Federal Republic, has extended its processing plant, with the result that the entire output of low-grade carnallite salts can now be converted into high-grade concentrate. Among other work designed to reduce handling costs is the installation of a flotation plant at the company's Sigmundshall mine. Wintershall is introducing the flotation process at its Neuhof mine, and Burbach is introducing similar changes.

A far-reaching measure of mechanisation is thought necessary by German potash producers in order to offset the increase in producing costs certain to result from the introduction of a 40-hour week. With Germany's labour reserves approaching exhaustion point, it will become increasingly difficult to secure sufficient manpower for the potash mines. Labour shortages and rising wages in agriculture are responsible for the attention given by all potash producers to compound fertilisers. Although the percentage of mixed fertilisers used in continental countries is mostly lower than in the British

Isles, the trend is towards increased use of compounded materials.

Salzdetfurth last year acquired a financial interest in Chemische Fabrik Kalk GmbH, a nitrogen producer. Wintershall, apart from owning 50 per cent of the capital of Gewerkschaft Victor, an important nitrogen producer in the Ruhr region, is building a nitrogen magnesia plant at Heringen; this fertiliser is produced from kieserite and liquid ammonia. The Verkaufsgemeinschaft deutscher Kaliwerke GmbH, the joint marketing organisation of the West German potash producers, acknowledge the trend towards mixed fertilisers by taking over two months ago the sale of the potash-phosphate fertilisers produced by Kali-Chemie AG.

Despite the great opportunities open in the petroleum chemicals field Wintershall AG, which is now the largest natural gas producer in Germany and has also increased its crude oil production, has decided not to enter this field directly, largely apparently because its financial resources are otherwise engaged. Shell and Esso, the big oil refiners, on the other hand, are both working on petroleum chemicals projects which are likely to account for a substantial part of the capital expenditure of DM.20,000,000 each, which these companies reportedly intend to spend on extending their installations in Hamburg. Deutsche Erdöl AG, another important oil producer and refiner, has also interested itself in the petroleum chemicals field by forming, together with Farbwerke Höchst AG and Mannesmann AG (the important pipe and tube manufacturer), Kohle- und Oel-Chemie GmbH. A plant, now in the planning stage, for making 12,000 tons of polythene from 1957 onwards and 24,000 tons when completed is to be built at Gelsenkirchen-Buer.

Izoniazide Discovery

A TEAM of Australian scientists led by Dr. J. Cymerman-Craig, senior lecturer in organic chemistry at Sydney University, has discovered the mode of action of the powerful anti-tuberculosis drug izoniazide. In a statement to the press, Dr. Cymerman-Craig said that many attempts have been made to discover the action of the drug since it was discovered simultaneously two years ago by two US drug manufacturers.

The Australian scientists found that izoniazide was effective only when it com-

bined with trace metals existing in minute quantities in the bodies of humans and animals. If prevented from combining with trace metals the drug lost all potency. In the presence of trace metals one milligramme was sufficient to kill a test-tube of tuberculosis germs.

Working in collaboration with Dr. J. Cymerman-Craig were Professor S. B. Rubbo, Professor of Bacteriology at Melbourne University, and Dr. G. V. Willett, a research student in Sydney.

BA Annual Meeting

A WIDE range of activities is planned for the 117th annual meeting of the British Association for the Advancement of Science, which will be held in Bristol from 31 August to 7 September (see THE CHEMICAL AGE, 1955, 72, 898).

About 400 speakers will take part in the section meetings, the open meetings and lectures, and in the various discussions. Considerable time will be devoted to subjects of great topical importance, including: recent advances in nuclear physics, cosmic rays, metal fatigue, nucleic acid, the teaching of chemistry, and trace elements in plant growth.

The full programme is now available. Information may be obtained from the Association at Burlington House, Piccadilly, London W.1, telephone Regent 2109.

I.C.I. Certificates

RESEARCH Department students of I.C.I. Nobel Division gained 70 first class certificates in the 1954-5 session and received awards amounting to £350 from Dr. David Traill, at Africa House, Ardeer, on 5 August. Since these classes began in the session 1947-8, some 226 first class certificates have been gained by students and awards have amounted to £1,806. During the past session, 11 students gained the certificate in Chemical Science at Paisley Technical College and 13 gained merit certificates in associated subjects.

Mr. R. N. Beveridge, plant engineer of Detonators at I.C.I. Nobel Division, Ardeer, has been appointed for a two-year period at I.C.I. Metals Division, Birmingham. Colleagues gathered at Ardeer last week to offer good wishes on his new appointment and to hand over parting gifts.

The Vyner Process

New Plant for Degreasing Bones

RAW bones, of which some 160,000 tons become available yearly in England alone, are a valuable source of several important products, including fats, glycerine, glue and adhesives, animal feeding meals, and organic fertilisers. As an adhesive glue has properties that make it indispensable despite competition from synthetic resins, while the uses of fats and glycerine are extensive and well known.

The majority of the raw bones are used in the manufacture of glue, after they have been thoroughly degreased and sterilised, and only a small percentage are treated simply with the sole intention of rendering fat and then producing feeding meals.

Degreasing and sterilising is usually achieved by the application of the solvent fat extraction process. This process, almost a century old, is the orthodox method adopted by the majority of manufacturers throughout the world.

In the last 10 to 20 years, however, the technical and economic disadvantages of this older process have become more obvious, particularly in the face of competition from more attractive products from other sources. Some of the more important disadvantages are: contamination from the residues of the benzine/benzole solvent, fire risk because of the extremely inflammable nature of these solvents, slowness of the process (18 to 25

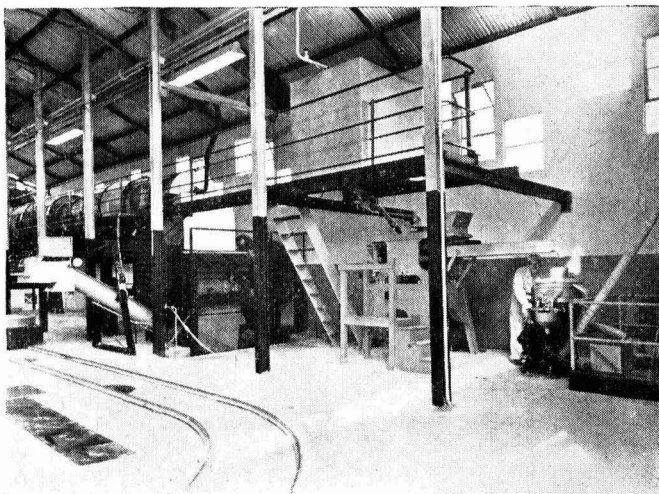
hours for the actual solvent extraction plus time to prepare the bones for the deglueing process, making a total of up to 40 hours), high power consumption and wastage of manpower.

In view of these disadvantages, the Sheppy Glue & Chemical Works Ltd. decided to look round for a better process and as far back as 1948 they commenced research work under the direction of Dr. E. M. Vyner. The results of this research work have been, the company claim, the development of a process, known as the Vyner process, which obviates all the disadvantages of previous processes.

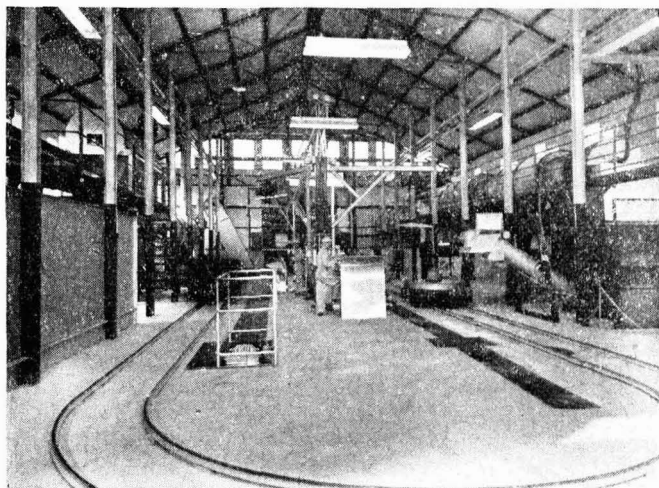
As soon as the results of Dr. Vyner's research were known the company decided to go ahead with developing the process and a pilot plant was erected.

From experience gained on this plant complete drawings of a working-scale plant were drawn up. Plant erection was begun in January 1954 and completed in June 1955. All the building work and most of the plant fabrication was carried out by the company's own employees.

The layout of the plant was vetted by the Works Study School at Cranfield, Bucks, who approved the proposed design, and it was found possible to carry out the complete erection of the plant without any deviation from the original plans.



A view of one corner of the degreasing plant showing (bottom right) the receiver for the final product



A general view of the degreasing plant

Successful trial runs have now been completed and the plant was opened for full-scale production on 21 July, as reported in last week's issue.

Substantial claims are made for this new process as compared to older processes. It is said that better yields are obtained of higher quality products. During the process a temperature is never reached that could be harmful to collagen and consequently it is obtained in a virtually undamaged form.

As far as the fat is concerned it is claimed that its quality is identical with that of the native material delivered to the factory. This is a consequence of one of the most important features of the process; its quickness. The whole operation can be carried out in about half an hour.

At this stage we cannot do more than indicate the nature of the process. The bones are passed through a pre-treater, where a careful control is observed of the varying

conditions required for different raw materials. By the time the raw material reaches the specially designed slow-running crusher the fat in the bone cells is in such a condition that it can be separated from the bones by thermo-mechanical means, after the bones have been brought to the correct size for this operation.

In addition to the greatly superior nature of the products this new process has the advantage of great economy in fuel. Fuel consumption has been reduced by 85 per cent of that of an efficiently run solvent extraction plant. The saving in manpower is also considerable.

It is possible, say the company, to obtain almost 100 per cent recovery from the starting material.

Patents for this process have been applied for in most leading countries of the world, and the process has already been adopted in one foreign country.

Welding in the US

RESEARCH on welding in the US is reviewed in a book, 'Welding Techniques and Uses in the U.S.A.', published by OEEC. This report is the result of a visit to the States by a mission consisting of 24 experts from 11 countries.

The mission was divided into two groups. Group A concentrated on welding research, welding in education and welding inspection, while group B gave more attention to recent developments in welding practice.

In its final recommendations the report

says that it takes 10 years before practice which is current in the US becomes widespread in Europe. It would be wiser to integrate American and European research rather than engage in exhausting competition which would mean that European laboratories would have to work up entire processes that had already reached an advanced stage in the US.

Surprise is expressed at the lack of interest shown by American industrialists in European methods which were often satisfactory and sometimes better than those in the US.

Small Food Firms

Must be Research-Minded says BFMIRA Ex-Chairman

THE need for small food manufacturers to be research-minded was emphasised by Mr. E. E. Wells, Rowntree & Co. Ltd., on Wednesday, 27 July. Mr. Wells, who is retiring chairman of the council of the British Food Manufacturing Industries Research Association, was speaking at the Association's annual meeting in London.

Appealing to them to join the Association, he said that many small firms had 'problems of which they are all too frequently unaware'. They were unable to appreciate what science and technology could do for them.

To reach such manufacturers and attract them into membership, it was necessary to give practical proof of the type of assistance which the Association could provide. This could best be done by visiting the factories concerned and to this end the Association was setting up a consultative and advisory unit.

Not Injurious

Mr. Wells referred to the question of food additives as one 'which must be very much in the minds of all responsible food manufacturers to-day'. He went on:

'Whether we like it or not, one of the effects of the new Food and Drugs Act is to place upon food manufacturers the responsibility of providing evidence that certain materials used in food manufacturing and processing are not injurious to health'.

Progressive food manufacturers realised that there was a need for a testing station for these additives, but, without considerable expansion of its laboratory accommodation and staff at Leatherhead, the Association could not undertake such work. It would seem that the answer was for a new co-operative biological testing and research station to be set up.

A meeting had been held at the Department of Scientific and Industrial Research at which representatives of various organisations and industries had been present. Further meetings were to be held soon to discuss plans and finance. The Government had intimated that a grant would be avail-

able and it was hoped it would be generous.

'From the industries' point of view', said Mr. Wells, 'there are many good reasons why this type of testing should not be carried out entirely under official auspices'. It was vitally essential that interested industries should have a major share in the management of any such establishment. But industry could not expect to achieve control unless its financial contribution warranted it.

Mr. C. O. Barber, Batchelors Peas (Southall) Ltd., moved a vote of thanks to Mr. Wells for his work. This was carried unanimously.

President Re-elected

Earlier in the meeting, Sir Frank Engledow, C.M.G., M.A., B.Sc., F.R.S., Drapers' Professor of Agriculture at Cambridge University, was re-elected president of the Association for the ninth year. Sir Frank has been for many years closely connected with the development of tropical agriculture on which so many of the raw ingredients of foods manufactured in Britain depend.

Mr. J. G. Mathieson, of Clarke, Nickolls & Coombs Ltd., and Lt.-Col. G. R. Harding, D.S.O., M.B.E., of Aplin & Barrett Ltd., were re-elected vice-presidents. The council of the Association elected Mr. R. P. Woollard, London Oil Corporation Ltd., the previous deputy chairman, as chairman, and Mr. C. O. Barber, Batchelors Peas (Southall) Ltd., deputy chairman.

New Member

A new member of the council is Mr. George Walsh, B.Sc., F.R.I.C., a director of Barratt & Co. Ltd. He was elected to take the place of Mr. H. O. Barratt, who did not stand for re-election as he wished to reduce his activities.

One-third of the members of the council retired on rotational basis and were re-elected.

Polamine, a new anionic type of emulsifier, is being marketed by the Yorkshire firm, Croda Ltd., who claim it to be a powerful emulsifier of the oil-in-water type.

Piston Ring Wear

Film to be Shown at Geneva

ONE of the ways in which atomic energy is being adapted to aid research in the oil industry will be shown in a film to be exhibited at the International Conference of Scientists on the 'Peaceful Uses of Atomic Energy', which began at Geneva on 7 August.

Entitled 'Project 074', the film was made by the Shell Film Unit for the Royal Dutch/Shell Group in conjunction with the Atomic Energy Research Establishment at Harwell. It includes scenes of the Atomic Pile at Harwell and of the Shell Research Centre at Thornton, Cheshire.

The film shows the use of atomic energy in research into new lubricants. The great contrast between the old and more conventional ways and the present-day quicker, more accurate and more sensitive methods is clearly defined.

'Project 074' starts by showing how in testing the wear of a piston ring in a special engine—to assess the wear-reducing properties of different engine lubricating oils—the conventional methods involve repeated fitting and removing, as well as minutely accurate weighing, of the piston ring under test. Results of apparently similar tests may vary considerably, and a number of tests have to be made to obtain an average result. These tests often involve up to 400 hours' running.

In the newest method the piston ring under test is made radioactive in an atomic pile. It is then fitted in the test engine which is modified to enable the lubricating oil to be circulated from the sump, while the engine is running, through an apparatus which measures degrees of radioactivity, after which the oil returns to the sump as part of the normal circulation.

While the engine is running minute particles of iron are worn off the piston ring and pass into the sump oil. The radioactivity recorder registers the amount of radioactivity indicated as exactly proportional to the amount of iron fragments circulating in the oil. The recorder is so sensitive that it can detect one 30-millionth part of an ounce of radioactive iron in the oil. Thus throughout the test it is possible to determine accurately not only the total amount of wear which has taken place since the beginning of the test run, but also the rate at which the wear occurs.

Petrol Delay

Fire in SASOL Plant

THE production of petrol by Sasol would be delayed for several weeks because of the recent fire in the oxygen compressor section of the works, said the managing director, Mr. P. E. Rousseau. He said: 'The whole plant was swinging into its stride, and petrol had seemed to be ten days, or at the most, two weeks off when the mishap occurred. The most we can say now is that everything that is humanly possible will be done to shorten the delay. It is really incorrect to talk about a petrol production date. Even after oil has first flowed from the plant, at least six weeks must elapse before petrol can be supplied to the public.

'We must be absolutely sure first of our quality and our continuity of supply. What has been done till now is no mean achievement. It is not three years since we started disturbing the veld to lay our foundations. The coal mine is producing smoothly, and the oxygen plant is running regularly and is still making liquid oxygen for sale. Initial trouble on the gasification plant has been overcome and the new process for gas purification has been a success. I doubt whether coal gas on a commercial scale has ever been made as pure as we have made it here. The conversion of pure gas into oil is about to be started. We have had our serious process difficulties. Our difficulties have been mechanical and they can be overcome with perseverance'.

'A spare oxygen compressor, which had already run without trouble for several months, was available, but it would be unwise to start it without taking precautions to prevent another fire. Senior men from the company which made the machine had been sent out and their recommendations would be made soon. Already the plant was producing and sales of many by-products had started. Eventually they would be worked up to nearly £10,000,000 a year, saving South Africa about £7,000,000 a year in foreign exchange'.

Chemicals Lead

The provisional index of industrial production for May is 139, the Board of Trade has announced. This compares with 132 for April, and with 133 in May, 1954. Index figure for the chemical and allied trades for the first quarter of this year is 180, the highest of all the industries listed.

Microchemical Meeting at Vienna

by T. S. WEST, B.Sc., Ph.D., A.R.I.C.

A MICROCHEMICAL meeting sponsored by the Osterreichische Gesellschaft für Mikrochemie was held in Vienna from 12-17 July 1955. More than 600 delegates from over 30 different countries, including several from 'Iron Curtain' states, attended the conference. Delegates arriving early in Vienna received a cordial welcome to attend the annual general meeting of the Austrian Microchemical Society. This was followed by a lecture on new methods and techniques in inorganic chemistry, given by Professor Klemm. Afterwards, delegates were welcomed less informally at a reception given in the 'Green Room' of the Rathauskeller.

The opening session of the meeting was held at 9 a.m. on 12 July, in the 'Auditorium Maximum' of the University of Vienna. Professor Lieb formally opened the meeting, and greetings were received from the microchemical societies of various countries. Dr. G. F. Hodsman spoke on behalf of the microchemistry group of the Society for Analytical Chemistry.

An item of note at this first meeting was the award of honorary membership of the Austrian Microchemical Society to Dr. Alice Lacourt, of the University of Brussels, and to Dr. C. L. Wilson, Reader in Chemistry at the Queen's University of Belfast. Both chemists have made outstanding contributions to the practice and teaching of microchemical techniques.

Microchemistry Prize

The Pregl prize for microchemistry was awarded to Dr. Benedetti-Pichler, of New York—one of the pioneers of microchemistry; the Emich prize was fittingly awarded to Dr. Unterzaucher, of Leverkusen, for his work on the direct determination of oxygen in organic compounds; and the Feigl prize was awarded to Dr. Weisz, of Vienna, for his evolution of the new and versatile ring-oven method of analysis.

On the conclusion of this business, the opening session was immediately followed by the first plenary lecture given by Dr. Caspersen, of Stockholm. In this lecture, various aspects of quantitative ultramicro-

spectrography were examined, particularly apparatus and application to the analysis of many elements in cell structures.

The ordinary lecture programme began in the afternoon. The lectures, mainly of 20 minutes duration, were held in two parallel sessions in the two main lecture theatres of the Chemical Institute II. H. Gysel, of Switzerland, discussed individual or personal errors in the estimation of numbers on balance scales, and described an improved scale. Psychological limits of error of $\pm 4 \mu\text{g}$ per weighing and up to ± 0.27 per cent in a carbon determination were established and confirmed.

Balance Design

G. F. Hodsman, of Messrs. Oertling Ltd., discussed recent developments in balance design with particular reference to lightness and strength of the beam, improvements in knife-edge bearings and the design of arrestment mechanisms. The growing popularity of the aperiodic balance, the evolution of the riderless microchemical balance and current trends in design were stressed, and also the possibility of using quartz fibre torsion balances to obtain higher accuracy and greater sensitivity.

T. S. West, of Birmingham University, described the construction of such a quartz-fibre torsion restoration balance. The quartz-fibre system, assembled by the novel method used originally by Dr. C. L. Wilson, was housed in channels cut in an aluminium block. This was effective in preventing disturbances from temperature variations, static electricity and dust, etc. The balance was capable of weighing loads of $700 \mu\text{g}$ with a precision of $0.04 \mu\text{g}$. The zero point of this remarkably robust balance was extremely stable. E. Bishop, of the University College of South-West England, described apparatus and technique in ultramicropotentiometric analysis.

H. Scheid, of Vienna, discussed the use of the Pregl precision weighing pipette in clinical chemistry, and E. Gabler, also of Vienna, outlined the potentialities of what has been hailed as the most important advance in the field of microscopy, namely, the microtelescopic device used in conjunc-

tion with an inverted microscope. G. Svensson, of Sweden, concluded the ordinary lecture session in theatre No. 2, with a paper on the measurement of absorption and refractive index of highly absorbing solutions. The techniques described required only 0.1 μ l for absorption and 0.01 μ l for refractive index measurements.

In lecture theatre No. 1 the afternoon began with a paper by F. Ludy-Tenger, of Switzerland. Many derivatives of pyridine, widely used in medicine, can be differentiated by means of a modified Dragendorff reagent. Only very small amounts shaved from the tablets are required for these tests.

Pharmaceutical Products

S. Simon, of Brussels, reviewed the use of microtechniques in the analysis of pharmaceutical products and quoted statistics showing the growing importance of these small-scale methods in the inspection of medicinals.

I. Otter, of Fisons Pest Control Ltd., Essex, described methods for residue analyses of organophosphorus insecticides in plants. The work was based on chloroform extraction of the plant material followed by microdistillation of the insecticide from the naturally occurring chloroform-soluble phosphorus compounds and colorimetric determination of the phosphorus. Less than 0.1 ppm. of these compounds can be analysed with a high degree of precision.

W. Friedrich, of Germany, continued with a paper on the chromatographic separation of group B₁₂ vitamins on cellulose powder columns and paper strips. The sodium and potassium salts of monobasic polyatomic acids, e.g., sodium tetraphenyl borate, sodium camphorsulphonate, potassium or sodium perchlorate and sodium trichloroacetate were specially recommended as chromatotropic salts, particularly with a mixture of secondary butanol and water as developer. In the presence of the developer and chromatotropic salts, the cellulose column and paper strips behave in a manner similar to a semipermeable cellulose membrane.

M. Brandstätter, of Innsbruck, contributed an interesting paper on some phase-contrast microscopy studies of crystal growth. K. Kratzl, of Vienna, spoke of problems in the detection of lignins by various microchemical methods. B. Nielsch, also of Vienna, concluded the afternoon

session with a short talk on the detection of petroleum products in natural waters. By means of their fluorescence in the light of an ordinary quartz lamp amounts of the order of 1 μ g/litre can readily be revealed. Impurities are absorbed on magnesium oxide or are extracted with ether or petroleum ether.

Both sessions ended the day by uniting to hear a plenary lecture on the uses of radioactivity in analytical chemistry. This lecture, given by H. Götte, of Mainz, Germany, dealt with the indicator methods introduced by Hevesy and Paneth, with dilution analysis and with radioactivation analysis. The speaker stressed that all three procedures are characterised by high sensitivity and great specificity and are versatile and adaptable.

On Wednesday, M. Lederer opened the session with a plenary lecture on inorganic paper chromatography. Delegates then divided to attend the lectures of their choice in either of the two lecture theatres. In theatre No. 2, E. Abrahamczik, of Ludwigshafen (Germany), discussed the uses of ion exchanges in microanalysis and micro-synthesis. A. Schleicher, of Aachen (Germany), followed with a discourse on methods for rapid quantitative analysis of inorganic materials dispensing with systematic analysis schemes and utilising sensitive and specific reactions.

Ring-Oven Method

A packed audience listened to H. Weisz, of Vienna, delivering his paper on the ring-oven method of analysis. The technique allows extremely small amounts of liquid present in only a minute drop of material to be concentrated into a sharply defined zone in the form of a ring on filter paper. By fixing certain metals on paper at the centre and diffusing out the soluble ions it is possible to divide a mixture of many ions into several groups and to identify them. The ring-oven method also makes it possible to conduct semi quantitative analyses. These require only about 2 μ g of the ion to be determined.

K. Kakihana, of Nagoya University, Japan, gave an account of the microchemical detection of several elements using ion exchange resins. Colourless or slightly yellow exchange resins are used. Both sensitivity and selectivity can be obtained because of the well-known properties of the resin.

The chromatographic separation of niobium and tantalum on paper strips was described by J. Eeckhaut, of Ghent. Various organic solvents were used as eluants. The most satisfactory system used 75 per cent methyl ethyl ketone plus 25 per cent 10M HCl. The same eluant permits the separation of titanium-niobium and iron or tantalum-niobium-iron. Tantalum and titanium are not separated. On the semi-micro scale niobium of 99.9 per cent spectrographic purity was obtained after two consecutive elutions on a cellulose column.

A. Lacourt, of Brussels, described the technique of quantitative paper chromatography (see *THE CHEMICAL AGE*, 1955, **72**, 1421). The technique is very simple and is capable of high precision with very minute amounts of material. H. Balczó, of Vienna, described a method in which amounts of BaSO₄, too small to be weighed, were decomposed with sodium phosphate. An excess of EDTA was added to the solution and the unconsumed reagent was back titrated with a standard magnesium chloride solution using an eriochrome black T indicator modified with the dyestuff tropaeolin O.O.

The interval before lunch was devoted to three papers from Professor Duval's school at Paris. These dealt with the measurement of infra-red absorption spectra in a single drop of aqueous solution, the use of thiocarboxyhydrazones in organic functional group analysis and with various reactions of chlorates, bromates and iodates in analysis.

Ca by Loretin

After lunch, J. B. Gillis, of Ghent, resumed with a paper on the spectrophotometric and microgravimetric determination of calcium using loretin as reagent. Having established the conversion factor for the precipitate obtained with calcium, the speaker showed how the reagent could be used to determine amounts of the order of 5.50mg with an error of 0.35 per cent, or smaller amounts down to 0.2mg Ca per ml. with an error of 0.45 per cent. Spectrophotometrically, amounts of Ca of the order of 20 μ g were determined indirectly by dissolving the precipitate in a ferric iron solution.

This communication was followed by three papers from H. Flaschka and his co-workers. H. Abdine, Graz (Austria), outlined the potentialities of 1-(2-Pyridyl-azo)-

2-naphthol as a complexometric indicator. Ni, Co, Zn, Cd, Cu, Pb and Fe can be determined. Titrations in acid and ammoniacal medium may be made in succession and it thus becomes possible to determine two metals, e.g., Ni-Mg, Zn-Mn or Fe-Ca.

The chief advantage of the indicator (PAN) over eriochrome black is that it is not upset by traces of copper, iron, manganese, aluminium, titanium, etc. However, against this must be set the fact that the weak colour of some PAN-metal complexes and the sluggishness with which they respond to EDTA, necessitates a back titration procedure at an elevated temperature.

Nb Colorimetrically

E. Lassner, Graz (Austria), discussed the colorimetric determination of niobium with Tiron. The yellow colour produced in strong hydrochloric acid is stable over a fairly wide range of acid concentration. A three-four fold excess of titanium, iron or tin did not interfere in the determination. Vanadium V interfered, but this was readily overcome by reduction with ascorbic acid. H. Flaschka, gave an account of the uses of unsulphonated eriochrome black T in extracton analysis.

These papers from Flaschka's laboratory at Graz, were followed by two papers from J. Hoste and his co-workers at the University of Ghent. The first of these papers dealt with the separation of indium from zinc by liquid-liquid extraction methods. Extraction of indium tribromide with diethyl ether was not practicable in the presence of zinc. Zinc was extracted over a wide range of HBr concentrations to the extent of five per cent. When the ethyl ether was replaced by isopropyl ether, the extraction of ZnBr₃ in the acid range 0.5-6M HBr became negligible. Quantitative recovery of indium was obtained in a single extraction from 6M HBr.

The second paper was concerned with the determination of micro amounts of indium in zinc and in gallium by a radioactivation method using a 1g Ra-Be thermal neutron source.

The first paper in the morning session in theatre No. 1 was also on the microdetermination of indium. J. Barlot, of Toulouse (France), described methods involving precipitation as rubidium chloro-indate and also precipitation as indium metal using zinc, magnesium or aluminium as precipi-

tant. This latter method can be used when the indium solution contains metal ions such as tin, cadmium and iron. The investigation of monoterpenes by microdisplacement absorption on a silica gel column using ethanol as displacement agent was the subject of the next paper by S. G. Blohm, of Stockholm.

Forensic Chemistry

T. S. Ma outlined a postgraduate training programme in microchemistry, for organic chemists, such as is used in the Chemistry Department at New York University. N. D. Cheronis, New York, followed with a similar paper on the use of microtechniques in the teaching of chemistry. The application of microtechniques in forensic chemistry was outlined by L. L. Vagnina, of Frankfurt. F. X. Mayer (Vienna) continued with a paper in similar vein, discussing the application of microchemical methods in the solution of police problems. This lecture was illustrated by the quotation of actual examples in the field of arson, forgery, traffic accidents, bullet wounds and new methods for taking finger-prints, etc.

J. M. Peixoto-Cabral, of Mainz (Germany), described the microchemical determination of fluorine by means of paper chromatography, using a radioactive indicator.

H. Hänni, of Switzerland, resumed after lunch with a paper on the determination of micro-amounts of iodine in milk and allied products. The substance is first submitted to an alkaline treatment at a relatively low temperature. It is subsequently digested with acid permanganate solution and the iodine in the ash is set free by reduction with phosphorous acid and distillation. The iodine oxidises hydroxylamine to nitrite which is then determined colorimetrically by reaction with sulphanilic acid and α -naphthylamine in the usual way.

R. Hamm, of Kulmbach (Germany), reported on micromethods for determining the Ca, Mg, Zn and Fe content of animal tissue in a single incineration solution. The method is based on ion exchange separation of phosphate and iron from calcium, magnesium and zinc on a cation exchanger. After elution, the calcium magnesium and zinc are determined by two titrations with EDTA. The iron is determined colorimetrically, using *o*-phenanthroline and reduction.

The final paper of the day was a plenary lecture by H. Milch, of Vienna, on micro-

electrophoresis. The methodology and applications of free and zone electrophoresis were surveyed in detail. With respect to zone electrophoresis stress was laid principally on paper electrophoresis, and the possibilities of separation at low and high potential falls were discussed. Separations of low molecular ions were cited primarily as examples. In conclusion, devices for the quantitative employment of electropherograms on filter paper were shown. The advantages and disadvantages of free electrophoresis were fully discussed.

In the evening, two open discussions, one on separation methods in inorganic analysis and the other on organic ultimate analysis and functional group analysis were held in the two lecture theatres, and the final event of the day was a display of microchemical films.

On Thursday, 14 July, no lectures were held, and delegates were free to take part in a specially organised excursion to the Wachau.

Prize Winner

Friday morning began in lecture theatre No. 2, with a discourse from prize winner J. Unterzaucher, of Leverkusen (Germany). Speaking on the subject of oxygen determination, he said that anhydroiodic acid HI_2O_6 could be substituted for I_2O_5 in the method and that this allowed the determination to be finished iodometrically since hydrogen does not react with this substance in contrast to the behaviour with I_2O_5 . The preparation, stability storage and use of the new reagent were dealt with in detail.

Unterzaucher was followed by W. Kirsten, of Uppsala (Sweden), who outlined methods for ultramicro quantitative organic elemental analysis. These were concerned with the analyses for sulphur, nitrogen, carbon and hydrogen. The microdetermination of fluorine in organic compounds was the subject of the next paper, given by G. Kainz, of Vienna. The sample was decomposed with potassium in a small glass tube. Potassium, cyanide and sulphide were removed and the fluoride was titrated with thorium nitrate using Alizarin red S with addition of Methylene blue.

The following paper, also read by Kainz, dealt with the uses of copper for removing nitrogen oxides in the C and H determination. The preparation of specially active copper was described. C. A. Rush, of Mary-

land (US), spoke of problems in the analysis of perfluoro compounds. Sulphur, phosphorus and halogens can be determined by the conventional Carius methods, and nitrogen by the Dumas method. However, oxygen cannot be determined by the Unterzacher method, and because of the high thermal and chemical stability of perfluoro organic compounds, special methods are required for carbon, hydrogen and fluorine.

In the proposed method, C and H were dealt with by oxygen combustion with a tube filling consisting of (Ag; 3Mg O.Al₂O₃; Ag) at 950° C (Ag; Pb₂O₃) at 460° C and (Ag; PbO₂; Ag) at 180° C. Fluorine was determined in the usual way by sodium fusion and thorium nitrate titration. Two papers were presented by W. Schoniger, of Switzerland. The first was a report of an observation made in the determination of oxygen by the Unterzacher method. Low values were obtained due to graphitisation of the contact tube after prolonged use. The second paper outlined a simple method in which sulphur was determined by combustion. Halogens were also determined with the same apparatus.

G. Ingram, of Messrs. Courtaulds, Maidenhead, spoke on the rapid combustion procedure of ultimate organic analysis. In the case of carbon and hydrogen, the technique is capable of the same degree of accuracy as the Pregl method, and is much more rapid. The replacement of lead dioxide by manganese dioxide for removal of nitrogen oxides is a noteworthy contribution. A simple 2g filling of the latter has a useful life of 150 combustions. The rapidity and low cost of the method are outstanding.

Titration of Halogens

An accurate and stable method for potentiometric titration of the halogens following rapid combustion was outlined. Sulphur absorbed as silver sulphate can be titrated with standard sodium chloride, using the same end-point technique. Miss A. M. G. McDonald, of the University of Birmingham, spoke on the determination of fluorine in organic compounds containing phosphorus and arsenic. Following sodium fusion of the sample, phosphate and arsenic were removed by addition of solid zinc carbonate. The method was finished by the conventional thorium nitrate titration.

Difficulties in the determination of carbon

and hydrogen in fluoro-phosphorus organic compounds were overcome by the ingenious device of mixing the samples with tungstic oxide.

R. Lévy, of Paris, dealt with the determination of halogens in organic compounds by an unusual argentometric method. After opening out the compound with peroxide, the sum of chlorine and bromine is determined by argentometric titration using the potential of a silver electrode under the conditions of the microdetermination of chlorine as reference. In the second titration reference is made to the potential of the Ag/Br⁻ electrode. The known variables are then substituted in an equation, and from this the derived values of Cl⁻ and Br⁻ are claimed to be as accurate as those obtained in separate determinations of the halogens.

Organic Compounds

N. D. Cheronis (New York), considered the application of micromethods to the identification of organic compounds. The concept of proof of identity was discussed at length. In the proof of microquantities there is a tendency to avoid isolating pure compounds for the determination of physical constants. More emphasis is placed, therefore, on colour group reactions. With microgram quantities, it is often possible to prepare derivatives and use R_f values as constants. New work on the derivatisation of fatty acids and their characterisation using a few micrograms of sample, and the development of new reagents for the microdetermination of reducing functions in organic compounds were specifically outlined.

F. R. Reich (Vienna), showed that an expression could be derived from the R_f (paper chromatographic) values of an organic compound under various conditions, which could be related to the constants for the individual structural units of the molecule under consideration. In the paper given at the conference, the method was used to determine the number of carboxyl groups present in organic acids. The method could not be applied when the value of the R_f constants for the various solvents exceeded 0.90 and when the molecule contained sterically adjacent carboxyl groups.

S. J. Clark, of British Nylon Spinners, Pontypool, outlined a method for the spectrophotometric determination of secondary aliphatic amines, based on their reaction with

nitrous acid. The configuration of the amine affects both the yield of nitrosamine and the UV absorption, but this effect is negligible in the series from dimethylamine to di-*n*-hexylamine. An accuracy of approximately three per cent is obtainable with amounts from 0.1-1.0 milli-equivalents, and the lower limit can be extended to 0.01 milli-equivalent. Primary amines interfere by formation of nitrolic acids, but these can be corrected for by calculation from optical density measurements at two wavelengths. Moderately large amounts of tertiary amines can be tolerated.

Trace Elements

In lecture theatre No. 1, Friday morning began with an address on the determination of trace elements by spectrochemical methods. This paper was given by N. W. H. Addink, of Eindhoven (Holland). H. de Laffolie, of Münster (Germany) discussed the limits of detection of a spectral line. The point at which a line sinks into the background is determined basically by the characteristics of the emulsion used.

The Seidel transformation was employed to show how granularity distribution and gradation can be used to determine the relation of line intensity and background at which the line just emerges against the latter. G. Holdt, of Stuttgart (Germany), showed that in using the cathode arc layer, irregularities in the consumption of the cathode lead to intensity errors. Rotation of the cathode during burning eliminated this effect. K. Pfeilsticker, also of Stuttgart, spoke of the spectrochemical microdetermination of lead in biological materials. If the lead is collected in the ash it may be determined by means of an intermediate spectrograph. The enriched ash together with a suitable bonding solution is dried on aluminium electrodes.

J. M. Lopez de Azcona, of Madrid, continued on spectrographic analysis with a paper on the determination of rubidium and strontium in mica, and this was followed by a similar paper from W. Seith of Münster (Germany) concerned with the quantitative spectrographic determination of lead after deposition on cadmium by internal electrolysis. Tin was used as a reference element and a rotating electrode was used for sparking off.

F. Rost, of Munich (Germany), dealt with the fundamentals of a spectrographic analysis of silicon carbide. The results ob-

tained for the content of Al, Fe, Ti and Mg were claimed to be superior to those obtained by chemical methods. The analytical results in many samples of silicon carbide show distinct dependence of the properties on the Al content, which may be influenced by extremely high or low values of Fe and Ti.

The influence of various factors in flame photometry were outlined by J. Fischer, of Frankfurt (Germany). The influence of co-solutes is most important in quantitative studies of the alkali metals. In addition to secondary interferences (light, atomising variations) which can easily be controlled, real interferences occur because of the influence of dissociation and ionisation in the flame itself. The great influence of temperature and solution concentration caused by the presence of co-solutes was stressed.

E. Preuss, of Munich (Germany), once more led the attention of delegates back to spectrographic analysis with some considerations affecting the analysis of particularly small amounts of sample, and H. Schüller, of Vienna, dealt with the application of the method to trace-element analysis in agricultural chemistry.

Semi-Conductors

After lunch, G. Hansen, of Oberkochen (Germany), discussed the influence of cell dimensions, characteristics of the light source and receiver, dimensions of monochromator and its resolving powers, etc., on spectrophotometric measurements. The second speaker, F. A. Pohl, of Möhne (Germany), began by pointing out that the electrical conductivity of semi-conductors was profoundly influenced by the content of foreign ions in the crystal lattice. The determination of non-metallic impurities is a particular problem. Methods were described for determining traces of halogens in selenium.

J. Mitchell, of Wilmington (US), spoke on the identification of organic compounds by microscopy and X-ray diffractometry. Several specific properties can be measured under the petrographical microscope such as optic axial angle, character and dispersion. In addition, refractive index directions can be established. The 'd' spacings and their intensities as determined with the X-ray diffractometer serve to identify crystalline materials. The two instruments should be considered as supplementary tools.

J. H. Beynon, of I.C.I. (Dyestuffs), Manchester, discussed the use of the mass spectrometer for the identification of organic compounds. The method is truly a micro one in that less than 1 mg. of the substance is necessary for production of the spectrum, and often very much less is required for identification. Thus, it is often possible to identify impurities and determine their concentration even in an almost pure compound without any previous concentration of the impurity.

G. Beck (Switzerland), outlined the uses of potassium copper (III) tellurate as a titrant for proteins. It was shown that in the differential periodic titration of proteins in sufficient amounts (40-60mg) the degradation curve proceeds in distinct stages, which probably correspond to very definite peptide linkages. E. L. Forster, of Vienna, gave details of two micro-osmometers with which it is possible to determine the molecular weight of from 5-10 mg of a high molecular weight substance. The two osmometers described operated without ground glass joints or stopcocks.

The concluding lecture of the day was a plenary one by H. Hintenberger, of Mainz (Germany). It concerned the uses of the mass-spectrograph in analysis.

Ultramicroanalysis

Saturday, the last day of the meeting, began with a plenary lecture from C. L. Wilson, of Queen's University, Belfast, entitled 'Ultramicroanalysis; Past, Present and Future'. Samples of the order of 10^{-5} gm or 10^{-3} ml may be regarded as ultramicro. Dr. Wilson reviewed the development of qualitative and semi-quantitative inorganic methods and of titrimetric and gravimetric procedures. He stressed the possibility of increasing the range from 10^{-5} to 10^{-4} gm, allowing the same relaxation of rigid techniques which followed the development of semi-micro from micro analysis. This would encourage more widespread application of ultramicro techniques in the ordinary analytical laboratory.

E. Schulek, of Budapest (Hungary), discussed the basic principles of gas analysis and described a new device for taking samples with 'analytical exactness' from gases and from the vapour space of heterogeneous systems. K. Peters, of Vienna, discussed the application of countercurrent flow in micro gas analysis, whilst J. Janák, of

Brno, Czechoslovakia, dealt with the micro-analysis of gases by gas chromatographic methods. T. Schönfeld (Vienna), reviewed the contribution made to the theory of chemical analysis by radiochemical measurements.

Last Lecture

The last ordinary lecture to be given in lecture theatre No. 2 came from L. Sverak, of Vienna, who described a sensitive method for the determination of radio carbon (^{14}C), using pure CO_2 to fill the Geiger counter tubes which were operated with an external quenching circuit. The yield, 80-90 per cent, was excellent, and the constance ranges (Ca.400 V) were long. Since in the final analysis the blank value was decisive for the sensitivity of the measurements, an anti-coincidence device was built in conjunction with the gas Geiger counter tube, and with its aid it was possible to lower the blank value by a factor of 10.

In lecture theatre No. 1 the last day of the conference began with a paper from J. Sternberg, of Montreal (Canada), on an automatic device for quantitative estimate of paper electrophoresis and radioelectrophoresis. The stained paper is scanned by a photomultiplier and the curve transmitted light is directly recorded and reconverted into an optical density curve. Rapid radio scanning permits the determination of total activity as well as the localisation of radioactive fractions.

An investigation of the determination of micrograin amounts of lead by the well-known dithizone method was the subject of the lecture by P. Schweda, of Vienna. In addition, the determination of such traces of lead by polarographic technique was discussed. W. Nielsch, of Hanover (Germany), showed that very small amounts of nickel can be precipitated with the water soluble sodium salt of dimethylglyoxime. The resulting compound can be extracted into chloroform and measured photometrically after removal of water.

M. Oosting, of Riswijk (Holland), reported on a new sensitive and selective method for the determination of bismuth. The latter was extracted from aqueous solution with chloroform as the brucine-bismuth-iodide complex, and its absorbancy was measured at $425\text{m}\mu$. Few substances interfere, but in cases where it is found, the bismuth can first be isolated by extraction at pH 11-12 in the presence of cyanide and

complexone using diethyldithiocarbamate. This separation succeeds from almost all elements even when the latter are present in excessive amounts.

At 12.15 p.m. on Saturday, 16 July, Professor Lieb, who had opened the conference, took the chair at the closing meeting. Compliments were received from several speakers on the outstanding success of the meeting. In the dying minutes of the conference the announcement was made by R. Belcher, of Birmingham, that the next microchemical meeting might well be held there in a few years time. And, so the last words were spoken and the meeting was at an end.

A civic reception was given to all delegates in the evening at the famous Pallavicini Palace and at the Rathaus. The microchemical meeting of Vienna 1955 will long be remembered by all participants as an outstanding success.

All the papers read at the meeting will be published in full in *Mikrochemica Acta* in the near future.

I.C.I.—Columbia—Southern

Joint Titanium Project in the US

IMPERIAL Chemical Industries Ltd. and Columbia-Southern Chemical Corporation of Pittsburgh, US, have, as reported briefly in last week's issue (p. 288), submitted a joint application to the United States Government for a contract under which the Government would undertake for a five year period to purchase 5,000 short tons per annum of granular titanium metal.

In their application to the Government for a contract the companies have stated that they have completed arrangements for the introduction into the United States of a granular titanium process not at present employed there and would also make available to fabricators techniques not at present known or employed in the United States.

If a contract is awarded in pursuance of their application, I.C.I. and Columbia-Southern Chemical Corporation will form a jointly-owned subsidiary for the purpose of producing granular titanium metal by I.C.I.'s sodium reduction process. The parent companies will each hold a 50 per cent interest in the new company, which would be known as Columbia Titanium Company. The plant would be built at Natrium, West Virginia, and would have a capacity of 5,000

short tons per annum. The cost of the proposed granular titanium metal plant will be in the region of \$10,000,000.

I.C.I.'s patent position and production experience have an unusually broad base through their experience of chemical and metallurgical technology. Their patent and process knowledge extends from the production of granular titanium metal by their new sodium process, to melting, scrap recovery, alloying, testing, jointing and fabrication, in the latter of which particularly they are favourably placed by virtue of their wide experience in non-ferrous metal technology.

Columbia-Southern's contribution to the proposed joint enterprise lies in the production of titanium tetrachloride, from which granular titanium metal will be made. Columbia-Southern, which is itself one of the leading American producers of chemical products and is a wholly-owned subsidiary of the Pittsburgh Plate Glass Company, has been engaged in research on the chlorination of titanium-bearing ores since 1937. It has established a broad patent position in this field and to-day licenses other companies under Columbia-Southern patents.

Columbia-Southern and I.C.I. believe that their proposal to the US Government will result in lower capital and production costs and in the acceleration of a titanium fabrication industry in the US.

Syton C

SLURRIES produced by mixing silica sols with ceramic materials normally settle out fairly rapidly and are consequently inconvenient in use. It is claimed by Monsanto Chemicals that this settling can be prevented by the use of Syton C plus small quantities of a non-ionic surface active agent and mineral acid.

Syton C is a colloidal dispersion of silica in water containing 15 per cent silica and having a pH of 10. The average particle size is said to be 1,500Å. This material is unaffected by boiling and a special grade which is unaffected by freezing is also obtainable.

A laboratory report (Silicon Chemicals 5510) published by Monsanto describes the use of Syton C in the formulation of dip-coats and moulding slurries. Syton C/zircon/Lissapol N slurries have been successfully employed in a precision casting foundry on production runs, says the report.

New Plastics Laboratory

Du Pont Polychemicals Department

A MODERN completely equipped sales service laboratory to develop processing and design techniques for plastics was officially opened recently by Du Pont's polychemicals department at Chestnut Run, near Wilmington, Delaware, US.

Many of the structural, decorative and mechanical parts of the new laboratory are fabricated in Du Pont plastics materials. In addition to work on plastics, the laboratory will service many of the one hundred or more polychemicals products used in industry and agriculture.

The primary work of the sales service laboratory will, as its name implies, be to assist customers solve service problems, but nearly half of its activities are scheduled to be concerned with development work on new materials and processes. It will evaluate new materials in representative equipment under conditions similar to those found in the industry generally.

Modern Architecture

Completely modern in its architecture, both inside and out, the laboratory occupies 62,000 sq. ft.; it is staffed by about 100 persons.

At a preview of the installation, Mr. Schumacher, of the Du Pont Company, said that since the first polychemicals sales service laboratory was built at Arlington, New Jersey, about eight years ago, the company's total annual sales of plastics have more than doubled. Plastics materials are new materials, and this laboratory is designed to educate users of plastics materials and develop comparable knowledge.

A section of the laboratory contains equipment for the moulding, extrusion, compounding and forming of the thermoplastic resins produced by Du Pont. These include Alathon polythene resin, Lucite acrylic resin, Teflon tetrafluoroethylene resin, and Zytel nylon resin.

The laboratory has a variety of sizes and types of extrusion machines, from a 1½-in. extruder used chiefly in the coating of small-diameter wire, to a 4½-in. machine capable of extruding heavy rigid sheeting. Auxiliary equipment includes radiant heaters, chill rolls, quench tanks, take-off equipment, and

a film-slitting machine. Injection moulding machines range from 1 to 16 oz. in size, and include a representative variety of types. The equipment installed includes a refrigeration unit which is used with the injection machines to regulate moulding temperatures.

Testing Motor Coolants

An interesting section of the laboratory contains about 20 automobile motor blocks and radiators. These are used for testing the performance of motor coolants, a function necessitated by the department's production of Zerone and Zerex anti-rust antifreezes.

In the field of plastics technology, substantial contributions have already been made by the laboratory group. Methods for coating paper with polythene, which had enormous impact on the packaging field, and the current work on the extrusion of acrylic sheeting, are examples of this work.

The letters on the facade of the building comprising the name of the laboratory, are made of Lucite. This material is used also in the translucent ceiling panels of the reception area, and in the prismatic light-diffusers in the office and conference sections. Lucite is used also for the blue laminated wall panels in the reception area.

Use of Alathon

A notable use of Alathon in the laboratory is in the 12,000-volt primary feeder cable. Alathon, which is used in both the insulation and jacket, gives good performance and reduces the cost of the cable itself and the installation. The material enables the cable to be buried in the ground without using a protective conduit; it is used also to insulate 440-volt feeder cables and in exhaust ducts, vent pipes, ventilating air filters, laboratory ware, and lubricating oil cans.

Many mechanical parts in use throughout the building are made of Zytel nylon resin.

Butacite polyvinyl butyral resin has been used for the inner layer of the safety glass in laboratory hoods. Teflon is used for the shaft packing for high-pressure boiler feed pumps and the stem packing on air-conditioning control valves.



CALCULATIONS OF ANALYTICAL CHEMISTRY.

By L. F. Hamilton & S. G. Simpson.
McGraw-Hill Publishing Co. Ltd., New
York & London. 1954. Fifth edition.
Pp. xii + 339. 37s. 6d.

The first edition of this book appeared as long ago as 1922, and its survival and growth in newer editions are a clear indication of its usefulness. The general approach to simple problems, and the section on mathematical operations have always served to place it high on the list of books introducing the mathematical treatment of chemistry to chemists.

In its present edition the sections on errors, precision, titration curves, and electrolytic and electrical methods (including conductometric, potentiometric and amperometric titrations) have been treated afresh. Certain newer titrimetric procedures have been added and colorimetric methods have been included for the first time, as also has instruction in the use of a nomograph. In order to keep the size approximately the same, some relatively unimportant matter has been deleted.

It is notorious that many students of chemistry find the mathematical side of their work difficult, and require constant practice in order to make them competent to apply mathematics to even the simplest problems. This book will give all that is necessary for a training (or a 'refresher') and any student who works through it conscientiously will have a fuller appreciation of the application of mathematics to the study of chemistry, as well as an ability to handle the mathematics themselves with certainty and assurance.—CECIL L. WILSON.

FOOD INVESTIGATION. Special Report No. 61. HM Stationery Office, London. Pp. viii + 159. 7s. 6d.

The full title of this report is 'Scientific and Technological Problems Involved in Using Ionising Radiations for the Preserva-

tion of Food.' It is described as a review of the present situation in this subject.

Subjects surveyed include the properties of ionising radiations, the use of waste radiation from atomic energy projects, the effects of ionising radiations on micro-organisms, the effects of irradiation on important constituents of food, together with sections on the experimental procedures necessary and the examination of samples.

This book perhaps represents one of the most comprehensive accounts of this important subject at present available.

ORGANIC SYNTHESSES. Collective Volume III.
Edited by E. C. Horning. John Wiley
& Sons, New York; Chapman & Hall,
London. 1955. Pp. x + 890. Cloth.
120s.

'Organic Syntheses' needs no introduction to chemists; its presence on the bookshelves of nearly every organic laboratory testifies to its usefulness as a source of reliable procedures for the preparation of organic chemicals. Collective Volume III follows the plan initiated by the publication of Collective Volumes I and II, and it covers the annual volumes 20-29. The material contained in these volumes has been reorganised, indexed and revised in the light of recent experience, and the references to the literature have also been brought up to date.

It is not generally realised that the notes appended to 'Organic Syntheses' procedures are a useful source of details concerning the purification of solvents and the preparation of common reagents. This information has now been made more accessible by the preparation of a special 'solvent and reagent' index. The book also contains other specialised indexes as well as a general index; the 'type of compound' and 'type of reaction' indexes enable research workers to use the 'Collective Volumes' as a source of general preparative methods.

This valuable contribution to the chemical literature will save chemists much time and trouble.—J.C.P.S.

HOME

Brackish Water Research

Great Britain has joined an international scheme for research on de-salting saline waters by electrodialysis. The work will be carried out in the Netherlands.

Return to Old Address

After an interval of 15 years the registered office of The Mond Nickel Co. Ltd. is once again Thames House, Millbank, London S.W.1.

CBMPE Exhibition

In last week's issue (p. 291) we reported that the joint Chemical and Petroleum Engineering Exhibition will be held from 9 June to 3 July, 1958. The CBMPE have asked us to point out that the exhibition will be open to visitors from 18 to 28 June only.

Oil Plant Contract

The London firm, Foster Wheeler, is to start the foundation work on Iraq's first lubricating oil plant which is scheduled to be completed in two years. The contract, worth £3,350,000, was awarded to the company in April by the Iraq Government Oil Refineries Administration.

Clitheroe Expansion Approved

The main board of Imperial Chemical Industries Ltd. has approved the proposed extensions to the Clitheroe catalyst factory which will increase output by 75 to 100 per cent. Work will probably begin next spring and be completed in about two years. It is hoped that the extension will permit Clitheroe to expand in overseas markets.

Big Brother—4,500 Gallon Reactor

In 1951 Styrene Co-Polymers Ltd. conceived the idea for a large reactor for the production of styrenated alkyds. The conventional reactors in use had a 1,450 gallon capacity; the new reactor was to have 4,500, but heat transfer problems had to be overcome. Last July the giant reactor arrived at the factory. Called 'Big Brother,' it is now producing every member of the Scopol and Scopolene range although it has not yet reached maximum output. It is to be fitted with auto-selective control, and safety devices to cut off heat input should re-circulation be reduced or stopped.

Leiner & Sons

The British firm of Leiner & Sons has acquired a 35-acre site at Coburg, Ontario, where it intends building a factory for the production of gelatine. Raw materials will be imported from Wales, India and Pakistan.

In Remembrance

Employees of I.C.I.'s Bickford Smith factory at Tuckingmill, Cornwall, have presented hymn books to the choir of Illegan Broadlane Methodist church in memory of the late Miss Lily Sherman, who for 43 years was a member of the choir.

Compoflex Holiday

Compoflex Co. Ltd. announce that their Oldham factory will be closed for a second holiday week from 13 August to 21 August inclusive. The Wimbledon factory will, however, be in production throughout the summer.

Geneva Scientists Get Harwell Invitation

Britain has invited all countries taking part in the Geneva Conference on the Peaceful Uses of Atomic Energy to send representatives to visit the Atomic Energy Research Establishment at Harwell. More than 60 nations are taking part in the Conference which opened on Monday, 8 August, until 20 August.

The United Strip & Bar Mills

The United Strip & Bar Mills, a wholly-owned associate of Steel, Peech & Tozer, whose manufacturing and trading activities have been amalgamated with the controlling company for many years, will, from 8 August, cease to trade under a separate name. In future it will trade in the name of Steel, Peech & Tozer, a branch of the United Steel Companies Ltd.

For Economy of Fuel

At the Fuel Efficiency Exhibition at City Hall, Manchester, from 12 to 22 October, Kelvin & Hughes Ltd. will display instruments which serve two aspects—economy in steam generation, and economy in process usage. A model boiler equipped with an econometer, a new instrument providing the information necessary for maintaining fuel economy, will be displayed in the steam process section.

OVERSEAS

Qatar Oil Production

Qatar Petroleum's crude oil output in June was 444,003 long tons, making total for first six months of this year 2,594,320 long tons.

Dutch Oil Strike

The Netherlands Aardolie Maatschappij has announced another oil strike near De Lier, in the Westland district, south of The Hague.

Oil From Canadian Sands

Two companies, Royalite Oil Co. and Can-Amera Oil Sands Development, have issued a joint statement that they are to begin a development programme to produce crude oil from the Athabasca oil sands in the Bitumont district 25 miles north-east of Edmonton, Alberta.

Bureau of Mines Grant

A sum of \$18,863,000 has been made available to the Bureau of Mines of the US Department of the Interior to enable it to embark on new research programmes. The appropriation is exactly the amount requested by the Department of the Interior which through the Bureau of Mines promotes efficiency, economy and safety in the mineral and allied industries.

Space Demands Heavy

Space reservations for the Silver Anniversary Exposition of Chemical Industries forecast one of the biggest displays in the 40-year history of the institution. Current applications are rapidly taking up the space remaining for allotment in the Commercial Museum and Convention Hall at Philadelphia, where the exposition will be held from 5 to 9 December.

Tung Oil Production

Although tung nut production in Argentina in 1953-54 declined 17 per cent below the previous season's figure, production of tung oil was nearly double the five year average ended 1951-52, and exports of oil last year at 12,248 tons, were slightly higher than for the previous year. A decree signed in January made compulsory the use of a certain proportion of tung oil in locally made paints and varnishes to help absorb surplus stocks.

Sulphuric Acid Plant Opens

The £3,000,000 sulphuric acid plant built at Port Adelaide, Australia, began production on Monday, 8 August. The plant, which roasts sulphur concentrates, will produce 100,000 tons of acid a year to make South Australia independent of imported sulphur.

Ford Foundation Grant

The Ford Foundation of New York has made a grant of \$26,500 to Stanford Research Institute to assist the participation of foreign scientists and engineers in the world symposium on Applied Solar Energy next November in Phoenix, Arizona. More than 50 scientists from 30 countries will be able to participate in the meetings through the contributions of the Ford Foundation and other funds.

USOM Aid For Israel Plastics

A laboratory for applied research to increase efficiency and the export potential of Israel's plastics industry is to be set up by the Weizmann Institute of Science in Rehovoth in co-operation with the US Operations Mission to Israel (USOM). The sum of IL.135,000 will be provided by the Weizmann Institute and \$38,200 by the USOM technical assistance fund in addition to supplies and equipment for the establishment of the laboratory, which is to form part of the Institute's Department of Polymer Research, headed by Professor Aharon Katchalsky.

Nigerian Cement Plant

The Nigerian Eastern House of Assembly announces that £2,000,000 has been subscribed to a new cement plant at Nkalagu which it is hoped will be operating by May, 1957. Output is expected to exceed 100,000 tons a year.

Chemical Plant to Treat Uranium

Mr. Thomas Playford, Premier of South Australia, says that the South Australian Government will legislate to allow the state mines department to negotiate with private companies for the establishment of a uranium mine at Mount Victoria. He said that the Port Pirie chemical treating plant was big enough to treat all the uranium produced at the new mine.

PERSONAL

MR. GEORGE WEATHERSTON, technical director of British Paints Ltd., has returned from a business trip to the US and Canada.

DR. P. H. FRANKEL is to resign from the board of Manchester Oil Refinery (Holdings) on 30 September.

SIR ALAN SAUNDERS, a member of the National Research Development Corp., has been appointed chairman in succession to SIR PERCY MILLS. The appointment is for four years.

Samuel Fox & Co. Ltd., announce that MR. CHARLES EDMUND LUPTON was appointed secretary and office manager on 1 August. He was formerly the statistical accountant of The United Steel Companies Ltd.

Metal Industries Ltd., announce the appointment of MR. E. BRUCE BALL, C.B.E., as an additional director of the company. Mr. Ball was formerly managing director of Glenfield & Kennedy Ltd.

Members of the committee of the recently formed Leeds section of the Textile Institute are: DR. G. MCLEAVY, MR. G. AKROYD, A.T.I., MR. F. C. PRICE, A.T.I., DR. R. R. LYNE, MR. H. B. TAYLOR, F.T.I., MR. H. NEEDHAM, A.T.I., and MR. D. S. MUMFORD.

MR. ARTHUR EVANS, who has been with the flexible plastics division of Dunlop Special Products since the beginning of the year, has been appointed assistant sales manager. Mr. Evans joined Dunlop at their Bristol depot in 1948 after war service in the R.A.F. The next year he became assistant at St. James's House, London, to the information officer, MR. J. BONAR MACCOLL.

DR. E. A. PERREN has been appointed chief superintendent of the Chemical Defence Experimental Establishment at Porton, Wiltshire, in succession to Mr. S. A. Mumford. Dr. Perren, who has been superintendent of research at the establishment since 1951, takes over his new appointment on 1 September. Before he went to Porton, he was chief superintendent of the Canadian Research & Development Establishment in Alberta.

SIR CHRISTOPHER F. A. WARNER has been appointed a director of the Imperial Continental Gas Association.

MR. R. J. BOWERMAN, formerly with Burt, Boulton & Haywood Ltd., has been appointed manager of the new department set up by W. Harrison & Co. Ltd. for supervising the sales of synthetic resins.

Ill-health has caused MR. A. J. RUTHVEN MURRAY to resign as a director and joint managing director of Trinidad Leaseholds. Mr. Murray joined the company in 1942 as general manager.

MR. A. G. ELLIOTT, formerly production controller of Sheepbridge Equipment, has been appointed works engineer at the Chesterfield, Derbyshire, works of the Sheepbridge group. MR. A. WELLS, deputy to Mr. Elliott at Sheepbridge Equipment, has become the new controller.

MR. CHARLES M. SCHWAB has been elected president of Shawinigan Products Corporation, New York, a wholly-owned subsidiary of Shawinigan Chemicals Ltd., of Montreal. Shawinigan Products acts as selling agent in the US for products of Shawinigan Chemicals as well as its own associated companies, Shawinigan Resins Corporation of Springfield, Mass., and Midwest Carbide Corporation of Keokuk, Iowa. Formerly vice-president of Shawinigan Products, Mr. Schwab succeeds MR. LOUIS F. LOUTREL who has retired after more than 35 years' service, but who remains as a director of the company.

MR. FREDERICK C. KROFT has been appointed general superintendent of manufacturing for Haynes Stellite Co., a division of Union Carbide and Carbon Corporation. Mr. Kroft received a B.S. degree in metallurgy from Purdue University in 1942. He joined Haynes Stellite Company in 1936 and was employed in the grinding department and later in the chemical laboratory. In 1942 he became a junior research engineer, in 1950 assistant technical director, and later that same year, superintendent of the inspection, process, and quality control department.

Water Conservation

HUNDREDS of millions of gallons of water are lost in Kenya every year through evaporation, and the East African Industrial Research Board, under the direction of Mr. H. B. Stent, has been conducting experiments on the use of a mono-molecular layer of cetyl alcohol as an evaporation retardant.

Cetyl alcohol in the form of small pellets is enclosed in fine copper mesh baskets which are held in the framework of box-like rafts. Fleets of these rafts are being anchored across large expanses of Kenya's water supplies. The initial tests are being based on one pound of pellets to each raft and one raft to each acre of water. The resultant film automatically repairs itself when broken.

The pellets cost around half a crown a pound and are estimated to last for several years. Experiments in evaporation pans suggest a possible saving of the order of 70 per cent, and if this figure is maintained on the 88 acre, 415,000,000 gallon Nairobi dam a saving of some 30,000,000 gallons a year is envisaged.

Tests are being carried out to confirm that the film is harmless to humans, fish, insects and animals, and to observe the effects on mosquito breeding.

Great areas of Kenya have less than 20 inches of rainfall a year, and in other parts the rains are erratic. It is hoped that the success of this process, based on the white pellets produced and patented by Mr. Stent, will change the whole picture.

New Machinery

STERLING Metals, PO Chloorkop, via Johannesburg, are completing the installation of new machinery designed by their engineers to handle the phosphate ore quarried by the company in the Potgietersrust district, so that in the near future it will be possible to deliver to a variety of South African industries such essential raw materials as sodium phosphate chemicals, the bulk of which so far had to be imported. The company is to produce these chemicals to high quality standards and in the quantity needed to meet the entire industrial demand in South Africa. Production is scheduled to begin before the end of this year.

This firm claims to be one of the biggest lead smelting and refining organisations in South Africa and they are to use waste and

other scrap material and ore from their mines in the Potgietersrust district. For some time now their plant has been producing pure lead on a commercial scale, and the purity of this product is claimed to equal that produced anywhere else in the world.

At one time lead of this purity had to be imported, but now that it is available from a local source overseas exchange can be used for other purchases. This lead is examined for impurities and generally analysed with the aid of a spectroscope, introduced a few years ago, which has been an important element in improving processing methods and speeding up the analysis of samples, doing in minutes what previously took a week or more. Furthermore, it has been possible to file a photographic record of each batch of samples.

British Chemical Plant

THE 1955 edition of 'British Chemical Plant' is being distributed to chemical and allied manufacturers at home and abroad on the basis of mailing lists compiled by the British Chemical Plant Manufacturers' Association who are the publishers.

This directory has three sections:

1. Lists of members of the Association with their addresses and, where they have wished to publish them, the names and addresses of their overseas agents.
2. An illustrated section consisting of members' advertisements.
3. A classified index of products and services, prefaced by advice to inquirers and followed by a key in French, German and Spanish.

Since the last edition there has been an increase in the number of members of the Association and this is reflected in an increase in size of the volume. A limited number of copies is being held to meet requests from chemical plant users, who will be supplied free of charge. The publication is not available through booksellers.

Chancellor Visits Matzen Field

A Russian oil exploitation company has discovered new reserves of oil and natural gas in the Vienna area. The Austrian Chancellor, Herr Raab, was recently shown round the oilfields at Matzen which are expected to produce 3,500,000 tons of crude oil a year, of which the Russians will be granted 1,000,000 tons.

Publications & Announcements

'BUSINESS management can safely assume that its operations will be significantly affected by nuclear energy'. This opinion is expressed in *Research for Industry*, 1955, 7, 7, a news bulletin put out by the Stanford Research Institute, Menlo Park, California, which devotes several pages to a review of nuclear engineering. It is not enough to solve technical problems, says the bulletin, the economic applicability in each case must also be evaluated. This is becoming a major activity in itself. Also contained in this bulletin is a discussion of the present position of titanium in the US. Consumption figures for this metal are said to be rather low, which is surprising in view of the enthusiastic predictions made for it in the last decade. One reason for the limited use of titanium, says the bulletin, is that mill products sometimes fail to meet rigid specifications. It is also found that bearing surfaces made of titanium often tend to seize and gall because of unusual lubrication properties. The staff of SRI's newly enlarged electrochemical laboratory is looking into these problems.

* * *

THE *Jenolite News*, published monthly by Jenolite Ltd., of London, features the protection of structural steel against corrosion in the June issue now circulating. There are also articles on how chemical pre-treatment overcomes corrosion on metal floats, and an illustrated feature on the protection of oil refinery equipment.

* * *

TWO NEW brochures have been put out by Hilger & Watts Ltd., 98 St. Pancras Way, London N.W.1. The first of these, CH 310/3, describes the Hilger Recording Infra-Red Spectrophotometer H 800. This instrument works on a 'double beam in time' principle, which means that the light of the sample beam and that of the reference beam travel alternately along the same path through the spectrometer to the same detector, a very sensitive vacuum thermopile. The changeover from one beam to another is effected by an oscillating mirror $12\frac{1}{2}$ per second. A suitable sample for quantitative analysis can be made by pressing a mixture of 0.1 to 1.0 per cent of the unknown with potassium bromide under vacuum. The

second brochure, CH 357/3, concerns the Hilger range of photo-conductive cells. These are claimed to have characteristics which make them very suitable for industrial applications: very high sensitivity, a low voltage will produce currents of the order of several mA, no breakable parts or vacuum containers, very small size and light weight, great adaptability.

* * *

A MONOGRAPH, 'The Chemical Background of the Aluminium Industry', by T. G. Pearson, of the British Aluminium Company, has been published by the Royal Institute of Chemistry. In this monograph the author outlines the history and development of the aluminium industry, starting with the preparation of the metal 100 years ago by Henry Ste. Claire Deville. He then goes on to discuss the various methods for extracting the metal from its ores. At present, says the author, the modern industry is founded on two processes, patented in 1886 and 1888. If, however, there were changes in mineral sources or in economic conditions other processes might become important.

* * *

THE June issue of the *Wild Barfield Heat-Treatment Journal* now circulating features articles on mercury arc rectifiers for frequency changing on induction heating equipment, a redesigned electrode salt bath, and gas carburising by L. G. W. Palethorpe, F.R.I.C., F.I.M.

* * *

STATISTICS for the US chemical industry for the years 1951 to 1953, together with some data for the first six months of 1954 are contained in 'Chemical Statistics Handbook', fourth edition, 1955, which is published by the Manufacturing Chemists' Association, Inc., 1625 Eye Street, N.W. Washington 6, DC. The Association will shortly issue current summaries of the Chemical Statistics Handbook on a semi-annual basis, giving up-to-date figures on a selected list of inorganic and organic chemicals, as well as data on employment, wages, hours, earnings, prices, production indexes, etc.

HORACE PRIEST, Chemical Engineering Co. Ltd., sends out every month a technical chart on one of a wide range of subjects, including distillation, heat exchange, absorption, liquid and gas extraction, evaporators, general properties of chemicals, and mechanical design requirements. These charts are printed on heavy foolscap paper, and periodically an index will be issued. No charge is made for them and the company believes that anyone whose business involves design work and the production of chemicals will find them useful. Copies may be obtained from the company at 'Beverley,' Farthings Hill, Horsham, Sussex.

* * *

ONE of the specialities of Sir W. H. Bailey & Co., of London and Manchester, is the manufacture of valves not always obtainable from standard sources. The company makes a wide range of pressure regulators to serve many industries, and these products are described and illustrated in a pamphlet which has just been issued.

* * *

SOME technical data on the type GP pumps made by Orr Products, Whitefield AK Works, Stroud, Gloucester, is contained in a leaflet put out by the manufacturers. These GP (general purpose) pumps incorporate a life-times' supply of lubricant which, it is claimed, cannot contaminate the fluid being pumped. Being slow speed these pumps will run for long periods without any attention, and the internal working parts can be replaced when worn at relatively low cost.

* * *

A FOUR-page bulletin describing the use of polyethylene glycol 400 monolaurate in defoaming, levelling, pigment and colour dispersion, emulsification of resin and plasticiser additives and dispersion of fungicides has been issued by Glyco Products Co. Inc. of New York. Acting as a non-ionic surface agent, polyethylene glycol 400 monolaurate, used to wet the pigments and to act as an aid in the grinding process, overcomes the problem of foaming during manufacture of latex paints, it is claimed. Foaming of latex paints usually occurs during the blending of pigment pastes with the latex base.

* * *

AT the annual general meetings of Unilever Ltd. in London and Rotterdam recently, Lord Heyworth of Oxtou, chairman of

Unilever Ltd., and Dr. Paul Rykens, chairman of Unilever NV, both gave speeches entitled 'Transport'. These speeches have now been reproduced in book form for private circulation and they cover the whole range of transport used by Unilever, outlining the general pattern of distribution and lessons learned from past experience.

* * *

AUTOMATION in the chemical and petroleum industries is the subject of the current issue of *The Kelloggram*, a periodical published by M. W. Kellogg, designers and builders of oil refineries and chemical plants. Coloured diagrams are liberally used to illustrate the basic functions of instruments in automatic control, and one section is devoted to describing the use of radio-isotopes in level measuring devices, a relatively new development in the chemical and petro-chemical industries.

* * *

DEMAND for synthetic detergents and fertilisers has resulted in a chemical production boom in the mountain states of the US where 60 per cent of the country's phosphorus reserves are located. The Chemical Industry Facts Book just published reveals that chemical production in 1953 was 50 times greater than it was in 1947, and that from 1953 until last year \$160,000,000 was being spent on chemical plant construction.

With new processes of extraction developed furnaces are engaged all-out producing elemental phosphorus, a basic raw material not only used in the manufacture of detergents and fertilisers, but for pharmaceuticals, paper, glass and insecticides. Soda ash and sulphuric acid production also forms a large part of the mountain states increasing chemical output.

* * *

FOR their next session starting on 26 September the Northampton Polytechnic, St. John Street, London E.C.1, have arranged a wide range of courses in pure and applied chemistry. They include courses for the associateship examination of the Royal Institute of Chemistry, and for ordinary and higher national certificates, and fuel technology, corrosion science and chemical plant operatives' courses for the examinations conducted by the City & Guilds of London Institute in these subjects.

PERMUTIT

ION EXCHANGE MATERIALS

Ion Exchange today performs many tasks in industry, and Permutit manufactures a wide range of these materials. Their application in roles distinct from water treatment has resulted in the development of numerous new industrial processes giving improved results and lower running costs. Some of the materials now available, with their characteristics, are shown below.

ZEO-KARB Na A sulphonated coal product containing both strong and weak acid groups.

ZEO-KARB 215 A nuclear sulphonated phenol resin containing also hydroxyl groups.

ZEO-KARB 225 A unifunctional cross linked sulphonated polystyrene resin in bead form of high capacity and exceptional chemical and physical stability.

ZEO-KARB 226 A unifunctional cross linked methacrylic acid resin in bead form containing only carboxyl groups as the ion active groups.

DE-ACIDITE E A high capacity anion exchange material of medium basicity.

DE-ACIDITE FF A unifunctional very highly basic anion exchange resin in bead form based on cross linked polystyrene and containing quaternary ammonium groups.

DE-ACIDITE G A unifunctional weakly basic exchange resin in bead form based on cross linked polystyrene and containing diethylamino groups.

DE-ACIDITE II A material similar to "De-Acidite G" but containing dimethylamino groups.

BIO-DEM/NROLIT A mixed cation and anion exchange resin for demineralisation in a single column.

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

DECOLORITE A resin of high porosity for removing colour from solutions.

PERMAPLEX C-10 A highly selective cation exchange resin membrane containing SO_3H groups.

PERMAPLEX A-10 A highly selective anion exchange resin membrane containing quaternary ammonium groups.

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Dept. V.A. 150, Permutit House, Gunnersbury Ave., London, W.4. Tel.: CHiswick 6431

Law & Company News

Commercial Intelligence

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

Mortgages & Charges

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

MARB-L-COTE (MANUFACTURING) GREAT BRITAIN LTD., London E., manufacturers of paints, etc.—1 July, mortgage to National Provincial Bank Ltd. securing all moneys due or to become due to the bank; charged on 28/30 Chapel Street, Stratford, with plant and fixtures, etc. *— 5 February, 1954.

Satisfactions

CARBONIZERS (BRADFORD) LTD.—4 July, of charge registered 16 April, 1951.

LAFARGE ALUMINOUS CEMENT CO. LTD., London W.—Satisfactions, 5 July, of debenture stock registered 25 June, 1946, to the extent of £5,555 and of debenture stock registered 11 April, 1949, to the extent of £2,777.

New Registrations

Breckwoldt Peel & Co. Ltd.

Private company (552,915.) Registered 4 August. Capital £1,000. To carry on the business of general importers and exporters, merchants, brokers, shippers, manufacturers of and dealers in electrical, mechanical, chemical, photographic, surgical and scientific apparatus, etc. Directors: Wilhelm F. Breckwoldt and Horace K. Peel. Reg. office: 3 Catherine Place, Buckingham Gate, London S.W.1.

Gas Purification Ltd.

Private company (552,817.) Registered 2 August. Capital £100. To carry on the business of importers, exporters and manufacturers of and dealers in the residual products arising or remaining from or produced by the manufacture or purification of gas or the materials used therein; manufacturing chemists, etc. Subscribers (each with one

share) are: C. F. J. Wigginton and F. L. Giles. Solicitors; Theodore Goddard & Co., 5 New Court, Lincolns Inn, W.C.2.

Birfield Nominees Ltd.

Private company (552,839.) Registered 2 August. Capital £100. The directors will be appointed by United Sulphuric Acid Corporation Ltd. Solicitors: Linklaters & Paines, 6 Austin Friars, E.C.2.

Piro Chemicals Ltd.

Private company. (552,707.) Registered 29 July. Capital £5,000 in £1 shares. To acquire the business of chemical manufacturers carried on by Arthur Roger and Valeria A. C. Pitts at Riverside Works, Sandycroft, Flints, as Piro Manufacturing Co. The directors are: Arthur Roger and Valeria A. C. Pitts. Registered office: Grosvenor House, 104 Watergate Street, Chester.

Company News

Oldham & Son Ltd.

Net profit, before taxation, of Oldham & Son Ltd. for the year ended 31 March, 1955, is £452,958, of which subsidiary companies contributed £202,751. After tax deduction there is a net profit of £230,000. With the account goes a resolution and notice of the proposal to capitalise a further £100,000 of the company's reserves by the issue to ordinary shareholders of 2,000,000 1s. shares, credited as fully paid, in the proportion of one for four.

Burt, Boulton & Haywood Ltd.

In his statement for the year ended 31 March, Captain F. J. E. China, O.B.E., chairman of Burt, Boulton & Haywood Ltd., said at the recent annual general meeting that group trading profits had improved on last year and there has been some increase in total revenue from coal tar distilling interests. The company, timber importers and merchants, tar distillers, and manufacturers of chemicals and paints, owns 50 per cent of Burts & Harvey Ltd., who are partners on one hand with the Southern Gas Board in the distillery company, South Western Tar Distilleries Ltd., and on the other hand with the South Western Gas Board in the West of England in the company known as the

(continued on page 342)

For a quick insect knock down

AFRICAN PYRETHRUM PACKS A POWERFUL PUNCH

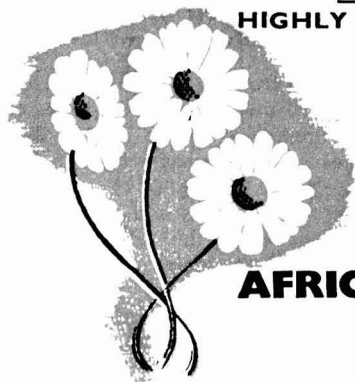
a punch that knocks 'em down and keeps 'em down

PYRETHRUM insecticides, although deadly to insects, are absolutely harmless to man and animals and can be used with the utmost safety in close proximity to foodstuffs.

PYRETHRUM is compatible with other insecticides and is capable of a high degree of synergism.

PYRETHRUM used in low concentrations with suitable synergists, combines high knock-down rate with effective killing power — moreover insects do not develop resistance to Pyrethrum based insecticides.

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The Pyrethrum Board of Kenya, NAKURU, Kenya Colony.

The Pyrethrum Board of Tanganyika, MBEYA, Tanganyika Territory.

Societe Co-operative des Produits Agricoles, GOMA, Belgian Congo.

Company News

continued from page 340

Plymouth Tar Distilleries Ltd. During the year the company augmented their creosoting and water soluble salt plants and equipped a pilot plant for treatment under pressure with pentachlorophenol. The agricultural and horticultural department was expanded and manufacturing facilities increased to meet demand for crop protection products. A development of significant interest during the year was the formation of a partnership with Farbenfabriken Bayer AG, of Leverkusen, Germany, of a sales company—Baywood Chemicals Ltd,—for the distribution in the UK of the crop protection products of Bayer, side by side with those manufactured by Burt, Boulton & Haywood Ltd.

Vitamins Ltd.

After providing for taxation, profits for the year of Vitamins Ltd. amounted to £92,928 as compared with £41,296 for the previous year. It is proposed to pay a dividend of 15 per cent on the ordinary stock, less income tax, and to transfer £11,000 to capital general reserve. Total unappropriated profits at 31 March total £75,666.

Esso Petroleum Co. Ltd.

The annual review of the Esso Petroleum Co. Ltd. for 1954 has just been published. It covers all aspects of Esso's activities and outlines some interesting figures. For the year the company's trading receipts were £188,559,000, of which £67,337,000 was paid to the Government for customs duties. Capital of £8,000,000 was spent on expansion of the Fawley refinery which produced on average 500,000 more gallons of products a day than in 1953. The refinery's actual crude throughput last year of 50,573,371 barrels represents an increase of 15½ per cent over 1953. White products which include petrol, turbo jet fuel and kerosine totalled 734,000,000 gallons; black products including lubricating oils and bitumen and gas totalled 936,000,000 gallons. The amount of sulphur manufactured amounted to 12,000 tons.

The Texas Co.

Estimated net earnings of The Texas Co. and subsidiaries for the first six months of 1955 totalled \$124,834,043, or \$4.55 per share, compared with \$97,480,845, or \$3.55 per share, for 1954. For the three months ended 30 June, 1955, estimated net earnings

amounted to \$68,812,831, or \$2.51 per share, compared with \$46,632,407, or \$1.70 per share, for the similar quarter of 1954. Net earnings for the first half of 1955 include dividends received from domestic and foreign non-subsidiary companies totalling \$41,443,309. Comparable dividends for the first half of 1954 totalled \$41,246,337. Included in earnings for the first half of 1955 is a non-recurring net profit of \$8,184,530 realised in the second quarter on the sale of a capital asset. The directors declared the regular quarterly dividend of 75 cents per share payable 10 September, 1955, to stockholders of record on 5 August, 1955.

Market Reports

LONDON.—There has been a steady call for chemical products during the past week and deliveries against contracts have been renewed on a good scale. Buying for shipment has improved with a steady flow of inquiry reported chiefly from Commonwealth countries. The non-ferrous metal compounds are in good request and there is an active market for hydrogen peroxide and formaldehyde. Acetone and other solvents are moving well. Conditions in the coal tar products market are unchanged with prices steady at recent levels.

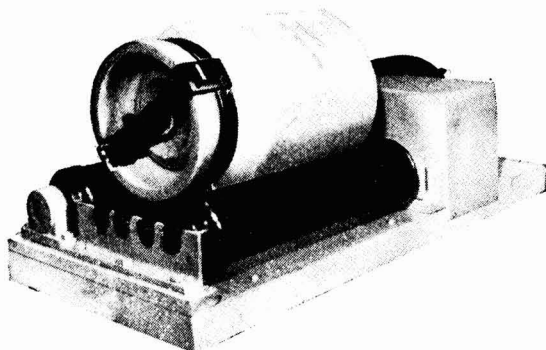
MANCHESTER. — The market for heavy chemical products this week has continued to be affected to some extent by holiday stoppages at consuming works in Lancashire and the West Riding of Yorkshire, but in spite of this seasonal factor contract deliveries have, in the aggregate, been on a reasonably good scale, while the overseas shipping movement has been fairly satisfactory. One or two sections of the fertiliser market have been moderately active, but, generally speaking, business has been on the quiet side. Among the tar products, creosote oil, refined tar, and carbolic acid are meeting with a steady demand.

GLASGOW.—A rather better week's trading has to be reported in the Scottish chemical market, particularly in the latter part of the week. Prices, however, appear to be on the increase due to carriage charges and the general rise in production costs with the recent increase in fuel. The export market is still extremely active.

laboratory ball mills

available in several designs to accommodate pots of different nominal capacities, i.e. $\frac{1}{2}$, 1, $1\frac{1}{2}$, 2, 3, 4 and 5 gallons. Various combinations of pots can be set up. The model illustrated is designed with two rolls, one driven and one idler, which can be adjusted to four different positions. This model can take either two 2-pint pots or one 1-gallon pot.

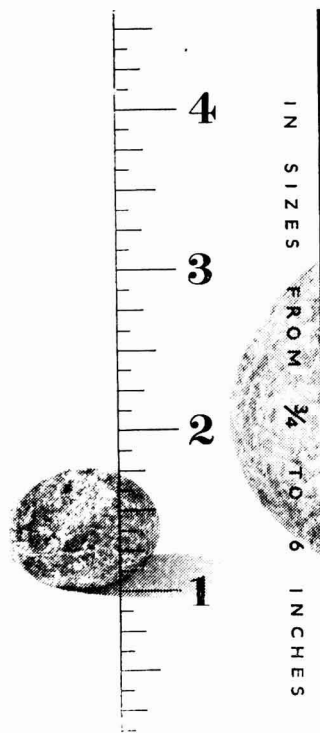
The units are supplied complete with motor, requisite pots and ball charges. Standard models are supplied with ceramic pots but, if required, metal containers and ball charges can be supplied.



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IT IS A MATTER OF OPINION whether you should use English or French pebbles, but whichever is your choice we can supply you with hand-picked individually selected pebbles ranging from 1" to 6" in size.

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CLASSIFIED ADVERTISEMENTS

EDUCATIONAL

UNIVERSITY OF MANCHESTER
THE NEXT SESSION COMMENCES ON
THURSDAY, 6TH OCTOBER, 1955

SITUATIONS VACANT

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

CHEMICAL ENGINEER, or similar background, age 28-35, required for residence abroad. Self-reliance and ability to be responsible for initiating and completing negotiations and contracts are essential. Apply to **SHARPLES PROCESS ENGINEERS, LTD., 62, BROOK STREET, LONDON, W.1.**

QUALIFIED CHEMIST required for North Midlands Laboratories. Experience in the Chemistry of Germicides and Sanitary Chemicals essential. Responsibility for maintenance of quality standards, some development research. Experience in supervision and control of the laboratory team. Salary according to qualifications and experience. Write, stating age, with full details of career and qualifications, to **BOX No. C.A. 3423, THE CHEMICAL AGE, 154, FLEET STREET, LONDON, E.C.4.**

CHEMICAL ENGINEERS AND CHEMISTS

required by
**UNITED KINGDOM ATOMIC ENERGY
AUTHORITY IN THE RESEARCH AND
DEVELOPMENT BRANCH AT INDUSTRIAL GROUP
HEADQUARTERS,
RISLEY, NEAR WARRINGTON,
LANCS.**

to work in a Group concerned with the industrial aspects of Atomic Energy.

This Group defines the long-term programme of chemical and chemical engineering research and development at a number of laboratories; effects liaison with laboratory groups at various sites working on specific projects; evaluates new processes and process modifications; supplies detailed flow-sheets to engineering design offices, and affords a technical service to them during the detailed plant design stage.

Applicants must possess an Honours Degree in Chemistry or Chemical Engineering, or corporate membership of a relevant recognised professional institution or equivalent qualifications. They must also have had practical experience on production or pilot chemical plants and be used to assessment of potential chemical processes. Salary range, £1,065-£1,370 per annum.

All new entrants under the age of 55 automatically join the Authority's Contributory Pension Scheme. Housing accommodation will be available within a reasonable period for the successful candidates, if married.

Interested persons having suitable qualifications and experience, should send a postcard requesting application form, to the **RECRUITMENT OFFICER, INDUSTRIAL GROUP HEADQUARTERS, RISLEY, NEAR WARRINGTON**, quoting reference 1057.

GRADUATES in **MECHANICAL** and **CHEMICAL ENGINEERING** required for progressive positions in the Research, Design and Production Divisions of **THE POWER-GAS CORPORATION LIMITED**. Training given to men without previous industrial experience. Apply to:—**STAFF PERSONNEL MANAGER, PARK-FIELD WORKS, STOCKTON-ON-TEES.**

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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.**

DOUBLE ABSORBER UNIT RECOVERY PLANT by Sutcliffe Speakman, for sale. Capacity 2 gallons per hour; air moved 900 cu. ft. per minute. Complete with fan and motor for 415 volt, 3-phase, 50-cycle supply. Very little used. Reasonable price accepted. Apply **A. S. ORR & CO., LTD., SCHOOL LANE, BAMBER BRIDGE, NEAR PRESTON.**

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invite inquiries for

"MORWARD" MIXERS

NEW Stainless Steel or Mild Steel Mixing Vessels made to requirements, jacketed or unjacketed, with or without mixing gear.

PROCESS and STORAGE Tanks in stainless steel or mild steel to requirements.

High- or Slow-Speed STIRRERS made and fitted to existing vessels.

JACKETED PANS

100g., 150g., and 200g. **NEW** in mild steel, for 100 lb. w.p., with or without mixing gear.

Structural and General **FABRICATION** requirements catered for.

SECOND-HAND EQUIPMENT

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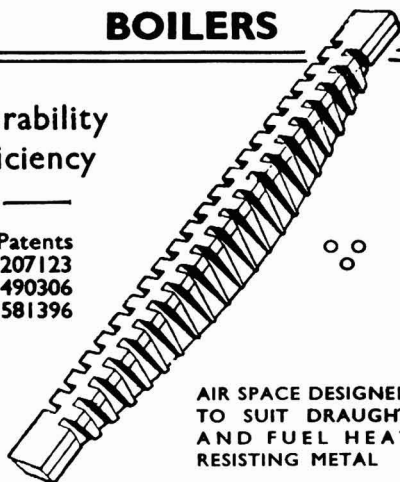
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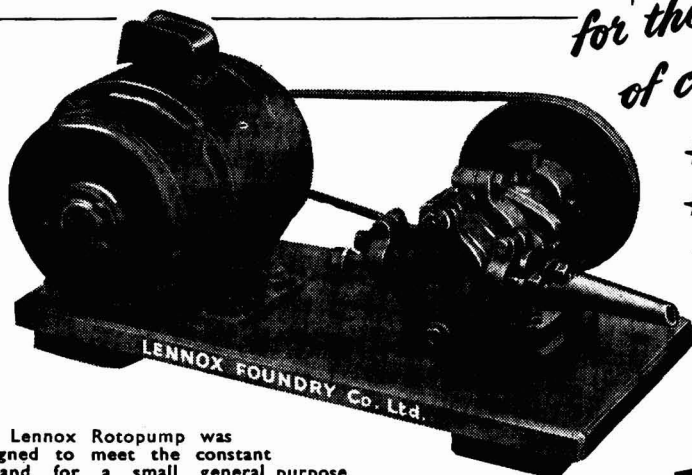
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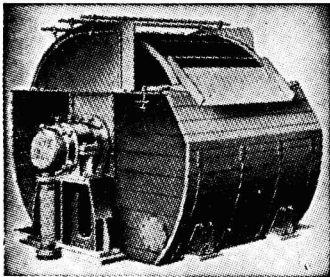


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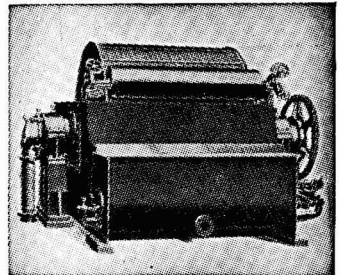
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