The Chemical Age

A Weekly Journal Devoted to Industrial and Engineering Chemistry

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No. 1404

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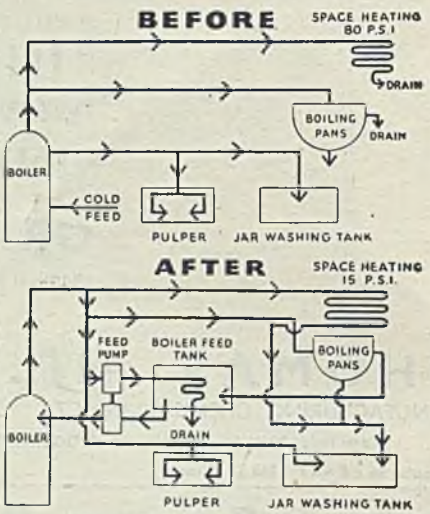

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For full details and complete diagrams of this abbreviated Case History see No. 30 of the *Fuel Efficiency News*, dated October 1945.

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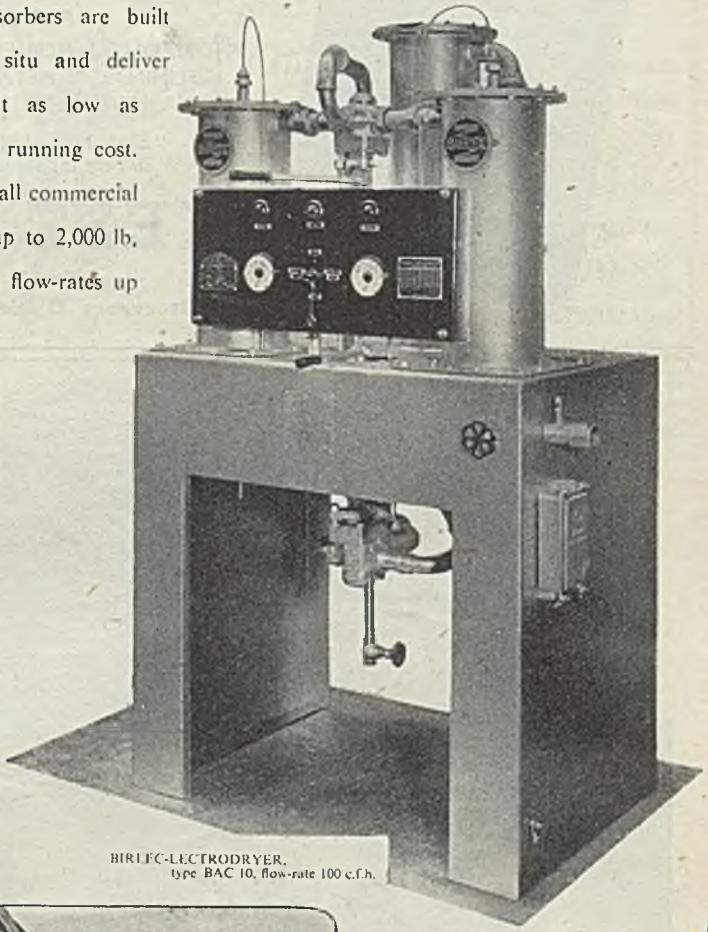

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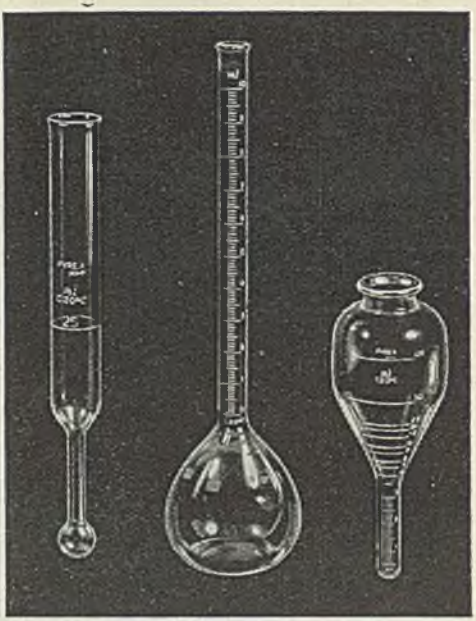

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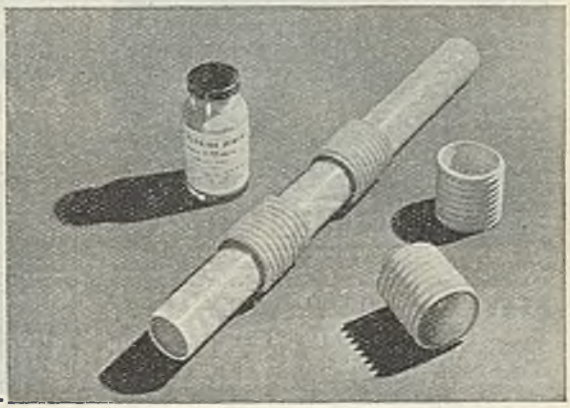

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The Steel Plan

THE White Paper on the iron and steel industry has now been issued and it is open to everyone to criticise it. For our part we acknowledge that it has been drawn up by experts and can be appraised only by those who have spent long years in the direction of this great industry. Nevertheless, as representing a user industry we may have questions to ask.

The iron and steel industry was not in good shape when the great depression of 1929 hit us. But tariff protection enabled it to recover in a remarkable manner. In the eight years preceding the war it spent no less than £50,000,000 in modernisation of equipment. It would have gone on spending had the war not intervened. The Government has thus no case for declaring that the industry would not make itself efficient. It was already doing so as fast as equipment could be made available. At the request of the Minister of Supply, the British Iron and Steel Federation has drawn up a comprehensive plan for the completion of the modernisation programme which would cost yet a further £168,000,000. This plan appears to provide a first-class foundation. The Minister cannot, therefore, excuse his dictatorial decision to dispossess its present owners on the ground that the industry either cannot or will not put its house in order.

The industry recognises that the tasks facing it are: (i) To make good the further modernisation and development which would have taken place during the last six years had there been no war. Under war conditions, the Government was unable to allow the industry to continue the process, which it had begun several years before the war, of systematic modernisation and development. (ii) To enlarge steel-making facilities to bring them into close relation with the higher demand for steel products that may be expected in the post-war years as compared with pre-war. (iii) To ensure the most effective use of plants by concentrating production, with due regard to the availability of raw material and the distance to markets, into efficient units of appropriate size. While the consideration may be inherent in the statement of these tasks, it is disappointing to find that there is here no specific recognition of the most important task of all, namely, to reduce the cost of finished steel to the consumer to the lowest practicable figure. The real question to be answered is this: Do the proposed changes secure production units which can on every

On Other Pages

reasonable standard be deemed internationally competitive and able, without either direct or indirect subsidy, to provide the steel-using industries of the country with their raw material at as cheap a cost as it is provided in equivalent circumstances by rivals in other countries, and at least as cheaply as it could be continuously obtained by importation? But the report contains no answer to that fundamental question.

The industry uses some 55 per cent. of scrap and must use some imported ore. It is considered that production must be raised to about 16 million tons of steel annually and that this would require, in addition to the 55 per cent. of scrap, some 7¼ million tons of imported ore and 12¼ million tons of home ore, of which 11 million tons would be obtained from the Northamptonshire, Lincolnshire, and other Midland orefields. Is the present location of plants the best possible in the light of these facts, or has the Federation been unduly anxious to preserve the present works just because they were in existence? Again the report does not answer this question, but two considerations are evident—movement of population and cost of scrapping plant.

To pull down a works and replace it by another works elsewhere is no light undertaking. Will the population wish to be uprooted? Will the result be just another depressed area? Can the houses be built? The report envisages increased production in the Midland area of 500,000 tons of billets a year and says: "The proposals provide for this increased demand to be met in the main by the installation of a new plant on a green field site and based on home ores. On account of the relative resources, and the developments planned in Lincolnshire, this new enterprise should be based on the Northamptonshire ore reserves. The plant will provide for preparation of the ore, coke ovens, blast furnaces, steel plant, a cogging mill and a continuous billet mill with a capacity of half-a-million tons of billets. . . . Even at the outset, many questions of a social and economic character, including housing, will need special consideration, and may well determine the date at which the scheme should proceed." To move *several* steel works to other sites would be a vast undertaking indeed. But it may be necessary for the production of cheap steel.

On the economic side, to embark on a policy which involves scrapping plants before they had worked out their economically useful life would mean spreading the capital cost of plant over such a short period that production would be uneconomic. A balance has therefore to be struck between the need to replace plant by the improved equipment which technical development makes possible, and on the other hand the need to spread the heavy cost of new plant over a reasonable length of useful life. It is not desirable—even if it were physically possible—to step up the rate of building beyond that proposed in the plan, as to do so would involve a wasteful use of national resources. The criterion adopted in the report as to whether a plant should be scrapped or not is interesting, namely, that the operating cost of the new plant, *including both prime cost and capital charges*, shall be less than the prime operating cost only of the old plant. The report adds that while the capital cost involved in the proposed major building programme is high, it is, nevertheless, essential to embark upon it now. In addition to such immediate gain as will accrue in cost, the industry will be progressively established on an improved level of efficiency which in the long run will bring still greater gains in cost and will also secure improvements in quality.

Treasury policy of 100 per cent. excess profits tax is now coming home to roost, as everyone (except the Treasury, apparently) knew it would. Where are the funds for reconstruction? The cost of a billet plant in 1935 on home ore was about £8 12s. per ton of billet capacity, or rather more than this per ton of output, when allowance is made for the periods when output falls below capacity. The corresponding cost to-day for a billet plant on home ore, including steel and blast furnaces, but excluding in both cases the capital expenditure on ore development and coke ovens, would be £23 10s. The difference is partly explained by the low price level of plant in this country in the depression period and the low figures at which plant could then be bought from the Continent. Just before the war the cost level had increased considerably and would probably have been of the order of £13 10s. per ton of capacity, while the present figure shows a further increase of from 70 to 80 per cent. The problem of building in a period of high plant cost is a handicap in relation to U.S.A., where 15 million tons of new capacity were built during five

years when war conditions suspended new construction here. Part of the American expenditure was incurred by the Government and part by the industry. The industry was permitted to write off expenditure at the rate of 20 per cent. per annum, and thus recover the outlay against war income. A major reconstruction and extension of capacity has thus been carried through in America with a legacy of very minor capital charges. Where are the British industry's reserves?

It would perhaps be less than justice to declare that reduction in the cost of steel is not considered in this report. Coal is a vital item of steel production costs. The possibility of reducing fuel consumption depends in the main on: (a) the full use of available scrap; (b) the use of high-grade ores; (c) the preparation of ores; (d) an increase in the size and efficiency of blast furnaces; (e) full integration of blast furnaces and steel melting and rolling plant; (f) utilisation of waste heat. Physical limits are set on the availability of scrap, and cost considerations limit the use of the higher grade imported ores. Under the scheme, the preparation and treatment of home ores would be developed to the extent necessary to ensure that over-all fuel consumption was brought down as near as possible to the lower fuel consumption achieved with high-grade imported ores. Fuel consumption would be reduced also by the use of larger and more efficient blast furnaces. The fuel used in blast furnaces is coke, and 1½ tons of coal are required to make a ton of coke. The new furnaces taken in conjunction with ore preparation would have a coke consumption, using imported ore, of 16 cwt. per ton of iron and, using home ore, of 20 cwt., or an average for the new furnaces of just over 17 cwt., which is equivalent to 26 cwt. of coal. The average consumption at the old furnaces which would be displaced by the new furnaces is about 24 cwt. of coke or 36 cwt. of coal. The saving in coal consumption would therefore be 10 cwt. of coal per ton of pig iron in the new furnaces. With the new plants in operation it is estimated that the over-all average consumption of coal will be reduced from 33 cwt. (in 1937) to 27 cwt. per ton of pig iron. As a result of this economy it would be possible to make 2,000,000 tons more pig iron than before the war, an increase of almost 30 per cent., with a rise in coal consumption of only 500,000 tons, an increase of about 5 per cent. The figure for fuel consumption aimed at by 1950 would put the U.K. industry on a basis comparable with that achieved in any other country when allowance is made for the types of ore, etc., available.

The iron and steel industry has put its cards on the table. Now let the Government do likewise. The Minister of Supply says this report is not acceptable. Let him forthwith publish his own plan so that we may see if it is any better. That is a challenge which he will not shirk if he has any better excuse for nationalising this great industry than political ideology. His present attitude is destructive of confidence at a time when every encouragement is needed by every industry.

NOTES AND COMMENTS

Regaining the Initiative

IN conferring the honorary degree of Doctor of Laws in the University of Manchester on Sir Robert Robinson, P.R.S., and on the Minister of Education, Miss Ellen Wilkinson (among others), Lord Woolton, as Chancellor of the University, took the unusual course of delivering a short address—devoted largely to the industrial and educational trends as he had observed them in the United States on his recent visit. He did not believe, he said, that the industrial initiative which we have been compelled to surrender temporarily to the U.S. had been permanently given up, but its recovery, he thought, depended more on the vigour and enlightenment of our individual merchants and manufacturers than on the action of Government. He suggested that the industrialists of Lancashire should make inquiry as to what the University could do to help them play their part in regaining the commercial leadership of the world, and to consider at the same time what they could do to make the University fully equipped to render that service to them.

Universities, Old and New

MISS WILKINSON, responding, said that she hoped to make a statement soon (which she could not anticipate) foreshadowing a considerable increase in

the provision of scholarships. She went so far as to say that she believed that the paralysis of penury would be removed from the universities, and also the excuse of penury. The grant of this money, she hoped, would not intensify the competitive scramble for the older universities. During the war years two-thirds of those who had won State scholarships had gone to Oxford or Cambridge, and the remaining third was spread among the rest. In the last academic year nine out of ten State scholarships went in the same direction. She did not wish to force scholars to go to the " red brick " universities, but she did hope that with the new money available, modern universities would be so good, and so alive to the needs of the modern world, that the student who had won a scholarship would actually look with pity on his colleagues who had gone to the ancient establishments. That, however, could only happen if they increased and intensified the standards of the work done in the newer universities. Is it out of place to point out here that the main thing that attracts the best minds to the older Oxford and Cambridge is that these universities are collegiate? Miss Wilkinson, like so many of her less experienced colleagues, appears to be confusing education with teaching. It is surely about time that the difference between them was realised in high places. It is not in the lecture-room that initiative is learnt.

Scholarships and Examinations

IN the past, many potential recruits to university education were dissuaded from proceeding beyond the scope of the secondary school because of their parents' limited resources; and undoubtedly this caused grievous loss to many branches of activity, industrial and otherwise, in this country. Now, however, the Ministry of Education has at last made the promised arrangements, starting with the next academic year, whereby this disability may be evaded. The Ministry will, in cases of need, provide supplementary financial help to successful candidates for university scholarships. The rather silly restriction by which the Ministry's contribution to a State scholarship was limited to £100 has been removed. This step will enable local authorities to devote their educational funds to the benefit of those pupils who have not gained an open scholarship, but are likely to be able to complete a university course with credit. Thus two good sources of recruits for research work and other advanced studies are made available. At the same time the Ministry announces the reform of the higher school examination and the eventual abolition or radical alteration of the school certificate examination. The last of these has come to be a sort of hallmark of efficiency: it is, in fact, nothing of the kind; and the Norwood Committee is right, we believe, when it opines that the secondary schools will be better able to study the needs of individual pupils under the age of 17 or 18 if they are free from the obligation of an external examination. This may mean more work for the schoolmasters, but it will be work directed to the best objective—the proper establishment of their pupils on the road of life.

Protein Chemistry

AT the bicentenary celebrations of the Middlesex Hospital, held in London on May 20, Professor Sir Robert Robinson, P.R.S., made a plea for the establishment in this country of an Institute of Protein Chemistry, similar to that at Harvard. This development of the study of organic chemistry has been made overdue by the remarkable advances in the application of chemistry to preventive medicine, among which the use of penicillin is only the most striking example. As Sir Robert said, we are gradually being compelled to believe that the nucleo-proteins are keeping one of the secrets of life itself, and this compulsion has been induced largely by chemical investigation. Knowledge of the synthesis of proteins would have the greatest repercussions of human life, and might show the way to the conquest of cancer. So far, by reason of their molecular complexity, the synthesis of proteins has defeated the chemist, but the outlook is promising, and if the chemist and biologist can work hand in hand, great progress can be made. At the level of the proteins and viruses they are approaching one another very closely. Chemistry has a magnificent record in the annals of preventive medicine, and the foundation of an institute of the kind Sir Robert advocates would be a tremendous step forward in the better application of chemistry to the alleviation of human suffering.

Production of Alumina in War Time

Lessons from American and German Practice

CONSIDERABLE developments in the production of alumina from clays and other low-grade materials occurred during the war, both in Germany and in the U.S.A. Formerly, bauxite ores containing about 55 per cent. of alumina in the uncombined hydrated form constituted the only commercial source of alumina for metal production, as well as for the manufacture of refractories and abrasives. The main sources of these bauxite ores are France, India, British and Dutch Guiana, Brazil, and the Gold Coast.

With the fall of France, in 1940, one of the most easily available sources of supply was lost to Britain and the U.S.A. Transport of ores from the remaining sources of supply involved comparatively long sea voyages, subject to the hazards of submarine warfare and additional strain on limited shipping space. To meet these difficulties—which had been partly foreseen—plans were made in the U.S.A. to conserve the very limited resources of indigenous high-grade bauxite ores, and to try to recover alumina from low-grade bauxites and clays. Before the war, progress had been made in Germany in developing processes for the recovery of alumina from low-grade bauxites, from clays and coal ashes. Although almost the entire output of French bauxite ore was made available to Germany, one or two large-scale plants were built to recover alumina from coal ash by the Séailles-Dyckerhoff process. The description of this process, which has just been published (B.I.O.S. Report No. 167, Item No. 22), enables some interesting comparisons to be drawn between the methods adopted in Germany and in the U.S.A. to recover alumina from materials not hitherto regarded as commercial sources.

The Séailles-Dyckerhoff Process

According to the published report, the Séailles-Dyckerhoff process, as operated at the Stromberg plant near Kitkovic (Czechoslovakia), and at the Rudersdorf plant near Berlin, consists essentially of burning alumina-containing raw materials, such as coal ash, with limestone, extracting the pulverised material with sodium carbonate solution, separating the sodium aluminate solution by settling and filtration, and subsequently precipitating the aluminium hydroxide by treatment with carbon dioxide.

After preliminary trials with clays and other materials, coal ash from power stations was the raw material finally utilised in the large-scale plants, the average alumina content of this material being 25 to 30 per cent. The quantity of lime added to the charge is proportioned to combine with the silica and alumina, yielding the compounds $2CaO.SiO_2$ and $CaO.Al_2O_3$ together with about 10 per cent. in excess. The mixture is burned in a rotary kiln of the type used in cement manufacture, a reducing atmosphere being maintained to ensure that the greater part of the iron will be present, either as FeO or as metallic iron. The presence of ferric iron in the clinker seriously reduces the percentage of recoverable alumina. With a burning temperature of 1300° C. and a slow rate of cooling, a self-pulverising clinker is produced, the recovery of the alumina depending largely on the degree to which the clinker is self-pulverising. Treatment of the clinker produced, containing about 13 to 14 per cent. of alumina with sodium carbonate solution, gave a 60 to 70 per cent. recovery of the alumina. A 0.3 per cent. solution of sodium carbonate at a temperature of 40 to 50° C. proved most effective, yielding a solution with 2 to 3 gm. of alumina per litre. After thorough mixing, the slurry of sodium carbonate solution and clinker passes to a thickener, the mud from which is treated on rotary vacuum filters and subsequently used in the manufacture of Portland cement. The overflow from the thickener, after clarification in filter presses, is treated with gases containing carbon dioxide to precipitate the alumina in the hydrated form. Gases from the kilns are used for precipitation, the dust being removed by wet-scrubbing. Sulphur

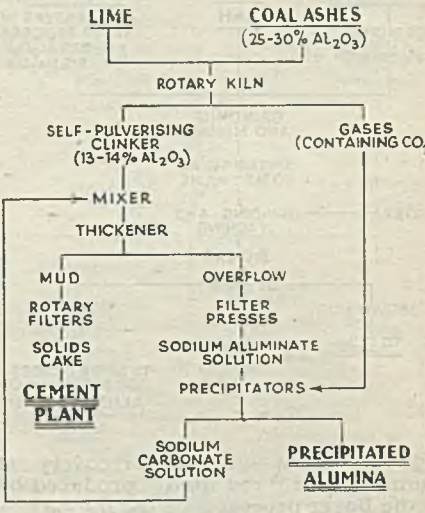

Fig. 1. Flow-sheet of Séailles-Dyckerhoff process for the extraction of alumina from coal ash (*B.I.O.S. Report No. 167*)

dioxide in the wet gases caused certain difficulties by corrosion of the pipe lines.

The sodium carbonate solution obtained from the precipitators is returned to the extraction stage, the diagrammatic flow-sheet for the process being shown in Fig. 1.

With a rated capacity of 10,000 tons of purified alumina per year, the commercial plant in Germany demonstrated that this process is technically feasible. Economically,

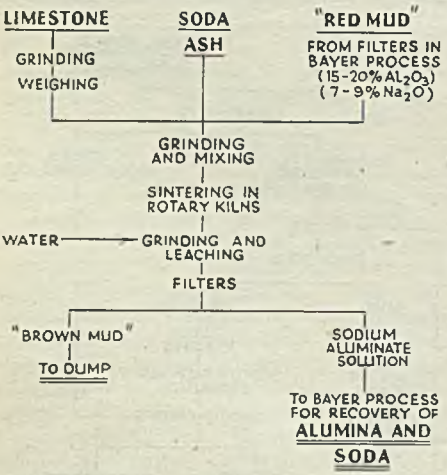

Fig. 2. Flow-sheet for recovery of alumina from " red mud " produced by the Bayer process *(Chem. and Met. Eng.)*

however, the process is not very satisfactory, the cost of the alumina produced being about 600 RM. per ton, compared with the figure of 120 to 150 RM. per ton for the Bayer process at pre-war prices. It is suggested that the process would continue to be uneconomic even with materials containing up to 40 per cent. of alumina, but that, with coal ash, the cost might be reduced to 50 to 60 per cent. of the figure quoted in a plant of three to four times the capacity stated. Low-grade bauxites with 40 per cent. of alumina were tried, but serious clinker rings formed in the kilns after 24 hours operation.

In common with other sinter processes for the extraction of alumina from siliceous materials, the quantities of raw materials required are very high in relation to the production of purified alumina, 10 to 12 tons of coal ash (25 to 30 per cent. alumina) and 15 tons of lime being required for one ton of purified alumina. In consequence, the process must be operated in conjunction with cement manufacture. The residue from the process proved quite satisfactory for Portland cement manufacture, yielding a good cement with a low alumina/iron oxide ratio.

In the U.S.A. the most significant advance in alumina production was the adoption of the " combination process " aimed at the recovery of the residual alumina and soda from the " red mud "—the waste material from the orthodox Bayer process for the treatment of high-grade bauxite ores. Significantly enough, this process also involves a sintering operation in rotary kilns, but a salient difference, compared with the Séailles-Dyckerhoff process, is the use of both lime and soda-ash in the sintering operation.

A highly important feature of this process was to open up the possibilities of utilising locally-produced bauxite ores with high silica contents. The Defense Plant Corporation established four plants to operate the " combination process " in conjunction with the Bayer process, a total sum of over $30 million being expended for this purpose. A plant of this type has proved particularly successful at Hurricane Creek, operating on an ore containing 11 to 13 per cent. silica.

Lime and soda-ash are added to the " red mud " from the final filter presses in the Bayer process in quantities sufficient to give the ratios: $2CaO : 1SiO_2$ and $1Na_2O : 1Al_2O_3$. After thorough mixing in Dorr agitators, the slurry is ground in two-compartment ball mills. The ground suspension from the ball mills is pumped directly to one of seven 250-ft. rotary kilns. The kilns, fired with pulverised fuel, are fitted at the feed end with festoons of chains to prevent balling of the damp slurry. This device, borrowed from cement practice, enables a wet slurry to be fed direct to the kiln and to be raised to the final sintering temperature of 1000-1100° C. without difficulty. Discharged in a soft friable condition through indirect air-coolers, the sinter is then fed with water into ball mills in which the sodium aluminate formed during the sintering dissolves in water together with any free caustic soda. The pulp from the ball mills is filtered on large drum filters, the filtrate being returned to the Bayer plant as part of the digester make-up for final precipitation of the alumina. Solid residue from the filters is repulped with water and pumped to waste as " brown mud." The flow-sheet of the process is shown in Fig. 2.

A Real Asset

This " combination process " makes possible a recovery of 95 per cent. of the alumina, compared with 75-85 per cent. recovery by the orthodox Bayer process alone, even when operating on high-grade bauxites. In addition, 60-65 per cent. of the soda is recovered, so that lime and soda-ash requirements are considerably reduced. It is claimed that the " combination process " is economic in bauxites containing 7-15 per cent. of silica, and in this range of composition offers distinct advantages over the straight Bayer process. There appears to be little doubt that the " combination process " has proved a real asset to the aluminium industry in the U.S.A., and its retention

under peace-time conditions appears to be assured.

In effect, the process makes possible the recovery of alumina from clays or other related low-grade materials. These may be mixed with the bauxite in quantities limited only by the fact that the silica content of the final charge should not exceed about 15 per cent. With average materials it may be calculated that one ton of 30 per cent. aluminous clay may be mixed with three tons of high-grade bauxite. By this means a considerable saving in the imports of bauxite ores might be secured in this country also, and more effective use made of indigenous materials.

As a further war-time measure, an allocation of about $18 million was made by the Defense Plant Corporation in the U.S.A. for the erection of four plants to test different processes for the recovery of alumina from clays and other minerals. Two plants were designed to operate the lime/soda sinter process on the lines developed in pilot-plant operation by the U.S. Bureau of Mines and utilising clays and shales as the raw materials. In both cases the rated capacity is 50 tons of purified alumina per day, with probably about ten times that tonnage of by-product material scheduled for cement manufacture. The principles of operation are exactly the same as those outlined under the "combination process."

Leaching Processes

The remaining two plants are designed to employ leaching processes for the extraction of alumina. One plant utilises the complex potassium aluminium sulphate mineral known as alunite, producing potassium sulphate as a marketable by-product. According to the most recent report, this plant has now been closed down. The fourth plant at Salem, Oregon, employs the process of digestion with ammonium bisulphate for extracting the alumina from clay. This process, a development of the sulphuric acid leaching process, is in operation at present in a plant with a designed capacity of 50 tons of purified alumina per day. The plant, on which an expenditure of $5 million was authorised, started to operate last November (*see* Fig. 3).

Raw materials employed are high-quality aluminous clays—30-35 per cent. alumina—obtained from local sources in the Pacific North-West. In common with all acidic leaching processes, a preliminary roast is essential to "open up" the clay structure, making it amenable to the action of the solvent. After being crushed to ¼ in., the clay is roasted at 815° C. in a rotary oil-fired kiln. The kiln product is fed to digesters simultaneously with molten ammonium bisulphate from the electric furnaces. Most of the available alumina in the clay is dissolved as ammonium aluminium sulphate, while varying quantities of iron, other metal impurities, and normal ammonium sulphate also pass into the solution, which also carries some suspended silica.

The solution containing the ammonium sulphate (aluminium alum) is separated from the insoluble residue in counter-current sand washers. From the sand washers the solution is pumped to autoclaves for reduction of the iron from the ferric to the ferrous state

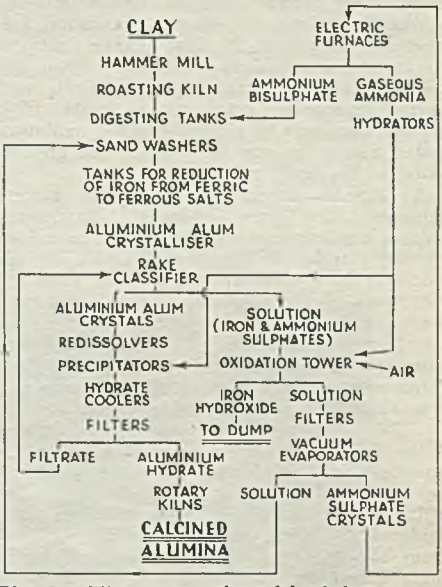

Fig. 3. The ammonium bisulphate process for the extraction of alumina from clays. (*Based on data by Callaham—Chem. and Met. Eng.*)

by the use of ammonium bisulphite. Ferric iron, the major impurity in the solution, forms an alum isomorphous with the aluminium alum on crystallisation, while ferrous iron does not act in the same way. It is, therefore, essential to effect the reduction of the iron before proceeding to recover the aluminium alum by crystallisation. From the autoclaves the solution is pumped to vacuum-type crystallisers operated in series. From these crystallisers aluminium alum crystals of high purity are obtained and separated from the mother liquor in rake-type classifiers. Overflow from the classifiers contains fine crystals and suspended silica, and is returned for further treatment. The large crystals in the raked product are dissolved in water and filtered to remove suspended matter. From the alum solution aluminium hydroxide is precipitated in steam-heated agitator tanks by the addition of 60 per cent. aqueous ammonia, the *p*H, pressure, and temperature of the slurry being controlled within close limits.

The slurry containing the precipitated

hydroxide is passed through a vacuum cooler followed by three stages of vacuum filtration on rotary filters to separate the hydroxide. Final calcination of the hydroxide is effected at 1200° C. in a rotary kiln provided with a cyclone and scrubber system for dust recovery. Wash water sprayed on the last hydroxide filter passes through the system counter-current to the flow of solids, and is then used for redissolving the purified alum before the precipitation of the aluminium hydroxide, while the strong ammonium sulphate solution from the first filtration returns to the rake classifiers. Solution from the rake classifiers, containing the ferrous and normal ammonium sulphates, is treated with air and ammonia in a wood-packing oxidation tower where the iron is oxidised and precipitated as the hydroxide.

A counter-current mud-washing system separates the iron hydroxide from the ammonium sulphate solution which is subsequently clarified by filtration. The ammonium sulphate is recovered in the solid form by treatment of the solution in a vacuum two-stage evaporator, the crystals being centrifuged and sent finally to the bisulphate furnaces. These are three-phase electric arc furnaces, to which the ammonium sulphate crystals are fed by variable speed screws. At 370° C. ammonium bisulphate is formed with the evolution of ammonia. Gaseous ammonia is cooled and recovered as 12-15 per cent. and subsequently rectified to 60 per cent. for use in precipitation of aluminium hydroxide. The molten bisulphate flows from the furnaces into the digestion tanks for reaction with the clay.

The Economic Aspect

Determination of the economics of the process is rather difficult, as published figures are not available for the electro-thermal decomposition of ammonium sulphate to bisulphate. The recovery and rectification of the ammonia gas, the recovery and crystallisation of the ammonium sulphate, and the reduction and subsequent oxidation of the iron sulphates are all of crucial importance in the economic aspect of the process.

While no very strong case may be made for the immediate adoption in this country of plans for establishing a large-scale plant for alumina recovery from clays, there are very sound arguments for advocating the utilisation of the " combination process " in conjunction with the Bayer process. This would permit the use of mixtures of bauxite and clays. Imports of bauxite could be reduced and home-produced clays utilised at least in part. Strong support is being given in the U.S.A. to the idea of retaining the four D.P.C. plants, to which reference has been made, on an experimental basis, to perfect the processes for the recovery of alumina from clays. If the need for such development work is felt in the U.S.A., the need for it is, at least, equally pressing in this country, and is a matter which the Ministry of Supply might consider seriously.

German Technical Reports

Further Processes Recorded

BELOW is given a list of some of the latest technical reports from the Intelligence Committees in Germany, published by H.M. Stationery Office.

CIOS XI—9. Mechanical and Metallurgical Targets—Savoy Region: Visit to five research laboratories (1s.).

CIOS XXII—15. I.G. Farben, Frose: Production of tetra-ethyl lead and ethyl fluid (6d.).

CIOS XXIV—9. Rheinpreussen, Homberg: Synthetic lubricating oil plant (2s.).

CIOS XXVIII—35. Production of fatty acids from by-products of the Fischer-Tropsch process (6d.).

CIOS XXXII—9. The chemical composition of German pyrotechnic coloured signal items (2s. 6d.).

CIOS XXXIII—23. Investigation of German plastic plants. Part 2 (for Part 1, *CIOS XXIX—62*) (26s.).

BIOS 197. *Reichsinstitut für Erdölforschung Technische Hochschule, Hanover*: Oil research institute (1s.).

BIOS 203. *The non-destructive testing of materials and X-ray protection methods* (1s.).

BIOS 244. *I.G. Hoechst and Ludwigshafen*: Manufacture of sulphuric acid, I.G. converter design and vanadium catalyst (3s. 6d.).

BIOS 287. *Barytes and pyrites in North-West Germany* (6s.)

BIOS 335. *Metallgesellschaft A.G. and the Lurgi group of chemical engineering companies* (20s.).

BIOS 350. *The synthesis of intermediates for polyamides on an acetylene basis* (translation of a report by Dr. W. Reppe, Ludwigshafen) (2s.).

BIOS 352. *Cyclopolyolefines. Miscellaneous report compiled from interviews with Dr. Reppe, Dr. Schlichting, and Dr. Kroper* (I.G. Farben, Ludwigshafen) (6d.).

BIOS 358. *Acrylic esters. Synthesis from acetylene and nickel carbonyl* (1s.).

BIOS 368. *Manufacture of adipic dinitrile and hexamethylene diamine* (1s.).

BIOS 369. *Manufacture of hydrazine hydrate* (1s.).

BIOS 370. *Manufacture of acetaldehyde* (1s.).

BIOS 373. *I.G. Farben, Ludwigshafen* (fuels and lubricants) (14s. 6d.).

FIAT 65. *I.G. Farben, Wolfen*: Manufacture of dissolving pulp by the sulphite and nitric processes (1s. 6d.).

The Electron Microscope

An Authoritative Text Book

by C. G. A. HILL, A.R.C.S., B.Sc.

THE electron microscope did not really come into its own as a research tool until a commercial model had become available. The earlier instruments provided a number of striking photographs, but were of greater value for the exercises they provided in the new science of electron optics than for the results which were obtained with them. It is only natural therefore that the first definitive text-book* on the subject should come from the pens of the brilliant and cosmopolitan team assembled by the RCA (Radio Corporation of America) to develop one of the first commercial models

The book is divided into two parts. The first, for the user of the instrument, contains descriptions of the various types of microscope together with a non-mathematical discussion of electron optical theory and the aberrations to which the instruments are subject. The second part contains a systematic and detailed survey of the practical and theoretical knowledge which must form the basis for further progress in electron microscope design.

The variety of instruments which fall into the category of electron microscopes will come as a surprise to many. In addition to the two main types, distinguished by electrostatic and magnetic focussing lenses, both of which are optically similar to the light microscope, there is the scanning microscope in which the object may be regarded as subdivided into small squares whose side is approximately equal to the resolving power of the instrument. A fine electron beam with a cross section equal in area to one of these elements sweeps over the object and the electrons transmitted or emitted by each element may be used to build up a picture on a fluorescent screen in the same way that a television picture is formed. An interesting variation of this device has been used for the direct examination of metallic surfaces which because of their opacity cannot be directly dealt with in the conventional instrument. Instead of appearing on a cathode-ray screen, the output of this type of instrument can be fed into a normal teleprinter to give a permanent record (*see* Fig. 1). Magnifications of the order of 6000 with a resolution of about 500 A.U. have been obtained in this way. Point projection or shadow instruments of extreme simplicity have been developed with resolutions of about 250 A.U.

Fig. 1. Portion of a scanning micrograph of etched brass, as reproduced by a teleprinter (× 6000).

In certain specialised research fields the self-emitting microscope has proved of immense value. Here the object under investigation is itself the source of electrons: it may be the cathode of a thermionic valve, a heated tungsten single crystal, or a photoemissive surface. Magnifications achieved by these instruments are seldom greater than those obtainable with light, but the structure revealed is frequently non-existent in the light image and in many cases microscopic examination by light under the desired conditions is quite impossible.

Of the two main types of electron microscope that employing magnetic lenses is claimed to have inherent advantages in ultimate performance over its electrostatic analogue, in spite of an additional aberration

* *Electron Optics and the Electron Microscope.* By V. K. Zworykin, G. A. Morton, E. G. Ramberg, J. Hillier and A. W. Vance. New York: John Wiley (1945). Pp. 766. $10.

due to rotation of the image about the axis of the instrument, which arises with magnetic lenses. On the other hand, the electrostatic microscope can be made very much more compact since the power supply for the magnetic coils is absent and the requirements for constancy of operating voltage are much less stringent. Existing microscopes of both types are described individually in some detail, and a number of German instruments,† data on which have only recently become available in this country, are included. In considering the vacuum system the authors are somewhat biassed in favour of metallic bellows for the manipulation of objects within the system as opposed to greased joints. The former are naturally subject to corrosion and the detection of the minute leaks which this causes is very difficult, while it would seem that the new silicone tap greases are free from most of the properties which made the use of greased joints undesirable. Variations in mechanical detail are considerable among the different instruments and it is clear that if the best features of a number of them were brought together the result would be very profitable.

Chemists and others who are primarily concerned with using the instrument rather than building it will be chiefly interested in the two chapters in the first part of the book which deal with the manipulation of the microscope and its use as a research tool. Unfortunately, neither of these chapters is as full as could be desired, the standard here being conspicuously lower than in the rest of the book. This is perhaps understandable since the authors claim that "no improvements in the orders of magnitude of resolutions and magnifications are to be looked for," while the techniques of manipulation and of specimen preparation are still advancing so rapidly that no balanced picture of these aspects of the subject can yet be made. For example, in the few months since the publication of the book several new techniques have been described, notably that developed by Wyckoff in which a metal is evaporated obliquely on to the specimen so that strong "shadows" are formed by the irregularities in its surface. The high opacity of the metallic film to electrons gives excellent contrast in the resulting micrographs, and by this means bacteria and single polymer molecules have been photographed which by themselves are virtually transparent to the electron beam. The subject of selective staining with stains of high mass and molecular weight is mentioned briefly, and it is interesting to note

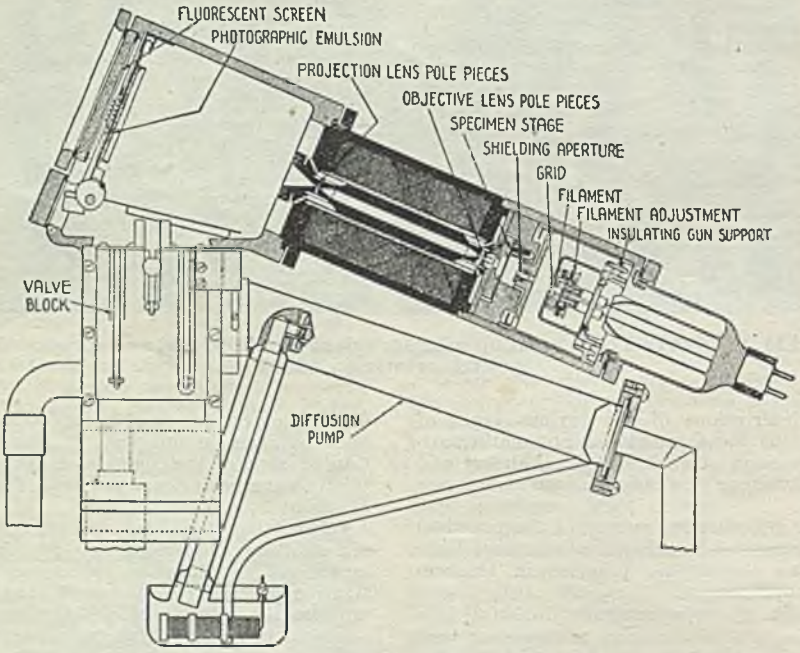

Fig. 2. Small electron microscope (magnetic type), showing a vertical section of an experimental model.

† One of these, the Siemens magnetic instrument, was exhibited in the recent exhibition of German electronic devices at Earls Court.

that the phosphotungstic acids which have proved of immense value in light microscopy are also very satisfactory as electron stains.

Fig. 3. Mercurochrome, in which most of the particles are of the order of .01 micron in diameter.

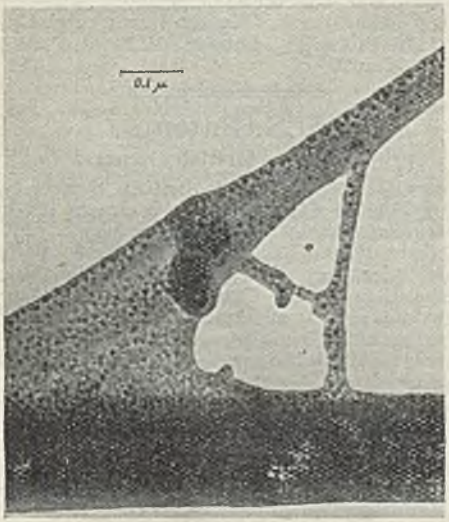

Fig. 4. Koroseal (polymerised vinyl chloride). The dark specks, which are about 30 A.U. in diameter, are of the dimensions of a moderate-sized protein molecule.

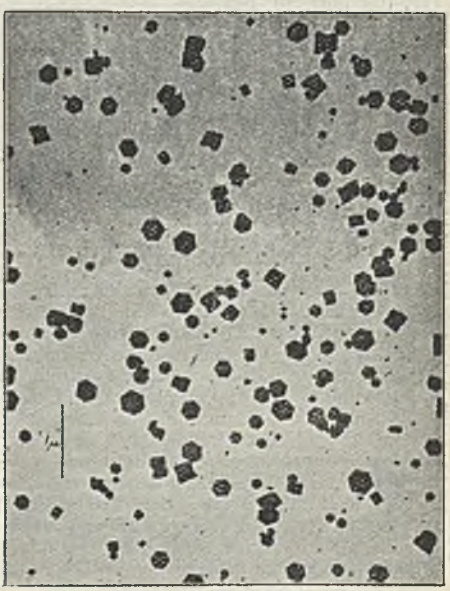

Fig. 5. Cadmium evaporated on a collodion film.

The application of the instrument to a number of problems in chemical industry covering the fields of pigments, insecticides, catalysts, concrete technology, photographic development, fibres, and metallurgy (among others) is very briefly mentioned and a large number of excellent electron micrographs are reproduced (*e.g.*, Figs. 3-5). There is also a fairly complete bibliography.

The second part of the book will interest the mathematician and the physicist more than the chemist, though even he cannot fail to be delighted by the ingenious mechanical models with which the designer of electron lenses solves some of his problems. An electrolytic tank, for example, is used to determine equipotential lines in a proposed electrode system by immersing a large-scale model in the electrolyte, applying suitable voltages, and plotting the field distribution with a small probe. Electron paths in a complex system are determined by rolling ball bearings over a stretched rubber sheet which is raised or depressed by suitably shaped "electrodes," the heights or depres-

sions being proportional to the voltages to be applied in the actual lens. Suffice it to say that the lucidity of the first part of the book does not disappear with the introduction of some mathematics. One point, however, is of general interest: it is clear that, although all the aberrations to which the electron microscope is subject have been dealt with analytically, the complexity of many of the problems is so great that empirical methods still play a large part in the design of electron lenses.

Although mainly concerned with electron microscopes, the book also deals briefly with the application of the fundamental principles of electron optics to such various devices as the electron-multiplier, the magnetron, the mass spectrograph, the cyclotron, and the betatron. Finally, it must be said that the book is most sumptuously produced and a pleasure to read. Chapter and paragraph numbers are printed on every page and the cross-referencing is complete.

As a text-book on all aspects of the design and construction of electron microscopes there is no doubt that this will soon become a standard work. The chemist, however, must wait until the rate of advance has slowed down slightly before a similar work can be written on "The Electron Microscope as a Chemical Research Tool."

LETTER TO THE EDITOR

Social Security

SIR,—I was pleased to read Mr. Rout's letter drawing attention to the need for a superannuation scheme for chemists which can be transferred when he moves from one job to another. Such a scheme would be an advantage to both employers and their staff, for it would enable the chemist to change his job occasionally and thus gain valuable experience. Enlightened employers would appreciate the value of such a scheme. There is also the difficult problem of providing a satisfactory maintenance allowance for those who are unemployed through ill health, accident, or any other reason except wilful misconduct.

For 25 years the British Association of Chemists has sought to provide the chemist with an adequate income when unemployed. To-day, a chemist *can* receive up to £6 5s. per week if he loses his job, and this is paid from a fund which has a reserve of over £40,000. Benefits may soon be increased substantially. The only unsatisfactory thing about the fund is that so few chemists subscribe to it and the majority of those who do subscribe are content with the minimum benefits which at present may be 25s. per week. Chemists are a curious race. Many complain that they are badly paid and that their remuneration frequently bears no relation to the importance of their work. This is undoubtedly true in many cases, but chemists are not prepared to risk a few pounds in order to establish a financial background which would be of the utmost value to them. I think the reason is that the education of the chemist includes no reference to business and finance nor does he receive any guidance as to how he should conduct his negotiations with prospective employers.

The British Association of Chemists has appointed a Social Security Committee to consider how their unemployment benefit fund may be extended to cover every kind of financial need from the day a chemist becomes a member until he dies. It can be done, and if the chemists of this country will join the B.A.C. in much larger numbers, it will be done. Of that I am quite certain. The problem referred to by Mr. Rout is urgent, but it is not insoluble. I invite him to join with us to work out a scheme.—Yours faithfully,

NORMAN SHELDON,
Vice-President, B.A.C.

175 Piccadilly, London, W.1.
May 20.

U.S. Patents

Notice to British Owners

THE attention of British owners of United States patents is drawn in the *Official Journal (Patents)* for May 8, 1946, to the Public Register of Patents Available for Licensing which has been established by the U.S. Patent Office. Owners of U.S. patents who have signified their willingness to grant licences thereunder on stated or reasonable terms may have such patents entered on this Register without cost to themselves. Notices of such entries are published in the *Official Gazette* of the U.S. Patent Office. Inquiries for information about the Register should be addressed to the Commissioner of Patents, Commerce Building, Washington 25, D.C., U.S.A.

GAS CYLINDERS

The British Standards Institution has recently issued two further specifications for cylinders for the storage and transport of carbon dioxide, nitrous oxide, and ethylene. They have been prepared at the request of the Home Office and are based upon recommendations of the Gas Cylinder Research Committee and the D.S.I.R. and on the Gas Cylinder Conveyance Regulations, 1931, as amended by appropriate exemption orders. Copies of these British Standards—No. 1287, High-carbon steel gas cylinders, and No. 1288, Manganese steel gas cylinders, may be obtained from the B.S.I., 28 Victoria Street, London, S.W.1 (2s. each).

B.C.D.T.A. Meeting

Annual Report and Luncheon

THE 23rd annual meeting of the British Chemical and Dyestuffs Traders' Association was held in London on May 21, when, following the adoption of the audited accounts, Mr. C. W. Lovegrove, the chairman, presented the annual report.

The period under review, he said, witnessed the end of hostilities and the beginning of the long and difficult road which would ultimately lead, they hoped, to a revival of world trade. That road was beset with constantly changing conditions, particularly for merchants, and the services of the Association must be continually adapted to the needs of the time. Cordial relations had been maintained with Government departments and, as in former years, the measure of co-operation and understanding attained between the Association and the administrative officials had been most satisfactory.

The great task of re-establishing the proper channels of trade at home and overseas, and of finding supplies for peace-time uses, was handicapped from the outset by the lack of shipping facilities, by export licensing restrictions and by controls which were slow to recognise the difference between war-time and peace-time emergency. These matters had had the attention of the Council and the approaches which were made from time to time to the authorities concerned frequently led to a measure of improvement or relaxation. Periods of scarcity require special measures to ensure equitable distribution, but to continue such measures beyond the period of necessity must inevitably result in the subordination of trade progress to the maintenance of officialdom.

The work undertaken by the Drugs and Pharmaceuticals Importers' Section of the Association in connection with the distribution of lease-lend drugs to approved users was continued throughout the year. With the inevitable decline in these stocks further consideration had to be given to the resumption of imports through commercial channels, and in the early months of 1945 the Association was consulted by the Directorate of Medical Supplies for the purpose of establishing import quotas for certain products.

Coal-Tar Questions

The Coal-Tar Products Group considered a number of questions in which the interests of the merchants might have been adversely affected, and the deliberations of the standing committee of the group were greatly assisted by the Association's representation on the Benzol Advisory Committee. At the request of the Ministry of Fuel and Power and with the co-operation of the producers, a number of foreign government orders received by the Ministry, for xylol, solvent and heavy naphthas, and toluol, were negotiated by merchants appointed by the Association. While these arrangements brought a satisfactory solution to a difficult problem created by abnormal conditions, their continuance beyond the point of necessity would be undesirable.

Mr. C. W. Lovegrove (Charles Page & Co., Ltd.), chairman of the B.C.D.T.A.

The Association continued to collaborate with the paint manufacturers on that industry's raw materials sub-committee.

The disposal of surplus Government stocks of chemicals, to which reference was made in the last annual report, was now proceeding in accordance with the agreed arrangements. Surplus chemicals for which the Ministry of Supply were open to receive tenders were notified from time to time through the Association.

Service for Export

"The Chemical Traders' Export Group," the chairman said, "which represents merchant exporters, is rendering a very useful service in this field of activity, and by its close contact with the Board of Trade is able to bring consideration to bear on the various problems which arise. There is no doubt that merchants have made a substantial contribution to the satisfactory expansion in chemical exports, but it is pertinent to observe that if the potential selling force of the British merchant organisations were to be fully utilised by the home industry, even wider markets would be established for British chemicals, dyestuffs, and drugs. Moreover, in a world short of almost every raw material, export selling to-day presents little difficulty to the producer entering upon overseas trade; but the years ahead will bring world competition, when efficiency of production must be

aided by expert salesmanship and good contacts, and it is timely to emphasise that merchants possess a wealth of experience of international trade, and they also enjoy wide overseas connections built by their own enterprise in the business of exchanging goods; and these are not transferable assets.

"A proposal which has often been raised in the past and which has now been actively considered by the Executive Council is the adoption by the Association of Rules of Arbitration. Members have already received a copy of the rules and necessary bye-laws and it is proposed that they shall come into operation during the current year.

"In conclusion, I wish to emphasise that our Association is the only body—as it has always been—which can speak with authority for chemical merchants and distributors. Development in the years ahead cannot yet be clearly envisaged, but our problems will not be insuperable if we all co-operate under the guidance of our Association."

Speeches at the Luncheon

At the annual luncheon, which preceded the business meeting, the principal guest, Lord Llewellin, P.C., C.B.E., M.C., following the loyal toast, proposed the toast of "The Association." From his experience in various war-time ministerial offices connected with trade and industry, he said, he knew the value of organisations of business men who knew their business. In the B.C.D.T.A. the Government found an organisation representing 90 per cent. of the merchants who understood the trade, and could help the Government to do their work. He appreciated the co-operation they had shown with the Controls of the Ministry of Supply.

If during the war the Association had played its full part in equipping the country for victory, it was going to be even more important in the difficult days to come. Some light on what the present Government was going to do to the distributive trades was thrown by its action in connection with the Liverpool Cotton Exchange. What was aimed at was the control of basic materials and their distribution. The Association, Lord Llewellin said, had a great fight to fight not only on behalf of its members, but on behalf of the country as a whole. The traders of the country would be beaten in detail unless they combined in organisations such as the B.C.D.T.A.

Mr. Victor Blagden, the president, responding, gave a brief and amusing account of how the Association had originated in a small committee—strangely entitled the "National Vigilance Committee"—under the London Chamber of Commerce, before it assumed its present form. Emphasising the importance of merchants to-day, Mr. Blagden quoted Sir Ernest Benn: "There are no more useful members in the Commonwealth than merchants . . . they provide work for the poor and wealth for the rich." Certain sections of the chemical industry would be attacked as the cotton merchants had been attacked; some of them even viewed the position with complacency, but he advised them to look to research to improve their products, and to leave distribution to the merchants—those best fitted to undertake it. He described the published export figures as "fantastic" in view of the difficulties thrown in the way of re-establishing foreign trade. He was convinced that the figures must contain make-weights, as the actual export tonnages were less than a quarter of their volume before the war. What we ought to know was not the nominal value, but the real volume of exports to-day.

Mr. C. W. Lovegrove, the chairman, proposing "The Guests," referred to the war-time activities of Lord Llewellin. They were glad to welcome also Mr. O'Brien, chairman of the A.B.C.M.; Dr. Bennett, the Government Chemist; Mr. R. B. E. Jackson, who had led the successful campaign against the concentration of the small paint firms and was now president of the Paint Manufacturers' and Allied Traders' Association; Major Knowles, the coal-tar controller; Mr. Fairfield, Director of Sundry Materials at the Board of Trade; and Mr. Walmsley, vice-president of the Association of Tar Distillers.

Mr. Jackson, in thanking the Association on behalf of paint manufacturers, recalled the assistance the B.C.D.T.A. had given in the fight against concentration. They were faced with many problems, notably the combination of great opportunities for trade, both at home and abroad, with a shorter supply of raw materials than ever before in history, including a world shortage of linseed oil. There were, he said, alternatives available for the materials in short supply, but the Government was reluctant to release them. He strongly deprecated the Government's method of importing urgently-needed raw materials, holding them in bond, and then re-exporting them.

Officers for the Year

The following officers were elected: *President*, MR. VICTOR BLAGDEN; *vice-presidents*, MR. C. S. BACHE, MR. A. F. LAWSON; *chairman*, MR. C. W. LOVEGROVE; *vice-chairman*, MR. W. S. ADDAR JONES; *hon. treasurer*, MR. A. NASH: *hon. auditor*, MR. T. H. HOTHAM. *Executive* COUNCIL: MR. L. S. HESKINS (R. W. Greeff & Co., Ltd.), MR. W. MANN (Produce Merchants, Ltd.), MR. S. R. PRICE, M.B.E., M.A. (Price Stutfield & Co., Ltd.).

A CHEMIST'S BOOKSHELF

WORLD POWER AND ATOMIC ENERGY. By Dr. H. E. Wimperis, C.B., C.B.E London: Constable. Pp. 87. 6s.

The atom bomb which wrecked Hiroshima on August 6, 1945, is stated by Dr. Wimperis, in the first sentence of his book, to have changed the course of history. This claim is large and vague, and it must be remembered that the course of history, like that of love, has seldom, for any length of time, run smoothly. It is constantly being affected by innumerable influences and events. Only the future can show whether the release of nuclear energy will prove to have been a "climacteric"—to borrow a Churchillian expression—in the history of human affairs. All that we are entitled to say on the facts at present, is that the atom bomb was the most important factor in bringing about the sudden and speedy end of the war in the Pacific.

The potentialities opened out to mankind by the development of the new discovery for industrial and economic purposes appear certainly to be enormous. It is, however, difficult for the layman to form a hard impression of the prospects over the next ten or twenty years, when the experts differ among themselves. There can be little doubt but that ultimately a new and tremendous impetus will be given to that great revolution in human affairs which began when the industrial age dawned first in this island. But whether the results of this latest discovery will be enjoyed in any appreciable measure by a majority of those who are living to-day must remain, for the moment, problematic. Dr. Wimperis does indeed suggest that the coalowners, smarting under the nationalisation programme of the present Socialist administration, may find that they have, in fact, been bought out at the right moment.

There is a real risk that the dangerous potentialities of the atom bomb as a weapon of war will be forgotten or, at least, relegated to a dim background. The problem is too big for the men who have to grapple with it. Opinion in Europe has been numbed and calloused during recent years as a result of an accumulated weight of horrors.

It is hardly too much to say that, despite the efforts of responsible statesmen, and of scientists of the standing of Dr. Wimperis, the atom bomb is in danger of being relegated to the status if not of a nine-days' at any rate a nine-months' wonder. Articles have recently been appearing in old-established periodicals in the United States purporting to prove that the explosion of an atom bomb in the centre of a well-built city such as Chicago or New York would not, in fact, be much more devastating than that of a ten-ton T.N.T. block-buster. It is suggested that Hiroshima was jerry-built, and that such steel and concrete buildings as existed there stood up to the atom bomb pretty well.

The atom bomb is, of course, in its infancy. There is no doubt but that its effectiveness in any future war would be enormously increased. Dr. Wimperis gives a very fair and impartial account of the various issues raised by the discovery and harnessing of nuclear energy. But, it is impossible, in present circumstances, to arrive at final conclusions about methods for averting its abuse. Human nature throughout human history is the only factor which remains constant. It is certain that any nation fighting for what it considered to be its life would not hesitate to use atom bombs if it thought that it would gain an advantage by so doing. There have been wars in the past; there is no reason to suppose that there will not be wars in the future. There is, nevertheless, no task more important to-day than that of trying to eradicate from our modern civilisation the seeds of future strife. The material destruction which would result from a war between nations armed with atomic weapons would certainly be frightful. The ruins of Berlin and Cologne would be as nothing by comparison. But this does not imply that civilisation would be extinguished. Recent events have shown, not so much that our civilisation is dying, but that, on the contrary, it is a plant of much hardier growth than some of us had formerly been willing to admit.

Taking a long view, it could not be held to be a matter of fundamental consequence if the advance of mankind along the road of material and economic prosperity were to suffer a set-back of a couple of centuries or so, as a result of human folly and inadequacy. If past events can be considered as affording any kind of guide to the future, it would seem probable that mankind will be called upon to suffer a number of such setbacks before it achieves the necessary moral and spiritual stature to enable it to control the dangerous toys which providence has given it to play with.

However, it is vital that no effort should be spared to avert, if that is possible, such unpleasant eventualities. Dr. Wimperis's approach to the problem is rational and convincing. It is questionable, however, whether reason alone will prove sufficient. Mankind is moved much more by its emotions than by its reasoning faculties. Reason unaided will never possess the strength to exorcise from our civilisation the poison of exaggerated national and economic rivalries. It may be suggested that what is needed is something akin to the overriding exaltation and ardour of a religious faith.

PHILIP MAGNUS.

British Association

Arrangements for Future Meetings

THE British Association has found it impossible to arrange this year an annual meeting on the lines of the pre-war meetings in provincial cities. A one-day meeting will therefore be held on Saturday, July 20, in London. The British Medical Association has generously granted the use of its hall for this occasion. At a general meeting in the afternoon the presidential address will be delivered by Sir Richard Gregory, Bt., F.R.S. There will be no sectional meetings.

Opportunity will be taken to receive delegates attending the Empire Scientific Conference organised by the Royal Society, and the Commonwealth Scientific Official Conference, at a luncheon on July 20 and at the subsequent meeting, and also, it is hoped, at a Sunday afternoon reception at Down House, the home of Charles Darwin, which the Association maintains as his memorial. The Association will by this means find occasion to express its gratitude to the Dominions and to India, in which some of the most notable meetings in its history have been held. It is also hoped to receive some of the foreign delegates who are expected to be in England at that time.

It is intended to resume normal meetings in subsequent years, and an invitation has been accepted for the meeting in 1947 to be held in Dundee, where the meeting in 1939 was cut short by the imminence of war. An invitation from Brighton for 1948 has also been accepted.

Allocation of Uranium

Professor Blackett on Atomic Energy

THE annual lecture of the British Association of Chemists was delivered by Professor P. M. S. Blackett, F.R.S., at the Central Library, Manchester, on May 17. Professor Blackett took as his subject, "The Scientific and Social Aspect of Utilisation of Atomic Energy," and a large gathering of scientists, chemists and others heard him deal in his customary skilful manner with some of the problems foremost in the minds of most people to-day.

Of particular interest from the chemical point of view was Professor Blackett's contention that it is highly probable that the world supplies of uranium will prove insufficient to satisfy the large industrial demand which will arise as soon as the technical problems have been overcome. He urged some kind of world allocation system, but pointed out that it is, however, equally certain that all possible uranium supplies are in danger of being utilised exclusively for military purposes, that is for making atomic bombs, leaving very little over for peaceful developments. He went on to say that if no success is obtained in setting up a control of some kind, and the nations independently start to make atomic bombs competitively against each other, then it was clear that if a major war does break out, those bombs would be used and the results would be terrifyingly destructive. Further, even if a war did not break out, there would be no spare uranium to be utilised for power production. There was thus at the present time a real clash between the military and civilian use of atomic energy.

A third application of atomic energy, said Professor Blackett, was the production of new forms of radio-active elements as indicators for many branches of scientific research and as a substitute for radium for curative purposes. This might turn out to be one of the most valuable by-products of the utilisation of atomic energy. An extremely important report on "The International Control of Atomic Energy," would shortly be published by the Stationery Office, and deserved close study by all interested.

"Britain Can Make It"

Selection of Scientific Instruments

THE "Britain Can Make It" Exhibition, opening on September 24 at the Victoria and Albert Museum, London, will include new designs in consumer goods from more than 50 British industries. The new designs will be selected by expert committees, which have now been appointed by the Council of Industrial Design. The committees will serve under the general chairmanship of Lord Woolton and will be assisted by technical assessors, appointed by each industry, who will advise the selectors on technical questions of production and marketing.

The selection of scientific instruments and cameras will be made by the following committee: Dr. H. R. Calvert, assistant keeper in the Department of Astronomy, Mathematics, Optics and Chemistry at the Science Museum, South Kensington; Mr. A. J. Philpott, O.B.E., M.A., B.Sc., director of the British Scientific Instrument Research Association; and Mr. Alfred Whitaker, research director of Nash & Thompson, Ltd., engineers. Acting as secretary to the committee will be Mr. J. Beresford Evans, a member of the staff of the Council of Industrial Design. Manufacturers who have not already been in touch with the Council regarding the submission of suggested exhibits for the exhibition are invited to write without delay to the Council of Industrial Design, Tilbury House, Petty France, S.W.1.

Personal Notes

MR. T. R. C. FOX, M.A., King's College, has been elected to the Professorship of Chemical Engineering (Shell) in the University of Cambridge, from July 1.

DR. R. C. TRAILL, who has been appointed senior lecturer in the chemistry department of the Melbourne Technical College, was formerly deputy director of the Scientific Liaison Bureau in Victoria.

MR. C. R. WHEELER has relinquished his duties as Controller of Iron and Steel with the Ministry of Supply, and on rejoining Guest, Keen, and Baldwin Iron and Steel Company, Ltd., has been appointed joint managing director.

MR. J. C. CARR, Principal Assistant Secretary in the Ministry of Supply, has been appointed Acting Controller of Iron and Steel in the interim period pending the setting up of the proposed new control Board.

MR. T. C. CORBETT has been elected hon. secretary of the Scottish section of the Oil and Colour Chemists' Association in succession to Mr. A. H. Whitaker, who had occupied that position since the section was formed twelve years ago.

DR. R. H. BARFIELD, D.Sc., A.M.I.E.E., A.C.G.I., who is shortly joining the research and development staff of Wild-Barfield Electric Furnaces, Ltd., is at present on the research staff at the National Physical Laboratory, from whom he was seconded during the war to assist in work of special importance in the Army.

The Albert Gold Medal of the Royal Society of Arts has been conferred by the Society this year on PROFESSOR SIR ALEXANDER FLEMING, F.R.S., F.R.C.S., F.R.C.P., and PROFESSOR SIR HOWARD FLOREY, F.R.S., M.A., B.Sc., Ph.D., as a joint award, for their services in the discovery and development of penicillin

Obituary

ACADEMICIAN ALEXEI NIKOLAYEVITCH BACH, whose death at the age of 89 has been reported from Moscow, was Secretary of the Soviet Chemical Sciences Department and a member of the Soviet Academy of Science. In 1944 he was decorated with the Order of Lenin and in 1945 received the title of Hero of Socialist Labour. He was noted especially as a biochemist and did important work in connection with the war-time supply of vitamins in Russia. In 1943, when he was director of the Karpov Chemical Institute, he was elected an honorary member of the Society of Chemical Industry.

Royal Institute of Chemistry

New Fellows

AS a result of the April, 1946, examination conducted by the Royal Institute of Chemistry, the following passed examinations for the Fellowship:

Inorganic Chemistry: A. R. BURKIN, B.Sc. (Lond.), F. L. SELFE.

Organic Chemistry: S. P. HAYES, E. S. LANE, B.Sc. (Lond.), F. F. STEPHENS, A. R. MUNDEN, B.Sc. (Birm.).

The Chemistry, including Microscopy of Food and Drugs and of Water: T. J. CAHILL, W. A. GREGEEN, I. DEMBREY, B.Sc. (Bris.), R. J. M. POLLITT, M.Sc. (Lond.), A. C. WILSON.

Industrial Chemistry: With special reference to coal gas manufacture: G. W. CULSHAW, B.Sc. (Liv.). With special reference to industrial water treatment: G. R. NELLIST.

The pass list for the examination in general chemistry for the Associateship embraces 32 names.

Pest Control

Association's New Officers

AT the recent annual general meeting of the Industrial Pest Control Association the following were elected as officers and executive committee for the ensuing year: *President*, MR. ANGUS F. MCINTOSH (Thomas Harley, Ltd.); *vice-president*, MR. G. MCLAREN (Haller Laboratories, Ltd.); *hon. treasurer*, MR. S. F. SPRANGE (London Fumigation Co., Ltd.). *Executive committee*: MR. K. G. ANKER-PETERSEN (British Ratin Co., Ltd.); DR. F. P. COYNE (I.C.I., Ltd.); MR. W. HIVEY (Hivey Fumigation Co., Ltd.); MR. C. S KREGOR (W. Edmonds & Co., Ltd.); DR. T. F. WEST (Hygienic Chemical Co., Ltd.); DR. E. HOLMES (*ex-officio*) (Plant Protection, Ltd.).

Cattle-Dip Makers

Officers and executive committee of the Association of British Sheep and Cattle Dip Manufacturers for the ensuing year have been elected as follows: *Chairman*, MR. W. H. MACMILLAN (Robert Young & Co., Ltd.); *vice-chairman*, MR. D. MARSHALL (Osmond & Sons, Ltd.); *hon. treasurer*, MR. V. G. GIBBS (William Pearson, Ltd.). *Executive committee*: MR. H. W. BARKER (Battle Hayward & Bower, Ltd.); MAJOR R. H. KING (Standardised Disinfectants, Ltd.); MR. R. W. LOWE (Chas. Lowe & Co. (Manchester), Ltd.); MR. A. S. ROXBURGH (Roxburgh Morgan & Co., Ltd.); MR. W. E. O. WALKER-LEIGH (Cooper McDougall & Robertson, Ltd.); MR. H. A. SMITH (immediate past chairman) (Lawes Chemical Co., Ltd.).

Parliamentary Topics

Phenolic Moulding Powder

IN the House of Commons last week, Sir I. Fraser asked the President of the Board of Trade in what proportions he was distributing phenolic moulding powder between firms who use it for electrical accessories for housing, for the export trade, and for luxury or semi-luxury goods.

Mr. Belcher: Distribution of these powders is not subject to statutory control but the producers give priority to their use for Government contracts, housing requirements, including electrical accessories, and manufactures for export.

Streptomycin

Mr. Percy Wells asked the Minister of Health to what extent streptomycin was being produced in this country; whether it had been used in connection with the treatment of tuberculosis; and with what results.

Mr. Bevan: A number of firms are carrying on research and development in connection with its production, but the quantity resulting from these activities, which are on a laboratory scale, is as yet very small and it has therefore not been possible to use it in the treatment of tuberculosis.

Penicillin for Dairy Cows

The Minister of Agriculture, in reply to a question by Mr. W. Roberts, said there were supplies of penicillin for approved research for veterinary purposes, but until the extent of the demand for human needs was known it would not be possible to indicate what supplies will be available for the treatment of dairy cows.

Rationing of Fertilisers

Mr. Dye asked the Minister of Agriculture whether it was his intention to continue the rationing of fertilisers for next year's crop; whether those farmers who had been unable to secure their full allocations this year would be able to obtain the arrears; and what steps were being taken to increase supplies of both potash and phosphates.

The Minister said he was not in a position at present to make a statement regarding the distribution of fertilisers for the 1946-47 season.

Asked whether he could assure the House that a sufficient quantity of fertilisers, both potash and phosphates, would be imported to enable maximum production to be reached, the Minister said that just as food was allocated by the Combined Food Board, so were various kinds of fertilisers. That was why no decision could be reached for at least a week or two with regard to the 1946-47 allocations.

New Control Orders

Export Control on Zinc Oxide

FURTHER changes in export control are made by a new Board of Trade Order (S. R. & O. 1946, No. 667) which came into operation on May 23. Among the goods which will not require export licences as from that date are a number of chemical products, while supply considerations have rendered it necessary to impose control on zinc oxide (including leaded zinc oxide) and on di-iodohydroxyquinoline, and export licences will be required in respect of these goods as from May 23.

Among items relieved of control are: extracts from yeast and edible preparations made from yeast; codeine preparations and preparations of codeine salts; nux vomica; physostigmine and its salts; platinum compounds; and sulphaguanidine and its preparations.

The following items under control have been amended as shown: "Citric acid and its salts" to "citric acid and citrates of inorganic bases"; "tartaric acid and its salts, excluding morphine tartrate" to "tartaric acid and tartrates of inorganic bases"; and "theophylline and its compounds and preparations thereof" to "theophylline and its compounds."

Alleged Nickel Monopoly

Suit against Canadian Company

THE U.S. Department of Justice began a civil suit on Thursday last week, states the New York correspondent of *The Times*, against the International Nickel Company of Canada, Ltd., its American subsidiary (the International Nickel Co., Inc.), and three of its officers, alleging a monopoly in restraint of trade and the preservation of the monopoly by cartel agreements with German and French concerns. The companies are the largest producers of nickel in the world, with combined assets of about $300 million.

The defendants were accused of exerting undue control over the importation, manufacture, distribution, and sale of nickel ores, nickel, and nickel products. The Government demanded a complete separation of the business of the Canadian company and its American subsidiary and asked the Court to formulate a plan for redistributing their assets so as to destroy the alleged monopoly and to "open the nickel industry in the United States to competition."

Atomic research on a small scale is expected to start at Didcot in a few weeks, according to the Parliamentary Secretary of the Ministry of Supply.

General News—From Week to Week

Imperial Chemical Industries, Ltd., are now moving into the new premises acquired for the Explosives Division at Hope Street and Bothwell Street, Glasgow.

The North-Eastern Chemical Company, Sunderland, is to open a branch at Marsden, South Shields, for the manufacture of pharmaceutical chemicals.

William Freeman & Co., Ltd., announce that their offices have now been shifted to their works, and that their new address is Subascal Works, Peel Street, Barnsley, Yorks.

On and after June 3, the registered office of British Celanese, Ltd., will be Celanese House, 22/23 Hanover Square, London, W.1 (Tel., MAYfair 8000; telegrams, "Celanese, Wesdo, London.").

Certain forms of steel scrap containing tungsten are exempted from price control by the Control of Iron and Steel (No. 49) (Scrap) Order, 1946 S.R. & O., 1946, No. 659).

The fossilised remains of a species of ox, possibly dating back to the post-glacial age, were unearthed by workmen in Leeds last week when excavating for new buildings at Wood and Bedford's branch of the Yorkshire Dyeware and Chemical Co., Ltd.

"Artificial Sunlight Treatment in Industry" is the title of the Industrial Health Research Board's Report No. 89, just published by the Medical Research Council. It gives the results of tests in an office, a factory and a coal mine. Copies are obtainable from H.M.S.O. (1s. each).

Amendment Lists have now been published by H.M.S.O. in respect of the following DTD Specifications: 363A, Aluminium Alloy Extended Bars and Sections; 389, Iso-Propyl Alcohol (2-Propanol); 631, Silver-Clad Copper Strip; 663, Lanolin Resin Protective; 691, Methylated Spirit.

This year's number of entrants—46—for the Textile Institute's general textile technology examination, constitutes a record. The examination was held on May 22, and the candidates sat at five centres in this country—London, Manchester, Bradford, Leicester, and Glasgow, and three in India—Bombay, Madras, and Baroda.

The National Society of Pottery Workers have put before the British Pottery Manufacturers' Federation proposals for a revised structure of wages and hours. The proposals embrace every craft in the industry, and the new wage basis simplifies the present complicated method of settling, as well as putting the basic rates on a much higher level than at present.

A range of mechanical handling equipment, including the Collis Truck, the Collis Stacker and the Collis Gravity Roller Conveyor will be exhibited by J. Collis & Sons, Ltd., Regent Square, London, W.C.1, at 29 Wellington Street, Glasgow, from June 3 to 14.

Plaster Products (Greenhithe), Ltd., are to erect a new factory at Dunball, Somerset, to supply the needs of the cities in South Wales, the Bristol Channel area, and South-West England. The technical staff is engaged on researches into new products and improved processes, some of which have already increased the productive capacity of the Greenhithe plant.

As a gesture of appreciation, and to mark the company's sixtieth anniversary, the board of directors of the British Oxygen Co., Ltd., have granted an anniversary bonus of 4 per cent. on the annual salary or wage to all employees who were in the service of the company on or before January 1, 1945. In addition, a large sum has been set aside to provide special grants, on demobilisation, to employees serving with the Forces.

The current issue of The Advancement of Science (III, 12), the quarterly published by the British Association, is devoted mainly to the addresses delivered at the conference on Scientific Research and Industrial Planning, held last December. There are also articles on International Scientific Co-operation, by Professor Stratton, and on the Place of Science in Town and Country Planning, by Professor Dudley Stamp.

The first official account of the activities of the Post Office during the whole period of the war, is contained in "The Post Office Went to War," by Ian Hay, published by H.M. Stationery Office (1s. 3d.) last Tuesday. The book covers London and the provinces, and the work of the Post Office overseas in connection with communications; it has 96 pages and 70 illustrations, and is excellently produced.

The following Scottish manufacturing firms have undertaken the production of the Department of Health's anti-midge lotion, to a formula agreed by the Scottish Tourist Board (*see* THE CHEMICAL AGE, May 18, p. 562): Raimes Clark & Co., Duncan Flockhart & Co., W. & R. Hatrick, Ltd., S.C.W.S., Ltd., Boots Pure Drug Co., Ltd., J. F. Macfarlane & Co., Thomas Harley, Ltd., and T. & H. Smith, Ltd. Manufacturing is now in progress, and distribution is expected in early or mid-June. Prices have not yet been arranged. The material is described officially as a repellant, and is likely to be made in the form of a thick cream.

"Organic Halogen Compounds," which is Leaflet No. 12 in the D.S.I.R. series on methods for the detection of toxic gases in industry, has been amended by a note stating that since the original tests were made, an alcohol lamp devised by J. W. Towers & Co., Ltd., Victoria House, Widnes, has proved to be comparable to the Turner halide detector when tested in concentrations of carbon tetrachloride, trichlorethylene or pentachlorethane vapours.

In accordance with their policy of research and development, General Refractories group of companies propose this year to construct at Worksop, Notts., a large and modern research laboratory, supplementing the existing laboratories at Worksop, Glenboig, and Deepcar. This point was brought out at the annual meeting of General Refractories, Ltd., at Sheffield, when the chairman, Sir Ronald Matthews, spoke of the heavy demand, both home and export, for the company's products.

Foreign News

The Dutch chemical industry is considering the establishments of a large-scale plastics branch as soon as conditions permit.

The total tonnage of Nigerian export of groundnuts for this season has reached more than 300,000 tons. This has been achieved in spite of many difficulties, including very bad weather conditions.

Markets for Australian lead seem to be assured for a considerable time ahead, owing to new uses being opened up to the metal, according to the *Industrial Australian and Mining Standard*.

According to the *Economista*, research in connection with the production of DDT in Spain has resulted in obtaining a product which is said to be superior in action to DDT, as well as less toxic.

The Madagascar graphite industry, which up to the end of 1944 exported practically its total production to Britain and the U.S., now finds itself overstocked, as sales to these two countries virtually ceased when export control was removed in 1945. In 1945 France was authorised to import 5000 tons, and it is hoped that this figure will be increased and that new markets will be found in the Americas.

With its second issue for 1945 (Nos. 2-6), which has just reached us, the *International Review of Agricultural Industries*, published in Paris and Geneva, makes the welcome reinstatement of its Economic Studies, suspended since 1940. The present volume contains an interesting article, Les Répercussions des Inventions et du Machinisme, by R. Higonnet, stressing the economic importance of inventions in relation to the level of prices, world gold stock, and employment.

Graphite is found in South Australia over a wide area on southern Eyre Peninsula and is being produced from two deposits, Uley and Koppio, situated 14 miles south-west and 28 miles north, by road, respectively, from Port Lincoln. The graphite occurs as flake, disseminated in metamorphic rocks.

The South African Government has issued a White Paper on the proposed increase of £15 million in the share capital of Iscor for the extension of steel plant. It is proposed to build a new plant at Vereeniging with an annual ingot capacity of 320,000-350,000 tons, and the Iscor works at Pretoria are also to be extended.

A new oilfield has been located on the Sinai coast, 50 miles south-east of Suez; it is to be exploited by the Shell and the Socony-Vacuum Company simultaneously. Oil experts are of the opinion that the new fields will be more productive and yield oil of better quality than other deposits along the Red Sea.

Forthcoming Events

May 28. Society of Instrument Technology. London School of Tropical Medicine, Gower Street, London, W.1, 7 p.m. Dr. A. Porter: "The Design of Automatic and Manually-operated Control Systems."

May 29. Royal Society of Arts. John Adam Street, Adelphi, London, W.C.2. Maj. W. H. Cadman: "Colloidal Carbon."

May 29. British Chemical Plant Manufacturers' Association. Connaught Rooms, Great Queen Street, London, W.C.2, 12.45 p.m. Luncheon.

May 30, 31, June 1, 2. Society of Chemical Industry (Food Group). Summer meeting in Scotland (*see* THE CHEMICAL AGE, 1946, *54*, 409).

May 31. Oil & Colour Chemists' Association (Bristol Section). Grand Hotel, Broad Street, Bristol, 1, 6.15 p.m. Mr. E. V. Colman: "What the decorator wants from the paint chemist."

June 5-28. The Tea Centre, Lower Regent Street, London, S.W.1, 10.30 a.m. Exhibition of Chemical Discovery.

June 5. Institute of Welding. Institution of Civil Engineers, Great George Street, Westminster, London, S.W.1, 2.30 p.m. Annual general meeting, discussion and dinner.

June 6. The Chemical Society and University of Oxford Alembic Club. Physical Chemistry Laboratory, South Parks Road, Oxford, 2 p.m. Sir Robert Robinson, Mr. J. M. G. Pryce, Professor C. N. Hinshelwood, Dr. D. D. Woods, Dr. E. B. Chain: "The Chemistry of Anti-Bacterial Substances."

Commercial Intelligence

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

Mortgages and Charges

(Note.—The Companies Consolidation Act of 1908 provides that every Mortgage or Charge, as described therein, 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 and 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.)

G. & L. PRODUCTS LTD., Cheltenham, manufacturers of plastics. (M., 25/5/46.) April 26, £1500 debentures; general charge.

Satisfaction

HASSALL & CO., LTD., London, E.C., chemical manufacturers. (M.S., 25/5/46.) Satisfaction, April 24, £2000 balance of debentures registered August 15, 1924.

Company News

British Enka Ltd. have received permission to deal in £937,500 stock in 5s. units.

English Clays Lovering Pochin & Co., Ltd., have been granted permission to deal in 63,464 5½ per cent. accumulative first preference shares of £1 each, fully paid.

Lacrinoid Products, Ltd., having made £9350 net profit for 1945, as against £5522 the previous year, are paying dividend (on increased capital) of 10 per cent. (9 per cent.).

Amalgamated Metal Corporation, Ltd., have published a profit and loss account for the year to March 31 last showing net profit of £211,013 (£210,814). Ordinary dividend remains at 3½ per cent.

An appreciable increase in their final dividend is shown in the statement issued by British Alkaloids, Ltd., who are paying 45 per cent. final ordinary dividend, making 60 per cent. for the year, as compared with 30 per cent for the previous year.

New Companies Registered

Gedland, Ltd. (410,318).—Private company. Capital £5000 in £1 shares. Manufacturing chemists, etc. Directors: C. T. Knowland, J. F. Geddes. Registered office: 25 Southfields Road, Eastbourne.

Robenau, Ltd. (410,190).—Private company. Capital £1000 in £1 shares. Manufacturers of and dealers in chemical goods, etc. Director: Mrs. D. Myron-Rose. Registered office: 7 Endsleigh Court, Upper Woburn Place, W.C.1.

Rodent Control, Ltd. (410,277).—Private company. Capital £1000 in £1 shares. Pest exterminators, etc. Directors: A. E. Perkins, Marion F. Perkins, G. L. A. Perkins, 8 Winsor Drive, Reading.

David Ginn, Ltd. (410,234).—Private company. Capital £1500 in £1 shares. Manufacturing, dispensing and analytical chemists and druggists, etc. Directors: D. Ginn, Mary E. Dowsen. Registered office: Viewcroft Works, Shipley, Yorks.

Lewis's Distributors, Ltd. (410,068).—Private company. Capital £1000 in £1 shares. Importers and exporters of and dealers in metals, chemicals, etc. Directors: J. Lewis, F. I. Lewis, 51 Marsh Lane, Stanmore, Middlesex.

Cree (Great Britain), Ltd. (410,381).—Private company. Capital £100 in £1 shares. Manufacturers of and dealers in chemicals and chemical compounds, etc. Directors: A. D. Howlett, E. W. Trotter. Registered office: Cree House, Creechurch Lane, E.C.3.

British Continental Drugs, Ltd. (410,374). Private company. Capital £1000 in £1 shares. Manufacturers of and dealers in chemicals, drugs, oils, colours, etc. Subscribers: A. G. de Q. Colley, D. G. Higgs. Registered office: 67 Moorgate, E.C.2.

W. James Davies (Western) Limited. (409,997).—Private company. Capital £2000 in £1 shares. Manufacturers of, dealers in and agents for chemicals, drugs, oils, colours, scientific apparatus, etc. Directors: W. J. Davies, W. Bennett, W. L. Thomson. Registered office: 31 Queen Street, Cardiff.

Oscar Kohorn & Company, Ltd. (410,532).—Private company. Capital, £10,000 in £1 shares. Manufacturers of and dealers in machinery and equipment used in the manufacture of industrial and fine chemicals, chemical and kraft paper and pulp, cellulose, dyestuffs, plastics, ores, metals, minerals, etc. Subscribers: L. T. Edwards; H. S. Phillips. Registered office: 75 Victoria Street, S.W.1.

Chemical and Allied Stocks and Shares

STOCK markets have been less lively this week, but generally the volume of business was only moderately lower, industrial shares remaining in favour on higher dividend hopes and on estimates of future benefits many companies are likely to derive from the abolition of E.P.T. Sentiment outside the gilt-edged market was little affected by the reaction in British Funds, which was attributed mainly to selling with a view to switching into the new 2½ per cent. Savings Bonds; a rally in 2½ per cent. Consols subsequently led a better tendency. The nationalisation groups fully held recent

gains, iron, coal and steel shares attracting on the possibility of improvement in a number of forthcoming dividends, while home rails were slightly better on balance.

Imperial Chemical, following the advance to 45s. on the annual report and strong balance-sheet, reacted to 43s. 10½d., while Turner & Newall at 90s. also reflected profit-taking, and United Molasses at 54s. failed to hold all an earlier rally. On the other hand, Lever & Unilever were prominent at 57s. 3d., and Lever N.V. rose to 60s., the latter on expectations of payments in respect of postponed war-time dividends; moreover, details are expected shortly of the revised dividend guarantee agreement between the two companies. The units of the Distillers Co. have been in demand up to 126s. on hopes of a bigger dividend; while in other directions, Dunlop Rubber rose on the higher dividend and bonus payments and were 63s. 3d. xd. B. Laporte were 93s. 9d. xd. on the larger profits and Victory bonus which raises the total payment for the past year from 15 per cent. to 17½ per cent.

British Aluminium remained firmer at 42s., but British Oxygen, following their recent good rise, eased slightly to 98s. 1½d. Shares of companies connected with plastics received more attention, De La Rue rising to £11½, and Lacrinoid Products 2s. shares to 7s. 9d., while British Industrial Plastics 2s. ordinary were 10s., and Erinoid 13s. 4½d.

British Glues & Chemicals 4s. ordinary showed firmness at 14s. 4½d. Dealings at close on 11s. were recorded in Greeff-Chemicals Holdings 5s. ordinary. Monsanto Chemicals 5½ per cent. preference have been dealt in up to 24s. 6d., and Burt Boulton ordinary at 26s. 9d. Morgan Crucible 5 per cent. second preference, which are firmly held on their investment merits, have marked 26s. There was increased demand for British Drug Houses, which were in demand up to 71s. 3d.

Babcock & Wilcox strengthened to 65s. 6d. on the full results and strong balance-sheet position. United Steel firmed up further to 24s. 9d. on the debenture conversion proposals. Tube Investments rose further to £6 11/16, Ruston & Hornsby were 60s. 9d., Guest Keen 44s., Dorman Long 26s. 9d., and Powell Duffryn 23s. 3d. Helped by the higher Fine Spinners dividend, textiles held firm, Bradford Dyers being 27s. 3d., Bleachers 15s. 6d., and Calico Printers 24s. 10½d. Associated Cement, following an earlier further rise, eased to 66s. 6d., and British Plaster Board to 36s. 9d., but Crittall Manufacturing were good at 31s. Barry & Staines were 61s. 9d., Nairn & Greenwich 86s. 3d. British Match rose further to 47s. 9d., and in other directions, Imperial Smelting shares improved to 19s. 6d., but Amalgamated Metal eased to 17s. 7½d. There was again a fair amount of activity in German Potash bonds, the 7 per cent. being 59 and the 6½ per cent. 57. Boots Drug were 60s. 3d., Borax Consolidated firm at 48s., Beechams deferred 25s., Sangers 32s. 9d., and Griffiths Hughes 58s.

Oil shares attracted increased attention. Anglo-Iranian receded to 97s. 6d., but later became firmer on more hopeful news from Persia. Shell rose to 90s. on the possibility of a Victory bonus, while Trinidad Petroleum Development advanced to £5½, but Mexican Eagle Oil fell to 14s. 6d. on the deadlock in the negotiations.

British Chemical Prices

Market Reports

LONDON market movements during the past week show that industrial chemicals generally have been moving steadily into consumption, and the export demand has again been substantial in volume. Quotations are unchanged at recent levels, but the undertone is very firm. There are no special features to record and in most sections of the market the chief concern is to secure supplies for new business. In the coal-tar products market, spot business continues to be difficult to negotiate. Pitch and naphthalene are receiving a good export demand.

MANCHESTER.—Steady to firm price conditions still obtain in virtually all sections of the Manchester market for both light and heavy chemicals, and the general view is that future changes will be towards higher levels. The textile bleaching, dyeing and finishing trades are taking steady contract deliveries and there is a substantial consumption by other domestic users. Replacement business on home trade account is coming through satisfactorily, and inquiries for shipment are circulating steadily. The tar products market is active in most sections and a fair amount of new business in both the heavy and light distillates has been reported during the week.

GLASGOW.—Busy conditions continued in force in the Scottish heavy chemical market during the past week. The home trade was very active in all classes of light and heavy chemicals, with a pronounced demand for sodium chlorate, whiting, barytes, silica, and all types of fillers and extenders for the paint trade. Supplies of these materials are still exceedingly slow and considerable opportunities exist for substitute materials. Inquiries from overseas markets followed normal lines, covering very nearly the entire range of industrial chemicals and raw materials. Only a limited number are available for export and the general world shortage of raw materials is reflected in the inability of exporters to quote for many products. Prices show no signs of easing and shipping space still remains a problem.

Inventions in the Chemical Industry

The following information is prepared from the Official Patents Journal. Printed copies of specifications accepted may be obtained from the Patent Office, Southampton Buildings, London, W.C.2., at 1s. each. Numbers given under "Applications for Patents" are for reference in all correspondence up to acceptance of the complete specification.

Applications for Patents

Plastics.—Alginate Industries, Ltd. (formerly Cefoil, Ltd.), and E. G. Millatt. 12236.

Substituted pteridines.—American Cyanamid Co. 12336-41.

Plasticisers.—12288. Ethylene.—12289. Styrene co-polymers.—12290. Solid particles.—12291. Polymerisation processes.—12292. Styrene resins.—12870.—J. C. Arnold. (Standard Oil Development Co.)

Paints.—L. Berger & Sons, Ltd., D. H. Hewitt, and L. A. Paxon. 12394.

Fermentation liquors.—S.A. Bioquimica Española. (Spain, Oct. 29, '45.) 12605.

Cellulose derivatives.—British Celanese, Ltd. (United States, May 3, '45.) 12868.

Corundum.—Cie. de Produits Chimiques et Electrométallurgiques Alais, Froges & Camargue. 12845.

Discrete materials.—Derbyshire Stone, Ltd., and J. W. Hobday. 12766.

Olefines.—Distillers Co., Ltd., M. D. Cooke, and J. J. P. Staudinger. 12501-2.

Sulphur burners.—E.I. Du Pont de Nemours & Co. 12353.

Dyes.—E.I. Du Pont de Nemours & Co. 12643.

Chlorination of ethyl alcohol.—E.I. Du Pont de Nemours & Co., and O. W. Cass. 12354.

Tanning of leather.—J. R. Evans & Co. 12343.

Organo-silicon esters.—J. G. Fife. (Dow Chemical Co.) 12303.

Dyestuffs.—J. R. Geigy A.G. 12494.

Photographic materials.—General Aniline & Film Corporation. 12234.

Thermometers.—C. R. A. Grant. 12557.

Fuel-jet control.—C. Halstead. 12638.

Penicillin.—D. J. D. Hockenhull, and I.C.I., Ltd. 12642.

Perborate compounds.—Imperial Chemicall Industries, Ltd. 12831.

Production of ethylene.—Imperial Chemical Industries, Ltd. (E.I. Du Pont de Nemours & Co.) 12496.

Sulphur compositions.—C. E. Leech. 12540.

Thermostat control devices.—E. G. R. Kipps, and E. Aron. 12847.

Vitreous enamels.—I. Kreidl, and W. Kreidl. 12924.

Oleaginous material.—Lever Bros. & Unilever, Ltd. 12613.

Production of iron powder.—G. Malecki. 12453.

Recovery of lead.—A. E. Malley. 12649.

Thermometers.—J. F. J. Malone. 12625.

Rubber compounds.—Manchester Oxide Co., Ltd., R. H. Clayton, R. A. Mott, and J. H. Clayton. 12742.

Deodorising seaweed.—P. J. C. Margotton. 12902.

Anti-malarial oils.—N.V. de Bataafsche Petroleum Mij., R. G. Aickin, L. W. L. Cole, and R. W. Noad. 12264.

Treatment of hydrocarbon.—N.V. Internationale Hydrogeneeringsoctrooien Mij. 12402.

Starch products.—N.V. W. A. Scholten's Chemische Fabrieken. 12271.

Treating carbon articles.—National Carbon Co., Inc. 12593.

Tanning agents.—Progil. 12299.

Tanning products.—Progil. 12690.

Insecticides.—F. F. Schwartz. 12411.

Moulding compositions.—Shawinigan Products Corporation. 12740.

Hydrocarbons.—Socony-Vacuum Oil Co., Inc. 12661-64.

Alloys.—B. Stahlane. 12524.

Electro-deposition of metals.—H. Webb, and A. E. Ellsom. 12178.

Removal of oil from water.—P. Wedgwood, and T. C. Battersby. 12447.

Treatment of gases.—Whessoe, Ltd., and A. Puttick. 12227.

Complete Specifications Open to Public Inspection

Preparation of products rich in enzymes and the products obtained thereby.—E. Alilaire. Oct. 27, 1944. 25609/45.

Resinous copolymerisation products.—Bakelite, Ltd. Oct. 27, 1944. 28148/45.

Synthetic wax compositions.—British Thomson-Houston Co., Ltd. July 19, 1943. 13870/44.

Alkanolamines.—E.I. Du Pont de Nemours & Co. July 14, 1944. 17934/45.

Amino acids.—E.I. Du Pont de Nemours & Co. Oct. 30, 1944. 28571/45.

Purifying volatile organic liquids.—E.I. Du Pont de Nemours & Co. Oct. 25, 1944. 28035/45.

Trichlorovinyl ketones.—J. R. Geigy A.G. Oct. 30, 1944. 28735/45.

Manufacture of esters of trihalogen-acrylic acids.—J. R. Geigy A.G. Oct. 30, 1944. 28736/45.

Manufacture of esters of trihalogen-crotonic acids.—J. R. Geigy A.G. Oct. 30, 1944. 29157/45.

Manufacture of esters of trichlorethanol.—J. R. Geigy A.G. Oct. 30, 1944. 29158/45.

Photographic silver halide emulsions.—General Aniline & Film Corporation. Oct. 25, 1944. 25870/44.

Reversible gel composition.—General Aniline & Film Corporation. Oct. 25, 1944. 25872/44.

Arylides of ortho-hydroxy carboxylic acids and diazo derivatives thereof.—General Aniline & Film Corporation. Oct. 19, 1944. (Cognate Application 2760/46.) 2759/46.

Continuous saccharification of vegetable substances.—A. Hereng. Sept. 22, 1944. 7571/46.

Purified penicillin.—Hoffmann-La Roche, Inc. June 27, 1944. 16212/45.

Production of vinyl cyanide.—Imperial Chemical Industries, Ltd. Oct. 27, 1944. 28568-69/45.

Catalyst material.—Imperial Chemical Industries, Ltd. Oct. 30, 1944. 28570/45.

Oxygen-free copper.—International Smelting & Refining Co. Oct. 28, 1944. 27056/45.

Thermochemically conditioning metal bodies.—Linde Air Products Co. March 6, 1943. (Cognate Application 10024/44.) 10023/44.

Polymerising together a plurality of polymerisable substances in the emulsified state.—N.V. De Bataafsche Petroleum Mij. March 23, 1944. 6723/46.

Manufacture or treatment of articles using vinyl chloride polymers.—N.V. De Bataafsche Petroleum Mij. Oct. 3, 1944 7565/46.

Aqueous sols of hydrous oxides.—National Aluminate Corporation. Oct. 26, 1944. 24036/45.

Purifying sols.—National Aluminate Corporation. Oct. 26, 1944. 24037/45.

Stabilisation of keratin solutions obtained by treating keratin containing material with aqueous solutions of alkali metal sulphides and/or hydroxides.—Nederlandsche Centrale Organisatie voor Toegepast-Natuurwetenschappelijk Onderzoek. Nov. 10, 1942. (Cognate Application 6721/46.) 6720/46.

Aromatic amine-aldehyde resinous products.—Norton Grinding Wheel Co., Ltd. July 23, 1942. 11897/43.

Frothing agents.—R. F. Powell, and National Chemical Products, Ltd. Oct. 28, 1944. 23280/45.

Polymers and co-polymers of diolefins.—Sharples Chemicals, Inc. Feb. 19, 1943. 17688/43.

Preparations for the care of the skin.—Society of Chemical Industry in Basle. Jan. 3, 1944. (Cognate Application 265/45.) 264/45.

Fusion of superpolyamides.—Soc. Rhodiaceta. Jan. 19, 1944. 7537/46.

Catalytic conversion of hydrocarbon oils.—Standard Oil Development Co. Dec. 27, 1941. 814/43.

Complete Specifications Accepted

Interpolymerisation of ethylene and vinylidene chloride.—E.I. Du Pont de Nemours & Co. Nov. 1, 1941. 576,830.

Production of polyhydroxy compounds.—E.I. Du Pont de Nemours & Co. Oct. 28, 1942. 576,842.

Derivatives of hydrolysed interpolymers of ethylene and vinyl organic esters.—E.I. Du Pont de Nemours & Co. March 3, 1944. 576,913.

Production of new organic silicon compounds.—P. J. Garner, and I.C.I., Ltd. June 6, 1940. 576,938.

Production of aminoalkyl iodoaryl ketones.—A. A. Goldberg, H. S. Turner, and Ward, Blenkinsop & Co. Dec. 8, 1943. 576,848.

Production of 2-amino-4-methyl hexane and therapeutic compositions derived therefrom.—E. Lilley & Co. April 9, 1942. 576,943.

Bleaching of organic materials.—Mathieson Alkali Works. Jan. 11, 1943. 576,909, 576,910.

Production of zinc.—National Smelting Co. ,Ltd., S. W. K. Morgan, S. E. Woods, and L. J. Derham. March 13, 1943. 576,906.

Aromatic amine-aldehyde resinous products.—Norton Grinding Wheel Co., Ltd. July 23, 1942. 576,880, 576,881, 576,882.

Water-cooled gas condensers.—Power-Gas Corporation, Ltd., and F. F. Rixon. May 9, 1944. 576,888.

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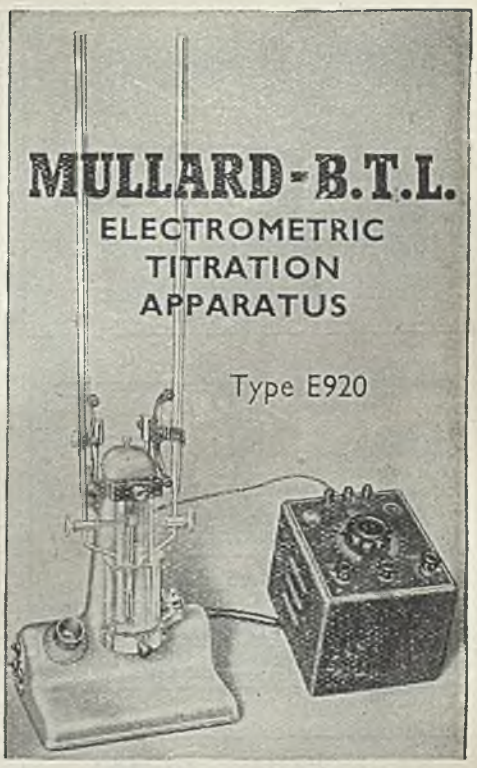

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