The Chemical Age

A Weekly Journal Devoted to Industrial and Engineering Chemistry

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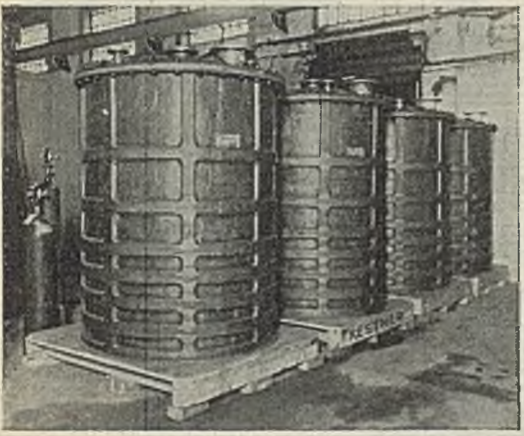

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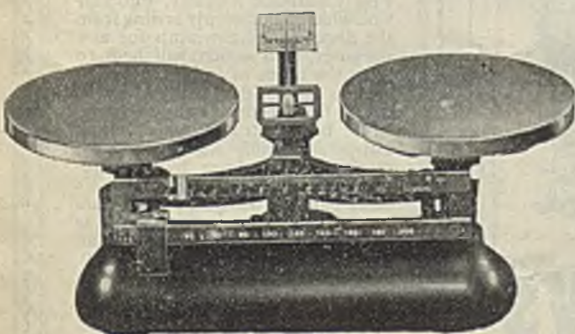

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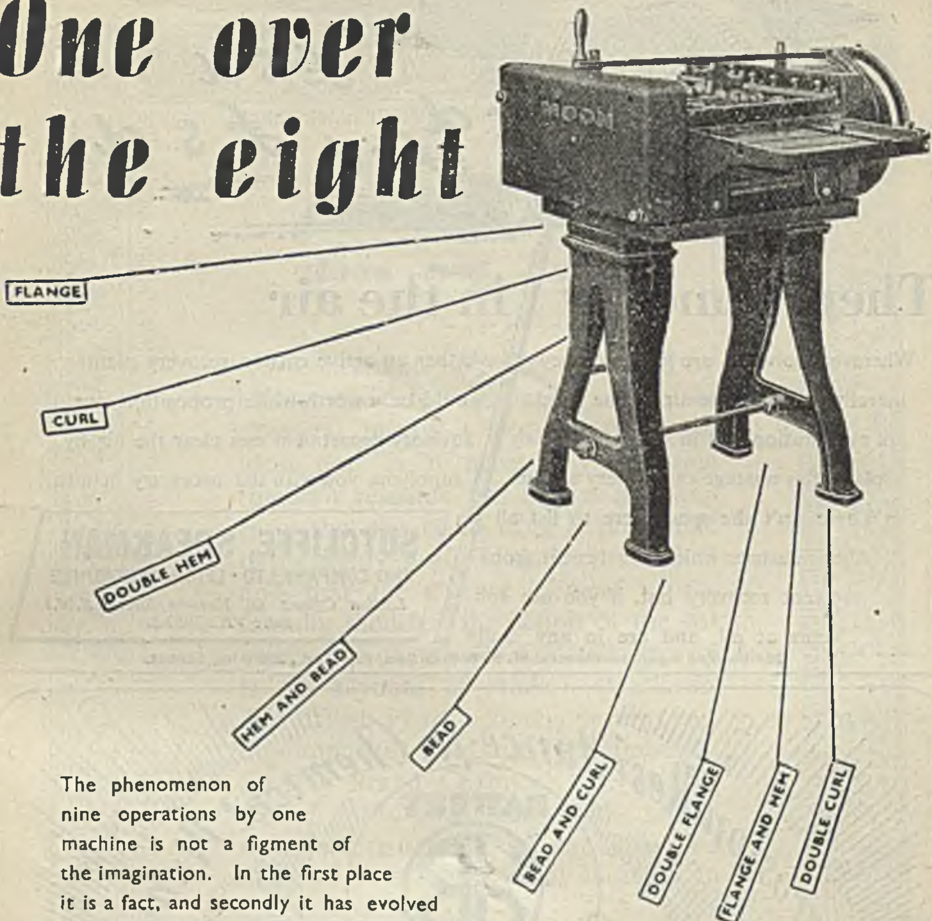

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Scientists and Security

THE work that has been done by scientific men of all nations during the present war and during the war of 1914-18 has clearly demonstrated that with the coming of mechanised warfare, and perhaps particularly with the multiplication of armies to the present scale, war has become organised scientific slaughter. Just as in industry it is continually necessary for a skilled undertaking to develop new processes and new methods, so in war success goes not necessarily to the big battalions, but to those battalions which, while not being too small to operate the weapons of war on an adequate scale, possess the best weapons. At the end of the war of 1914-18 the tank was in its infancy, the aeroplane was just beginning to become a potent offensive factor in war. In the inter-war period, however, we did not develop those weapons save on a very inadequate scale. It is true that we evolved new and improved tanks and that we proved ourselves in the forefront of the designers of high-speed fighting aeroplanes; but we were outmatched in quantity by our enemies and our lead in quality was insufficient to overcome this handicap on land though we were able to defend ourselves adequately in the air, thanks mainly to the fact that the big battalions were insufficiently large to overcome our lead in quality.

The close of this war sees the flying bomb and the long-range rocket in their infancy. What will be our policy after the war is over? Shall we again be content to carry out a few casual experiments and to leave development to other nations. We hope and believe that war will be rendered impossible. We can be pretty sure that there will be no more major wars in the world within the next 30 years, let us say, but it is rare that in war there is a second chance. Even the most peaceful nation must keep abreast of warlike developments. Its armaments must be adequate in quantity and they must not be less effective in quality than those of other nations.

This has been recognised in America where Mr. Stimpson, Secretary of War, Mr. Forrestal, Secretary of the Navy, and Dr. Jewett, president of the National Academy of Science, have announced the setting up of a scientific research board "to ensure continual preparedness for national security," and to maintain the close co-operation between civilian

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scientists and the armed services. "There will thus be maintained at all times a substantial body of scientists, acquainted with military personnel, establishments, procedures, and problems, who can be immediately mobilised for effective service in the event of another war emergency"—so runs a statement issued by the Navy and War Secretaries. "This war emphasises three facts of supreme importance to national security: (1) Powerful new tactics of defence and offence are developed around new weapons created by scientific and engineering research; (2) the competitive time element in developing those weapons and tactics may be decisive; (3) war is increasingly total war, in which the armed services must be supplemented by active participation of every element of the civilian population."

It seems not unlikely that during the next few weeks a similar proposal will be brought before the British Parliament. The Parliamentary and Scientific Committee is understood to have this question under consideration and to be on the point of issuing a comprehensive plan for the reorganisation of the nation's scientific resources. So far as we see it, however, this report is not necessarily limited to, and may not even comprise, the creation of a permanent scientific general staff. But undoubtedly there must be some means for experimenting upon new developments in defence, and therefore in offence, in order to make sure that we shall never be caught unprepared.

As we see it, the difficulty is that of the time which the scientific leaders of the nation can give to the subject. In time of war our scientific resources are mobilised just as much as are our military resources, and men of science agree willingly to abandon for the time being their normal pacific work in order to tackle the urgent task of national defence. The result is that we get a rapid advancement in the application of science both to warfare and to production, but work on pure science practically ceases. This state of affairs is unhealthy and cannot be permitted to continue. It would appear that a proper course is for the armed services, either separately or together, to maintain an adequate full-time scientific staff under one or more Directors of Research, the work of which shall be devoted almost wholly to warfare. Such research staffs could operate in a very similar way to any normal peaceful research association and, in particular, any part of their work that happened to be of academic interest could be delegated to such universities as are most likely to be helpful. Naturally, the War Research Board should be able to call into consultation, under conditions of secrecy, any recognised scientist or technician in the country for the purpose of its work. We do not feel very much impressed by the idea of maintaining a scientific general staff composed of the leaders of science except in an advisory capacity. It is difficult for anyone to maintain an equally active interest in several branches of work and it would appear likely that in time of peace under these conditions work on problems of offence and defence would not be particularly effective. It is, however, necessary for us to "ensure continued preparedness for national security" and we must not again allow our desire for peace to cause us to become unprepared for war.

UNIT PROCESS OF MIXING

At a recent meeting of the North-Western branch of the Institution of Chemical Engineers held at the College of Technology, Manchester, Mr. J. P. Asquith read a paper entitled "The Unit Process of Mixing," in which the mixing of liquid-liquid and of liquid-solid systems were mainly considered because of the lack of data on mixing for other systems. The factors involved in mixing are such that it is necessary to study actual mixing operations and to develop from the experimental results some general laws, applicable to other mixing operations. The experimental laws and the application of these laws to practical operations were discussed. The experiments include investigations of the change in the velocity of reactions under agitation at different speeds, the rate of mixing strong brine in water, the rate of distribution of sand in water, the rate of heat transfer in agitated systems, and the rate of solution of solids in liquids. Progress has been made in finding the relationship between the power required to drive different agitators and the agitation produced. Good results are obtainable with simple apparatus without waste of energy by splashing, by waves or vortices. An extensive bibliography was included in the paper.

NOTES AND COMMENTS

German Insincerity

OUR leading article to-day on how we are to treat Germany after the war in order to ensure that we shall not again be involved in war, calls to mind what happened after the last war and the manner in which the Germans overcame the measures imposed upon them. Mr. Anthony Eden, speaking in the House of Commons on September 29, 1944, said that " certain documents about German activities immediately after the last war showed a devastating indictment of Germany's sincerity from the very beginning in fulfilling any of the disarmament stipulations of the Treaty of Versailles. Evasion and obstruction were practised ingeniously and universally at all possible points." One method by which this evasion and obstruction was practised has lately been made public by Mr. J. H. Morgan, who was the British Military Representative on the Interallied Council of the Control Commission for the Disarmament of Germany from 1919 to 1923. By pleading that the suppression of factories devoted to war manufacture would mean the destruction of German industry with consequent inability to pay reparations, the Germans succeeded in inducing the Allies to agree to spare every factory and every machine which could be converted to neutral purposes.

Once Bit, Twice Shy

IN other words, whereas we to-day maintain that every machine that could be converted to war purposes should be scrapped, the mistake was made in 1919 of allowing every war machine which could be converted to peace purposes to be retained. By this decision, to quote Mr. Morgan, " Germany retained 90 per cent. of all the machines which, during the war, had been devoted, and exclusively devoted, to belligerent purposes. Nearly all the plant of the great chemical industry, which had manufactured 73 per cent. of the total high explosives output during the war and 100 per cent. of the nitric acid so necessary, as an ' intermediate product,' for the manufacture of explosives of every kind, we were compelled by this decision to leave intact. Converted once more to their pre-war manufacture of dyes, drugs, and fertilisers, the chemical factories could be, and no doubt in many cases were, reconverted to war production within six weeks after the Commission had been withdrawn." These facts emphasise how necessary it is that considerable thought should be given now to the subjects mentioned in our leading article.

Tax Reliefs for Industry

IT is arguable that much of our 1920-30 depression was due to a chronic shortage of capital consequent upon the effect of the war and of Government taxation policy. Industry in general found itself without the means to buy new plant even though existing plant was worn out or obsolete. British industry was thereby put at a disadvantage in respect to foreign competitors. Meanwhile, the Allies were pouring money into Germany that was used for building nice new works, to take the place of those which the Germans had worn out in making the engines of war with which they had assaulted us. Urgent representations have been made—among other places in these columns—that this mistake should not be repeated. The Chancellor of the Exchequer made certain promises in general terms in his last Budget speech. He has now implemented them in the new Income Tax Bill and, so far from whittling down the promises he then made, he has enlarged the scope of some of them. We believe that industry will be satisfied by these proposals, which are summarised on p. 183 of this issue. Many long-standing grievances are swept away and financial help will be provided for the post-war re-equipment of industry. The Bill appears to simplify and extend considerably the arrangements for final writing-off of assets for tax purposes, and may go farther than the original announcements might have implied.

Allowances for Plant

BOTH machinery and industrial buildings will now rank for " balancing allowance " as soon as they cease to be used for production. This is, of course, a great improvement over the provision for mills and factories made by the 1937 Act, particularly as the buildings concerned (while limited, of course, to productive industry) are bounded by a wide definition. Plant and machinery will rank irrespective of whether they are replaced or even scrapped. Machinery attracts the balancing allowance if it is "put out of use as being worn out or obsolete or otherwise useless or no longer required," and an industrial building ranks if it is "demolished or destroyed, or, without being demolished or destroyed," ceases altogether to be used. The provisions just mentioned, together with the 10 per cent. on buildings and 20 per cent. on new plant, will help manufacturers to write off their plant and equipment within a period roughly conterminous with its real life. Moreover, the 20 per cent. allowance is to be extended to cover second-hand machinery and plant provided that it is newly installed for industrial purposes. This provision is doubtless intended to assist in the disposal of surplus Government plant. It is doubtful whether it should be retained indefinitely. The use of second-hand plant is not generally conducive to industrial efficiency and unless such plant is comparatively new and is really up-to-date, its use should not be encouraged.

Towards Rehabilitation

ANOTHER welcome innovation is an annual allowance in respect of capital expenditure on patent rights, which is a normal trade expense as expenditure on plant—and may be more speculative. Finally, there is to be an allowance made for capital expenditure on buildings, plant, and machinery for research incurred after January 1, 1937, and last year's allowance for scientific research expenditure is to be extended to payments made after April 6, 1944. This encouragement—and in particular its effect on pilot plants—will be of great importance to British industry. It may make all the difference to many firms between undertaking development work themselves and sitting on the fence waiting for others to start. There is a great deal of modernisation required in British industry. On all sides we hear of American output being far in excess of ours per man-hour or per machine. The Chancellor has in our opinion taken a very important step towards the rehabilitation of our industries.

Exports in 1944

CONTINUING the series of figures concerning British export trade, the Board of Trade has published a pamphlet: "The Export Trade of the U.K. in 1942, 1943, and 1944" (H.M.S.O., 1s.). This shows that for the whole year 1944 exports were valued at £25 million more than in 1943, but that they failed by £13 million to reach the 1942 total, notwithstanding a considerable rise in prices. As might have been expected, the invasion of Europe caused a marked falling-off in June, July, and August, the value for the last month being the lowest on record (£13.9 million). The volume index figure for metal goods, which had dropped to 23 in 1943 (1938 = 100), rose to 29, largely because of additional shipments to Russia. The apparent stability of the index figure for chemicals (80 in 1944, and 81 in 1943) covers some marked changes in make-up. Increased exports of ammonium sulphate, benzol, and drugs were offset by reductions for finished dyestuffs and sodium compounds. The total value of chemicals, etc., maintained a steady rise: in 1942 it was £23.75 million; in 1943, £27.5 million; in 1944, £28.1 million. Speaking regionally, total exports to South America showed a decline of £11 million, but there were increases of £21 million to British countries, £14 million to Russia, and £10.1 million to Asia, including notably a rise of £6 million to India, accounted for by the increased industrial demand in that country.

"Corrosion," a 54-page publication issued by the International Nickel Company, New York, is a convenient and comprehensive analysis of corrosion principles, prepared in the belief that a good working knowledge of corrosion is the best possible means of securing the maximum life of equipment with a minimum maintenance cost. It explains how corrosion processes work and discusses all the known factors that influence their action, acidity of solution, oxidising agents, temperature, agitation, films, inhibitors, surface treatment, welding, concentration cells and galvanic action. Graphs, drawings and tables are appended.

Polythene

A Great British Discovery

IN July, 1930, I.C.I. decided to start a new programme of fundamental research, the special study of this research being the effect of extremely high pressures on certain chemical reactions. The range of pressures selected for study was of the order of 15,000-300,000 lb./sq. in., considerably higher than those of any industrial process working at that time. A year or more was spent in developing the technique of making and handling laboratory equipment to stand up to such intense pressures. Chemical studies began in 1932, but not until the beginning of 1933 was anything novel observed. Then, in the course of a series of experiments involving the use of ethylene, a minute trace of a white solid was first found in a reaction vessel in the laboratory. This was polythene, a polymer of ethylene which may be described as a solid comprising a large number of ethylene units linked together, 500 or more, which, under the combination of extreme pressure, temperature, and a catalyst, are made to combine. It was not, however, until the end of 1935 that the technique of handling these enormous pressures was improved, and larger and more efficient apparatus was available so that a systematic study of the phenomenon could be made.

Controlling the Process

Again, a series of setbacks and disappointments were met. Attempts to repeat initial experiments encountered violent and inexplicable explosions in the reaction vessels. Indeed, until proper precautions were taken for dealing with these there was constant danger, and on one occasion the laboratory was badly damaged. When at length the reason for these explosions was found and the process brought under control, progress was rapid. The first beginnings were made towards devising a continuous process of manufacture which it was felt was essential if an ultra-high-pressure process was ever to be economical and control of the properties of the product maintained. Yet continued working with pressures above 15,000 lb./sq. in. was not easy, involving entirely novel designs of gas compressors, joints, valves, tubing, reaction vessels and other equipment. The technique employed in the manufacture of artillery, known as "auto-frettage" (used in making the famous French "75"), was drawn upon, as the pressures were of a similar order to those occurring in a gun immediately after the explosion of the propellant. By 1937 continuous running on a small pilot plant had been achieved and by 1938 it was possible to start up a proper pilot unit embodying the basic ideas for full-scale production.

While the technique was being developed a study was being made of the properties of the new material. It was soon apparent that it had outstanding electrical characteristics, great toughness and flexibility, coupled with lightness and extreme water-resistance. Its future in the electrical field at any rate was promising, and during 1938 close contact was made with the Telegraph Construction & Maintenance Co., who were quick to see the advantages of polythene and had machinery available which could be adapted for using it. An experimental length of submarine cable was made at the end of 1938 and a mile length in 1939, much to the interest of the British Post Office authorities. It was quickly seen that polythene was not only most promising for telephone and telegraph cable, but also for high frequency work, especially in the field of television.

Polythene and Radar

By 1938 progress had been sufficient to decide I.C.I. to design and erect the first full-scale manufacturing unit involving a high-pressure reactor 600 times the size of the original experimental vessel. Work began on the erection of the plant early in 1939 and the unit actually came into production on September 1, the day of the German invasion of Poland. Before the plant had produced even a pound of polythene the decision had already been taken to double it. It is an interesting coincidence that this remarkable new electrical insulation material should have been forthcoming just at the moment when it was most needed for the development of that other great triump of British scientific enterprise, radiolocation, now known as Radar. Experiments on the use of polythene in Radar work were completed by the end of 1939. They were highly successful. All polythene delivered in the first three months of the war was used for this purpose.

By the beginning of 1939 another wartime use of polythene was under development with the Admiralty. This was for the insulation of special submarine cables. The Army was also interested in new types of communication cable embodying polythene; but by the time of Dunkirk—and the second unit of the first polythene plant came into operation on Dunkirk Saturday, June 1—radiolocation uses had outgrown all others in importance. All the polythene that could be produced was needed—by far the greater part for radiolocation. Equipment using polythene was not available in time for the "Battle of Britain," but by then it had been decided that cables for Radar should in future be almost all standardised on the use of polythene. Particularly was polythene useful in the construction of airborne Radar equipment, which came into use in the winter of 1940-41. The fact is that while Radar could have gone on without polythene—and in enemy countries it has had to go on without it—it could certainly not have developed so efficiently.

Construction of a much larger plant began in August, 1940, and was pressed on with the highest priority so that it was in production early in 1942. Considerable operating difficulties continued to arise as a result of the extreme pressures involved, but these were all overcome and a continuously rising output achieved. Early in 1940 I.C.I. shipped polythene to the Du Pont Company in the U.S.A. for processing. Early U.S. experiments on insulation for Radar cables had not been entirely happy, and in 1941 the decision was taken to standardise on polythene. It was not, however, until 1943 that polythene was made on a full productive scale in the U.S.A. To-day, production is assured. British plant capacity is 200 times the output of 1939 and 2000 times that of 1938, while a recent order from the War Production Bureau, Washington, allows an allotment of 25 lb. per month for research instead of the 5 lb. hitherto permitted.

Polythene combines remarkable insulating properties with extraordinary lightness. With a specific gravity of 0.92, it floats on water, and its water absorption is only about 0.01 per cent. It is tough, flexible, and has very high impact strength. Filaments, cold drawn, exhibit tensile strengths up to 15,000 lb./sq. in.

A new booklet (PGM 1044) just issued by THE POWER-GAS CORPORATION, LTD., Stockton-on-Tees, describes fairly comprehensively their P.G. Mechanical Producer Gas Plant, and has the welcome feature of being unusually well illustrated with diagrams and a number of photographs of plants recently constructed, as well as some examples, for comparison, of earlier designs.

Industrialists concerned with the efficient operation of electrically-heated furnaces, ovens, baths or other units will be interested in a temperature control system now available for the first time. It is described in a new catalogue just issued by THE LEEDS & NORTHRUP COMPANY, 4934 Stanton Avenue, Philadelphia, Pa., explaining how, by means of an "on-off" contacting system, the heating unit is fed the electric current needed to keep temperature to the required control point.

New American Products

Fluorine-Resistant Glass

A NUMBER of interesting new chemical products have recently become available in the United States, according to reports in the American technical Press. One of the most remarkable of these is a glass which is resistant to the attack of hydrofluoric acid, announced by the American Optical Company. The glass, which was developed by Dr. A. G. Pincus, of the company's research staff, is free from silica, its major ingredient being phosphorus pentoxide. In spite of the affinity of phosphorus pentoxide for water, the new glass is less soluble in water than ordinary glass, while its melting and working properties are about the same as for ordinary glass.

Heat-Resisting "Lucite"

The plastics department of Du Pont's has recently produced a new compound of their methyl methacrylate resin, "Lucite," which adds the quality of heat-resistance 15° to 20°C. higher than the general-purpose moulding powders so far produced to the other useful characteristics already available. The new formulation, described as HM-122, is at present allocated entirely to Service needs.

New Diacyl Peroxide

Acetyl benzoyl peroxide, an inflammable solid consisting of yellow-white crystals with excellent solubility characteritics and an 8.4 per cent. active oxygen content, is announced as available by the Lucidol Corporation, Buffalo. It is useful as an undiluted catalyst for the polymerisation of various monomers, as a drying agent for unsaturated oils, and as a bleaching agent and germicide.

Catalysts for Nitriles

In producing nitriles from primary alcohols and ammonia, copper catalysts rapidly lose their effectiveness. Yields range from 80 down to 40 per cent. Two newly patented American processes claim to increase the yield by boosting the activity and stability of the catalyst. These processes involve the use as catalyst of either reduced silver or reduced copper, or, better, a mixture of the two, deposited on a partially dehydrated amorphous oxide of aluminium, zirconium, thorium, or other rare earth metal. The latter serves as a dehydrating agent. While the new catalysts lose effectiveness, they do so much less rapidly than copper alone. Further, they may be reactivated readily by passing air over the catalyst at the temperature of reaction. This is followed by treatment with hydrogen to restore the oxides to the metallic form. Among the alcohols readily converted by this process are *n*-butanol and ethanol.

Australian Shale Oil

Production and Plant Design at Glen Davis

ATTENTION has been attracted during recent years to the shale-oil resources of Australia, and this was no doubt intensified when the capture of the oil wells of the East Indies and Burma by the Japanese created a sudden petrol shortage in the Pacific. The existence of oil shale at the foot of the Blue Mountains in New South Wales was ascertained as long ago as 1802 and, during the last 30 years or so of the 19th century, there was a useful production of kerosene, lubricating oil, and similar commodities from this source. Later efforts were only temporarily successful, largely owing to the unsatisfactory results obtained in retorting the shale, but a renewed, and so far successful, attempt was made by National Oil Proprietary, Ltd., at Glen Davis, in 1939, some details of the progress of which have been reported in THE CHEMICAL AGE from time to time. A comprehensive article, covering not only this company's operations, but also the history of Australian shale mining, and the geology of the oil-shale deposits, was contributed by J. M. Antill to the *Chemical Engineering and Mining Review* (1944, *37*, p. 10).

Early Exploitation

The exploitation of the Glen Davis deposits was first attempted by John Fell & Company, who operated the neighbouring field at Newnes in 1912-22 until the mine there was nearing exhaustion. Fell's ambitious scheme was to drive a tunnel through to the rich Glen Davis deposits, retort the shale at Newnes, and despatch the oil to a modern cracking and refining plant at Sydney. Owing to financial considerations the scheme was unsuccessful, but before closing down, Fell produced about 25 million gallons of oil. He was also responsible for the currently-used retort which bears his name and has overcome many of the difficulties of dealing with the rich shale, and he had actually proposed, in order to overcome his mining troubles, to carbonise the shale *in situ*, by setting fire to the seam, thus anticipating the idea which has been successfully worked by the Russians in the Donetz Basin.

From the chemical engineering point of view, the most interesting part of Mr. Antill's article is the account of the methods of carbonising and refining the shales. Samples of these averaged, on analysis, 58 per cent. volatile matter, 14 per cent. fixed carbon, 27½ per cent. ash, and ½ per cent. moisture.

The existing retorts at Glen Davis consist of 60 modified Scottish retorts, with a single internal offtake suspended inside the retort, and four Fell retorts, with multiple external offtakes. The latter have proved much more satisfactory both in percentage of assay value extracted, and in quantity of oil produced per retort per day. A further 44 Fell retorts are in course of construction, after which the existing 60 internal offtake retorts will be reconstructed to the Fell design. At present the output of crude oil is about 100,000 gal. per week.

The Scottish retort was developed for the carbonisation of Scottish shale of low oil content, and has proved unsuitable for use with the New South Wales mineral. One reason is that such a tall retort (30 ft. high) leads to condensation of oil on the cold shale at the top of the retort; secondly, the excessive pressure drop through the long column of shale makes it impossible to effect a reasonable balance between pressure conditions inside and outside the retort.

The Fell Retort

Modifications introduced in the Fell retort comprise four vapour-offtakes at different heights, thus reducing the effective length of the retort; secondly, a screw extractor is substituted for the original Pumpherston plate and wiper arm; and, finally, air and steam, instead of steam only, are injected into the base of the retort. With these improvements the retort will produce over 500 gal. of oil per day, as against 250 gal. from the internal-offtake modified Scottish retort. It is of interest to note in passing that the injection of air as well as steam has recently been adopted in Scotland with marked improvement in the throughput of shale. The Fell retort recovers 75 per cent. of the assay value by condensation alone; the recovery of naphtha will increase this figure to 85 per cent. when the new plant is in operation. In addition, the Fell retort will more readily carbonise the fines (passing ¾-in. screen).

A new type of retort known as the Renco retort is also being erected at Glen Davis. This retort has yielded under trial an extraction of over 90 per cent. of the assay value. It has been developed on Australian shale, and operates under a pressure of 200 lb./sq. in. The shale is passed continuously through a vertical retort, heating being effected in two stages by circulating two independent streams of gas for preheating and carbonising respectively. The charge is first heated to about 200°C. without decomposition, and then rapidly carbonised under conditions precluding any condensation of vapours within the retort. Ingenious mechanical devices are incorporated for charging and discharging under pressure without interruption to the process and without damage to the mechanical equipment. The capacity of the Renco retort is many times greater than that of any other internally-heated retort of similar dimensions. While the Renco retort has yet to be proved commercially, it may provide the best solution to the carbonising problems at Glen Davis.

Recovery Plant

For the recovery and treatment of the carbonisation products, a completely new plant is in course of erection, and is expected to be in commission this year. This plant will handle ten million cubic feet of retort gas per day. The gas is first scrubbed for the removal of dust at a temperature of about 200°F. It is then cooled in water-tube condensers substantially to atmospheric temperature before passing on to steam-driven turbo-exhausters. The heat generated in the gas in the turbo-exhausters is then removed, together with ammonia, by passing through water-spray towers. Further scrubbing then occurs with straw oil in two 100-ft. packed towers connected in series; the naphtha absorbed by the oil from the gas is then recovered by stripping the oil with open and closed steam in a still of the Wilputte type. The fixed gas remaining is used for fuel.

The crude oil is cracked in a two cell Dubbs unit, with a charging capacity of about 56,000 gallons per day when drawing off a heavy fuel oil residuum. The cracked gases are polymerised in a small non-selective Universal Oil Products unit; this process comprises the re-combination of cracked unsaturated gases, in the presence of a catalyst, at a pressure of 1000 lb./sq. in., and temperatures of the order of 450-500°F., in order to form hydrocarbons with boiling temperatures substantially the same as that of motor spirit.

The raw stabilised petrol from the Dubbs unit is next pre-fractionated, giving about 30 per cent. overheads which do not require acid treatment, and 70 per cent. bottoms which are then caustic-washed for the removal of tar acids and volatile mercaptans, before being acid-treated. The acid treatment is performed in two stages: the caustic-washed petrol is contacted first with once-used sulphuric acid, and then secondly with fresh acid (98 per cent.), centrifugal separation being employed after each stage. This acid treatment removes the tar bases, some sulphur compounds and some of the unsaturated compounds, which otherwise would form gum; other unsaturated compounds are merely polymerised and remain dissolved in the treated oil.

The petrol is then again caustic-washed to neutralise any traces of acid remaining, then it is blended with the polymer petrol from the Universal Oil Products unit, the gases forming this polymer petrol having already been caustic-washed prior to processing. The blended product is next re-run in a vacuum still to remove any heavy polymers boiling outside the petrol range; this is accomplished by distilling over everything within the petrol boiling-point range, and drawing off the residue separately for fuel oil. The distilled petrol is now blended with the caustic-washed 30 per cent. overheads, which in their raw state are comparatively low in sulphur content and are not gummy. This blend is then contacted with sodium plumbite to oxidise to disulphides those mercaptans not already removed; the main improvement is in odour, all the evil-smelling constituents being oxidised. The petrol is next inhibited by the addition of minute quantities (about 0.005 per cent.) of a proprietary chemical to prevent absorption of oxygen by the petrol during its period of retention in storage prior to use; deterioration due to the formation of gum, and reduction in octane value due to oxidation, are thereby substantially prevented. This final product is then "leaded" to raise the octane value to specification.

Raising the Daily Yield

The yield of finished petrol when cracking to fuel oil residuum is about 45 per cent. When cracking to coke, the light oil recycle stock becomes very refractory owing to accumulation of naphthalene, and the capacity of the plant is then barely 1000 barrels of fresh feed per day; the yield of finished petrol is then slightly over 50 per cent. The capacity of the unit, when cracking to coke, has been raised to 1600 barrels per day by drawing off a small side-stream of light oil containing the naphthalene. At present this side-stream is being re-charged to the plant when on residue operation; but it is proposed to charge this to a reformer heater when improved octane ratings are called for after the war.

A typical oil-coke from the cracking plant would comprise 87 per cent. fixed carbon, 11½ per cent. volatiles, and ½ per cent. ash; it has a calorific value of 16,000 B.Th.U. per lb., and is at present used for fuel in the existing boilers. For efficient combustion without damage to the grates, the coke is mixed with coal; but in the new boiler house now under construction, the boilers have been designed to burn any of the four available fuels, either singly or in combination, *viz.*, coal, oil-coke, oil fuel, or retort gas. Owing to its low ash content, however, this oil-coke would be an excellent raw material for electrode carbon, and should have prospects as such in the aluminium industry.

Returned Empties by Rail

Special Cheap Scales Available

by GRAHAM SAVILLE

IN normal times the importance of empties had not been properly appreciated by many chemical concerns, but it has now become essential, owing to shortage of materials, that a proper check should be kept of the movement of empties. In addition, it is necessary that the regulations and charges regarding the transit of these essential articles should be understood. By far the largest bulk of empties is despatched by railway goods service, and the classification covering such traffic is set out in the General Classification of Merchandise published by the Railway Clearing House.

It is important to distinguish between "empties" and "returned empties." As far as chemical firms are concerned, returned empties are empties when sent from the consignee to whom, and the station or private siding to which, they were carried full by rail, to the consignor from whom, and the station or private siding from which, they were carried full by rail. Fibreboard cases are only considered as returned empties when collapsed flat.

While empties are charged at the ordinary goods scales, returned empties are carried at special returned empties' scales which, in the majority of cases, are much cheaper than the ordinary scales. It is essential, therefore, that when returned empties are being despatched they should be properly described.

Eight Classes

The classification of "Returned Empties" divides all returned empties into eight classes. Class A has a limited interest to chemical concerns as it includes such empties as sacks and bags. Classes B, C and D cover traffics of no concern to the chemical industry. Carboys as defined in, and when packed according to the regulations set out in the General Classification are in Class F. The classification of "Returned Empties" contains a note in respect of Class F, which reads:—

"Carboys that have contained dangerour, corrosive, or poisonous chemicals, other than hydrochloric acid in full truck loads, will not be accepted for conveyance unless they are quite empty and clean, or securely stoppered and such stoppers secured by means of a metal band . . . or by some other equally effective means. Stoppers not fitted in the carboys will only be accepted for conveyance when packed in sacks or cases.

"Carboys that have contained hydrochloric acid, when being returned in full truck loads, need not be stoppered."

Crates containing straw and shavings wood or paper), and cardboard box crates are among the returned empties in Class G, while Class H covers the following items:

- Bath covers (frames), collapsed flat.
- Boxes, cases, casks, crates, frames, hampers or skips, collapsed flat, sections securely fastened together, not containing other packing material.
- Cable drums or reels, collapsed.
- Cylinders, iron and steel, for compressed gases or air, not exceeding 12 in. in diameter.

The most important of all the classes is possibly E, which covers all returned empties not comprised in any of the other classes of returned empties. This class covers such empties as ordinary cases and boxes and fibre-board cartons, collapsed flat.

Basis of Charges

The normal method of charging ordinary merchandise by railway goods service is on a "per ton" basis, together with surcharges in respect of consignments of 3 cwt. and under. Returned empties are, however, charged on a "per cwt." basis, and the premiums for small consignments just referred to are not applied. Again, with ordinary goods, the normal mileage zones are of one mile, while the returned empties' zones are much larger. They are: not exceeding 25 miles; exceeding 25 miles but not exceeding 50 miles; exceeding 50 miles but not exceeding 100 miles and they then continue at 50-mile intervals until the highest zone, exceeding 600 miles, is reached.

Some idea of the charges in respect of the classes of returned empties which concern chemical firms may be seen from the following table:—

	SCALE A	SCALE E	SCALE F
Not exceeding 25 miles	1½d.	4d.	8d.
,, 50 ,,	4d.	7d.	1s. 4d.
,, 100 ,,	7d.	1s. 3d.	1s. 11d.
,, 150 ,,	9½d.	1s. 9d.	2s. 8d.
,, 200 ,,	1s. 2d.	2s. 3d.	3s. 4d.
,, 300 ,,	1s. 8d.	3s. 4d.	4s. 7d.
Exceeding 600 ,,	3s. 5½d.	6s. 10d.	9s. 3d.

The figures given only cover the carriage from station to station, and any collection and delivery undertaken is the subject of additional charges. With classes A, B, C, E and H, these charges are: (i) Carted at sending station only, 2d. per cwt.; (ii) carted at destination station only, 2d. per cwt.; (iii) carted in London, 6d. per cwt.

The corresponding figures for class G empties are 5d., 5d., and 1s. per cwt. The railway companies do not normally undertake cartage on Class F empties, but, when this is done, it is a matter for special quotation.

The minimum weight of empties charged for is 56 lb. and charges are increased thereafter with each 14 lb., fractions of 14 lb. being counted as 14 lb. There are minimum charges in respect of each of the returned empties' scales, these being for scales A, B, C, E and H—5d.; scale F—8d.; scale G—9d.

While with ordinary traffic despatched or received at a private siding, the minimum weight charged for is one ton, with returned empties, provided the wagon is fully loaded, charges are raised at the tonnage rates on the actual weight of empties.

Dangerous Goods

Chemical concerns should appreciate that any returned empties which have contained commodities provided for in the Railway Companies' Special Classification of Dangerous Goods, must comply with certain regulations for returned empties, laid down in that publication. One of the general regulations covering dangerous goods, reads:—" Returned empty vessels, including tank wagons, must be securely closed airtight (subject to provision of vents where required). Returned empty vessels that have contained liquids must be loaded with the bungs in such a position that escape of any remnants of liquid is impossible and must be accompanied by the special consignment note." There are also many special regulations covering individual commodities. For example, " empty sacks which have contained nitrate of soda or nitrate of potash must be thoroughly washed with water to remove the nitrate before being tendered for conveyance."

Carriage Forward

Many chemical firms find it advisable to have their empties returned to them " carriage forward " as this is more likely to ensure their prompt return. This can only be arranged by entering into an agreed charge with the railway companies covering such traffic. The names of traders having such agreements in operation are listed in a booklet, issued by the Railway Clearing House, entitled " Acceptance and Carriage of Returned Empties under Agreed Charge Arrangements " and also in pamphlets amending this booklet. When returned empties are covered by agreed charges instead of each consignment being charged separately according to classification and mileage, the traffic is charged at a flat rate per ton and per package.

With regard to the return of empties for incoming goods, chemical firms will find it essential to keep accurate records of the goods received and of the empties returned. Among the details which can be advantageously recorded are the date of receipt, the name of the consignor, the forwarding point, the type and number of packages and the nature of the merchandise. It will then often be found useful to have additional columns on the record to provide for the signature of a responsible person in the department receiving the goods, the date on which the empty package or packages are returned to the sender, the date on which credit is taken or received and possibly the amount of such credit.

Chemical firms, in common with other traders, experience difficulty in connecting many empties with the sender and the appropriate original order. It assists, therefore, in this connection if the labels attached to empties are marked with the sender's name and address, the date of despatch and reference to the order or advice note, in addition, of course, to the consignee's name and address.

Passenger Train Rates

There are certain occasions when empties have to be returned by passenger train. As far as chemical firms are concerned, empties to be classified as returned empties must already have been conveyed full by passenger train. The charges for this traffic are based on the weight of each consignment instead of per package, as with the bulk of passenger train traffic. The zones for returned empties by passenger train differ from those for goods train traffic. They are: any distance not exceeding 15 miles; exceeding 15 miles, but not exceeding 30 miles; exceeding 30 miles but not exceeding 50 miles; exceeding 50 miles but not exceeding 75 miles; exceeding 75 miles but not exceeding 100 miles; exceeding 100 miles but not exceeding 150 miles; and then in 50-mile intervals until the highest zone, over 300 miles, is reached. In conclusion, the minimum weight charged for is 14 lb. and the charges thereafter increase with each additional 14 lb. or part thereof.

Tunisian mineral production has fallen considerably, but since exports have ceased almost completely, stocks have increased. Output of phosphate rock in the last quarter of 1944 amounted to one-fifth of the pre-war output of over 1,800,000 tons; stock on hand total 2,000,000 tons. Iron-ore production was only 15 per cent. of normal with stocks of 200,000 tons, reports *Foreign Commerce Weekly*. Owing to the coal shortage, lignite deposits in the Cape Bon area are being worked yielding some 5000 tons monthly.

The Scientist After the War

His Place in Administration

A STIRRING appeal to scientists to fit themselves more for the work of government was made by Professor Harold Laski in a lecture arranged by the British Association of Chemists at Caxton Hall on February 14. He defined a scientist as a man who seeks to organise the relations between nature and his fellow human beings and to give them power to control nature. To achieve this the co-ordination of all sciences, including economics and politics, must be attempted on the largest possible scale. The man of science must understand the control of public affairs, and the ordinary citizen must be given an insight into scientific methods.

The speaker deplored the fact that our Civil Service is organised on the assumption that science and administration are two very different things, and allots all the power to the administration to whom the world of science is an alien world. In industry the position is even worse, for scientists are controlled by the financier, whose only concern is the making of money. To search for a scientist in the *Directory of Directors* is like a search for an oasis in the desert. There was too much separation of scientific knowledge from industry, and also of pure science from applied.

Civic Consciousness Needed

Professor Laski blamed scientists for their contribution to these tragic situations. He accused them of turning their backs on society and its problems. He urged them not to leave the education of the public in scientific matters to a Press that is only interested in "news value." Scientists must so change their habits that the public no longer looks upon them as a race apart. The scientist, who has changed the face of the world in a century, must no longer be utterly dependent upon the politician and the business man. He must no longer be devoid of a civic consciousness. Galileo, Lavoisier, and Priestley could combine the functions of a citizen with that of their profession, but the narrow specialisation of modern scientists had produced serious defects, and they must acquire a breadth of view that would have wisdom as well as learning.

Coming to the place of science in the educational curriculum, the lecturer asserted his belief that there was as much educational value in a journey through the realms of science as in translating Tennyson's "In Memoriam" into Latin. He thought that a child who devoted time to mathematics would, when grown up, be able to argue more sensibly with his fellows. Speaking again of the Civil Service, Professor Laski said that it was generally recognised that the quality of applicants for scientific posts was poor, and he thought this was largely due to the inferior status and salaries of scientists in Government service, and to their lack of any share in the shaping of policy.

In industry and in the universities, said Professor Laski, science was controlled by the rich, either by employment or endowments, and the scientist worked in a mental climate unfavourable to his social development. Moreover, the miners, the textile workers, the iron and steel workers and many other trade unions should have their own scientific advisers, who should co-operate with the practical knowledge of the manual worker. If we are to have full employment this co-operation is essential. There are, however, signs that an understanding is growing between science and labour.

Danger of Specialisation

If the scientist is to take his proper place in the post-war world he must recognise the social danger of excessive specialisation. He must learn to co-ordinate; he must advocate with all his power the need to make scientific knowledge a public thing; he must not abandon the quest for truth whatever the consequences.

The understanding of science must be the spinal column of our educational system. We must shape the minds of the post-war generations in such a way that administration, at the highest level, can be undertaken by men with a knowledge of scientific method, instead of treating such men, in the Civil Service, as clerks with a special qualification. Many of our great scientists could hold their own with the best of the Permanent Secretaries of the Treasury, and if in future such men feel the call to administrative work they should not be denied the opportunity because they have not taken a brilliant degree in history.

Access to Authority

Another suggestion Professor Laski made was that the high scientific specialist in the Civil Service ought to have access to the Minister when the non-scientific official rejects his advice. Only in this way can we ensure that his proposals shall receive due consideration and his feeling of frustration be avoided. The scientist of the future must study the economic pattern of the society in which he functions and get a real understanding of the historical background out of which public policy emerges. He must have the understanding which leads to wisdom.

LETTERS TO THE EDITOR

DDT

Sir,—Our attention has been drawn to a statement made in your leading article of January 27 which refers to the recent paper read by Professor Heilbron to the Royal Society of Arts on DDT.

The statement says: "The insecticidal properties of DDT were discovered by Paul Muller, one of the chemists of J. R. Geigy, of Basle, Switzerland; but it was not until the Research and Development Panel set to work that its outstanding qualities were recognised."

This gives the erroneous impression that Geigy, the discoverers of the insecticidal properties of DDT, were not in fact conscious of its outstanding qualities. This is by no means so, and on reading Professor Heilbron's lecture very carefully we cannot trace that he ever made such a statement.

Geigy were aware and had tried DDT on a large scale as a lice killer and were perfectly aware of its fatal action on the mosquito as the carrier of malaria, and they did in fact communicate these findings to the British authorities when first introducing the product to them.

This fact does not in the least belittle the truly imposing amount, and the quality, of work carried out by the various authorities in this country under the inspired leadership of Professor Heilbron, but we are very anxious that your readers should not be left under any erroneous impression such as the statement cited might give.—Yours faithfully,

The Geigy Colour Co., Ltd.,
C. Gysin, Managing Director.

DDT Patents

Sir,—In your February 3 issue, your contributor, Mr. G. Colman Green has fallen into a slight error. He uses a somewhat curious expression in ascribing patent protection to the Swiss firm of J. R. Geigy for DDT, *viz.*: "its use (DDT) in suitable form has been protected by that firm in B.P. 547,871 and 547,874 (1939)." Inspection of the patents mentioned shows that the application date of both was December 12, 1941, not 1939.

If your contributor intends to convey by his expression that the patentees have covered more than two methods of using DDT, admirable as they are, then I feel he is in error. I have myself applied for patent protection for no less than six methods of using DDT, none of which intrude upon the ground Messrs. Geigy have marked out for themselves, and have in addition applied for patent protection for a modified form of DDT possessing certain additional characteristics which I have found desirable in experimental work on my farm.

One can have nothing but admiration for the educative campaign of Messrs. West & Campbell. DDT is destined, I believe, to revolutionise much of our pest control after the war, and U.S.A. is well aware of it. Yet it is impossible to get the Ministry of Supply to release more than an infinitesimal quantity for experiment.—Yours faithfully,

F. N. Pickett, M.I.Mech.E.

German Patents After the War

Sir,—I have read with great interest the article on this subject in The Chemical Age of February 10. Mr. Mittler in that article suggests continuing the war-time administration of German patents by the Custodian of Enemy Property after the cessation of hostilities, and refers to the suggestion made by another writer that German patents should be confiscated altogether. While I am in full agreement with the purpose aimed at by these and other writers on this subject, I feel that the means suggested by them are not quite adequate.

After the last war, the treatment of enemy-owned patents (and other rights in industrial, literary and artistic property, such as trade marks, designs, copyright) was considered to be an isolated problem. Whereas the Treaty of Versailles, in Article 297 (b), enabled the Allied and Associated Powers to liquidate property, rights and interests belonging to German nationals, or companies controlled by them, situated within their territories, colonies, etc., such a liquidation did not apply to patents and other rights of industrial or intellectual property, except in the course of, and together with, the liquidation of other property, rights and interests, such as German-owned or controlled businesses (Paragraph 15 of the Annexe to Article 298, and last paragraph of Article 306 of the Treaty of Versailes). Consequently, a British patent owned by a German national, who neither owned nor controlled a business in the country to which the patent belonged, could not be liquidated, but remained, with certain restrictions (Paragraph 5 of Article 306), the property of its German owner.

If the terms imposed on Germany after this war will again provide for the liquidation of enemy-owned property, rights and interests, within the territories of Great Britain and her Allies, and if the differentiation made after the last war between property, rights and interests in general, and rights in patents, etc., in particular, will be abandoned, the result aimed at by the above and other writers will be arrived at in a much more simple and consistent manner than suggested by them. Moreover, the ominous term of confiscation would be avoided, as Germany will be bound to compensate her nationals for the value of the liquidated rights and the proceeds of the liquidation could, as after the last war, be credited to a reparation account.

Mr. Mittler further suggests that the benefit of the International Patent Convention should be denied to German nationals. It seems to me that this suggestion has also a wider bearing. The treaty of Versailles contained many provisions as to the restoration of lapsed patents, etc. All these provisions were based on a reciprocal basis and worked, therefore, in favour of German nationals as well. It will have to be considered whether or not the principle of reciprocity shall again be maintained or abandoned.—Yours faithfully,

P. ABEL,
Consultant on International Law.

Tax Relief

Provision of New Buildings and Plant

IN his last Budget speech, the Chancellor of the Exchequer promised tax relief in the post-war period to help industry to provide new factory buildings and equipment. The main proposals in the new Income Tax Bill, implementing his promise, take effect after an "appointed day" to be fixed by Parliament, but expenditure on buildings, plant, and machinery after April 6, 1944, will qualify for the allowance.

An initial allowance of 10 per cent. of the cost of constructing new industrial buildings after "the appointed day" and an annual allowance of 2 per cent. will be made to the trader if he constructs the buildings for his own use, or to the landlord if he builds it to be let to a trader. The effect of these two allowances is that the cost of a new industrial building will be written off over a period of 45 years. Provision is made for earlier writing off if buildings are scrapped before the end of this period. "Industrial Buildings" are defined to include premises used for productive industry and transport and for the welfare of their workers (including sports pavilions), and to exclude retail shops and offices. If houses are built for workers in mines or oil wells and they are likely to become valueless when work is abandoned there, they are included.

Cost of Machinery

An initial allowance is made of 20 per cent. of the cost of plant and machinery, new or second-hand, and the ordinary annual allowance is increased by one-fourth instead of one-fifth as at present. Provision is made for earlier writing off if plant and machinery is scrapped or replaced. There is provided, in mines and oil wells, an initial allowance of 10 per cent. of the cost of construction of works likely to become valueless when the source is no longer worked; and an annual allowance designed to write off the cost of capital assets whose life is limited by the life of mineral or oil deposits, within the life of the deposits.

Patents and Research

An annual allowance spreads the cost of new patent rights acquired after "the appointed day" over 17 years or the life of the patent if shorter. The seller of the patent will be charged to tax, the charge being spread over six years. Provision is made for earlier writing off of patents sold or lapsed. The existing allowance for scientific research expenditure is extended to payments made after April 6, 1944. An allowance will also be made for capital expenditure on buildings, plant and machinery for research incurred after January 1, 1937.

The existing allowance is extended to buildings, plant and machinery not scrapped but retained in the business if they are worth less than their cost.

Semi-Rotary Pumps

New British Standard

BRITISH Standard No. 1208 : 1945 covers six sizes of semi-rotary pumps, hand-operated, double-acting for water. While such pumps are manufactured up to 3 in. inlet and outlet and also quadruple-acting, this specification is limited to double-acting pumps from ½ in. to 1¼ in. inlet and outlet. It has not been found practicable to standardise the internal mechanism of such pumps on a dimensional interchangeable basis, but the standardisation of external dimensions allows installation and replacement of a pump of a given size by another of similar size irrespective of make. It has not been found practicable at present to standardise such pumps for fluids other than water.

The specification prescribes materials, workmanship, and performance; the last is based on five minutes' continuous operation by normal adults of average physique without undue fatigue and thus affords a guide to the correct selection of a pump for known conditions. The pumps which are for vertical mounting are suitable for hot water not actually boiling and are of two types: cast-iron brass-fitted, and all-brass, both with steel operating spindles and hinged flap valves complete with tapped mating flanges, gaskets, and operating handle. The specification excludes ancillary equipment such as foot valves, strainers, retaining valves and air vessels. Makers will not be in a position to supply pumps to this specification for a period of three months from its date of publication. The specification is procurable from the British Standards Institution, 28 Victoria Street, London, S.W 1, price 2s., post free.

A CHEMIST'S BOOKSHELF

Colorimetric Analysis. By Noel L. Allport. London: Chapman & Hall. Pp. 452. 32s.

This book is intended primarily for those who have some knowledge of colorimetric methods and who require accounts of methods which have been critically examined and found useful. Consequently, and this may perhaps restrict the book's appeal, general descriptions of the apparatus and methods which can be employed in the various modes of colorimetric analysis are almost entirely absent. The reader, in other words, must either be familiar with this side of the subject or must refer to other texts for this information.

On a broad view, one tends to receive the impression that the author has skirted too carefully round the confines of the field of absorptiometric methods. And it seems implicit in the book that the most suitable methods for colorimetry depend on the use of the Lovibond comparator and Nessler glasses. This is not, however, the place for a disquisition on the relative merits of the various methods in vogue, and it can be said that within the limits which it sets itself the book should be extremely valuable. Five sections (which must not be regarded as completely isolated since certain analyses inevitably fall into several sections) are dealt with: metals; acid radicals; substances of clinical and biochemical significance; alkaloids, hormones, and vitamins; and miscellaneous substances, chiefly including common organic materials. Each analysis is not only considered from the point of view of its immediate application, but is also discussed in respect to its limitations and its possible development.

The critical attitude adopted towards each analysis is particularly helpful, and distinguishes this work favourably from what is probably the only other work in the English language that is approximately comparable, a work which loses almost as much by its uncritical relaying of information as it gains by its comprehensiveness. Mr. Allport is to be commended for realising that an increase in quality is often preferable to mere quantity, and one feels that he has chosen wisely in restricting his net to include only those estimations which his experience has shown him may confidently be used.

Metallurgical Analysis by Means of the Spekker Absorptiometer By F. W. Haywood and A. A. R. Wood. London: Adam Hilger. Pp. 128. 18s.

In a limited way this book provides a useful supplement to the one reviewed above, though it should be borne in mind that it only sets out to deal with absorptiometry, and this with a single type of instrument—admittedly that most likely to be generally available in this country. There is a comprehensive section dealing with the manipulation and calibration of the instrument, together with a brief résumé of the theoretical background.

The second part of the book describes fully 26 of the more commonly required metallurgical analyses. The methods are of comparatively recent date, since the first developments along these lines were published by E. J. Vaughan in 1941, but they have been widely applied in industry. The principle importance of the absorptiometric method, in distinction to more truly colorimetric methods, lies in the fact that it is frequently unnecessary to remove other elements by laborious separations. This makes for added rapidity of analysis, and therefore recommends itself particularly to industrial metallurgists for routine purposes. The book includes four composite schemes of analysis which enable complete analyses of various alloys to be made, starting with a single sample or a small number of samples. It is possible, by using an appropriate procedure, to estimate as many as seven elements absorptiometrically in a single sample.

Although the two Institute of Chemistry Monographs by E. J. Vaughan are probably well known to most chemists who intend to use the Spekker, this book will form a useful addition to their working library.

Plastics and Industrial Design. By John Gloag; with a section on the Different Types of Plastics, their Properties and Uses, by Grace Lovat Fraser. London: Allen & Unwin. Pp. 112. 10s. 6d.

Manufacturers, designers, exporters, and all others interested in the nature, use, and possibilities of plastics will extend a warm welcome to this non-technical reference book. Industrial design and its importance, both in the home and export markets, is now receiving that attention that was so sadly absent in the inter-war period. Mr. Gloag, who has made himself a name as author of several books emphasising the importance of design in various spheres, helps the reader to apprehend the development and significance of the plastics industry and of its bearing on industrial design and commercial art. In an equally valuable second section, Mrs. Lovat Fraser sets forth, in compact form, the properties and uses of various types of plastics. Her contribution contains some recent information on the progress made in the plastics industries in this country and in the United States, and is partly based on recent investigations in the latter country. In Section III the potentialities of plastics are illustrated by 48 excellent plates, and there are also 12 illustrations in the text. The book concludes with a useful glossary.

Personal Notes

Mr. W. O. Meade-King, works manager, has been elected to the board of English Clays Lovering Pochin & Co.

Mr. Geoffrey B. Harrison and Mr. James Mitchell, who have been in the service of Ilford, Ltd., for many years, have been appointed directors of the company.

Mr. A. E. Chattin is appointed assistant secretary of the Iron and Steel Institute, as well as assistant secretary of the Institute of Metals.

Mr. V. B. Lillie has been appointed assistant to the general manager of the Chemical Group of the Canadian Industries, Ltd., while Mr. H. R. Dorken has become acting sales manager of the General Chemicals Division. Both the newly-promoted officers are graduates in chemical engineering, and both have served with C.I.L. for more than ten years.

Obituary

Dr. Carl Oswald-Fleiner, who died recently in Basle, aged 81, was for nearly forty years chemist and later works manager of Durand & Huguenin. After his retirement in 1927, he continued to serve on the company's board until 1940.

Parliamentary Topics

Foamed Slags

In the House of Commons last week, Mr. Astor asked the Minister of Works what was the position regarding the production of foamed slags; whether foaming plants were being adjoined to all steel works; and what production and price were being aimed at.

Mr. Sandys: There are at present three foamed slag plants in operation, together producing about 125,000 tons per week. The provision of capacity for a further 500,000 tons a year is under consideration by various steel works. It is hoped that the price can be reduced considerably, but I am not able to quote precise figures.

Roofing Alloys

In reply to another question the Minister of Works told Mr. Astor that his Department was investigating the use of light metal alloys for roofing, as well as for many other purposes.

Chemist's Release

Sir E. Graham-Little asked the Minister of Labour whether he would investigate the case, details of which have been submitted to him, of a science graduate of London University in the employ of a British firm in London, who has been offered a responsible position in this country as an employee of a company in Canada wishing to buy British chemicals for sale in Canada after the war, thus aiding our export position. His application for release had been refused, although his present employers agreed.

Mr. Bevin: The science graduate in question had the permission of his present employers to transfer to employment with the Canadian Company, but it was made clear that the work upon which he is engaged required that he should be replaced. The need for chemists for urgent war work is still so great as to make it difficult to agree to the proposed transfer, but I hope to be able to suggest an arrangement which will be satisfactory to all parties concerned.

British Coal Survey

Major Lloyd George, replying to Mr. Edward Williams and Mr. Aneurin Bevan, said that the survey of British coal was virtually completed, and he was expecting the last report of the technical Committee early next month.

Indian Industrialists' Visit

Sir Stanley Reed was informed by Mr. Amery that a group of Indian industrialists will leave India for their visit to this country early in April.

New Control Orders

Export Licensing

The Export of Goods (Control) (No. 2) Order, 1945 (S. R. & O. 1945, No. 150), which came into force on February 19, makes relaxations in the control of exports. The following items (among others) have been removed from the Schedule to the Export of Goods (Control) (No. 10) Order, 1943, and consequently require a licence only when exported to those destinations to which the export of all goods is controlled: Talc, steatite and soapstone and mixtures consisting wholly or mainly thereof; iron or steel wool and shavings; iron oxides and pigments containing iron oxides, including ochres, siennas and umbers; nickel compounds and mixtures containing any of these compounds; prussian blues. The item "catalysts containing nickel, nickel compounds, or phosphorus compounds" has been deleted and replaced by the item "catalysts containing nickel."

Lend-lease supplies to the Soviet Union from the beginning of the programme up to December 1, 1944, included 733,000 tons of non-ferrous metals, including 253,000 tons of aluminium, 314,000 tons of brass, and 65,000 tons of other copper products, as well as 16,000 tons of ferro-alloys. Chemicals supplied totalled 638,000 tons, while 1,300,000 tons of petroleum products were also shipped

General News—From Week to Week

As from February 19, air-mail correspondence with Finland will be permitted.

Employees of the Ministry of Food have now contributed £10,000 in pennies to the Red Cross Penny-a-Week Fund.

The Scottish Shale Oil Industry was the subject of a paper read at Glasgow on February 23, before the Institute of Fuel.

"Pyrethrum and Pyrethrins" was the title of a lecture given by Dr. A. E. Gillam on February 22, before the Chemical Society at Nottingham.

The air mail rate to Sweden has been reduced to 5d. for the first oz. and 3d. for each additional oz. for letters, and to 2½d. for postcards. Surface mail is still suspended.

Professor J. B. Speakman, of the Department of Textile Industries, Leeds University, after having described the department's valuable work, put forward a strong plea for increased funds for research purposes.

A general licence issued by the Board of Trade (S.R. & O. 1945, No. 145) authorises the resumption, as from February 12, of written communication with Bulgaria with reference to commercial, financial, or other matters. The transmission of goods or money is not yet authorised.

The Trading with the Enemy (Specified Persons) (Amendment) (No. 3) Order, 1945 (S.R. & O. 1945, No. 154) contains 46 additions to the list of persons in neutral countries with whom dealings of any kind are unlawful. About 150 deletions are also included.

Scottish Industrial Estates, Ltd., have written to Glasgow Corporation regarding a proposal to purchase 57 acres of ground at North Cardonald with a view to enlarging the Hillington Industrial Estate. The ground was bought by the Corporation for housing purposes.

Seventeen candidates were successful in the January examination for the Associateship of the Royal Institute of Chemistry. Of these, four studied at the Merchant Venturers' Technical College, Bristol; four at the Municipal Technical College, Hull, and four at the City Technical College, Liverpool.

Wholesale prices in January showed little change so far as the chemical and metallurgical trades were concerned. Chemicals and oils rose by 0.1 per cent. from 151.5 to 151.6 (1930 = 100); non-ferrous metals were stationary at 128.0, and iron and steel fell by 0.1 per cent. from 185.7 to 185.5 owing to a decline of 3½ per cent. in high-speed steel tool bars.

Work on the seaweed processing factory at North Boisdale, South Uist, has had to be suspended for six weeks owing to delay in the delivery of machinery. The power plant, processing tanks and electrical equipment have been installed, and the factory should be in operation by the end of May. Smaller processing factories may be built in Bornish, South Uist, and in Benbecula. A survey of the potential supply of seaweed round the Hebrides is to be made this summer.

The Newcastle Chemical Industry Club held its 26th annual general meeting on Thursday last in the club rooms at Lovaine Place, when a chairman and officers for the coming year were elected. Members were specially asked to make suggestions towards improving the activities of the club, and to intensify their efforts to obtain new members, since the return of more normal conditions may reasonably be expected in the coming year.

At the opening, last week, of a petroleum-technology laboratory, the gift of the Anglo-Iranian Oil Company, at Neath Mining and Technical Institute, Sir Frank Smith, Controller of Telecommunications Equipment, M.A.P., gave an address in which he indicated that the country's future was in the hands of technicians, industrialists and educationists. The House of Commons, he said, could not contribute to knowledge; it could only attempt to make the path of these people easy.

An interesting comment on the efficacy of DDT was provided by a Medical Officer of Health in the discussion following the recent paper by Mr. Campbell and Dr. West on "DDT in Paint." Plans, he stated, were prepared years ago to meet the risk of typhus from the East, but after the dramatic story of the conquest of typhus in Naples, these were relegated to the background. Incidentally, a full report of the paper and the discussion appears in the current issue of *Paint Technology* (9, 108, p. 261).

The Steam Engineering Department of B.C.U.R.A. has just issued its progress report for the year ending April, 1944, and its programme for the current year. Two items in the programme of research are of particular importance, *viz.,* Boiler Deposits and Shell-type Boilers, as it is estimated that the loss of boiler capacity due to the necessity for cleaning is of the order of 15 per cent. The objectives envisaged in the programme are set out under 12 headings and form a comprehensive study of the preparation and use of steam in all its facets.

At the request of physicists employed in industry in South Wales, the Board of the Institute of Physics has authorised the formation of a South Wales branch of the Institute which is to be centred on Swansea. The inaugural meeting of the branch will be held on March 10 (*see* p. 188), and further particulars of the branch may be obtained from the acting hon. secretary, Dr. T. V. I. Starkey, the Technical College, Mount Pleasant, Swansea.

A claim brought by a 65-year-old chemical processman against the firm by whom he had been employed for over 40 years, was heard at Widnes County Court on February 9. The plaintiff, James Flanagan, alleged that when employed in feeding a cupola from a tipping bogie in the Cornubia Works, Widnes, belonging to the defendants, James H. Dennis and Co., Ltd., he sustained injury owing to the defectiveness of the bogie. Judge Crosthwaite, having heard the evidence, pointed out that there was no evidence beyond the plaintiff's that there was a defective bogie, and adjourned the case until the next court, after a consultation in private with the representatives of both parties.

Foreign News

Quicksilver production in the United States fell from 51,929 flasks of 76 lb. in 1943, to 37,500 flasks last year. Domestic consumption declined from 54,400 to about 43,000 flasks. It is reported that Spanish supplies will be available as soon as shipping permits.

Supervision of German laboratories and research work as well as strict control of all possible war industries are likely to be included among France's suggestions for the elimination of German armament industry after the war, according to Paris radio.

Penicillin allocations to hospitals in Canada have been doubled as from December 2, 1944, and the price reduced to $3.50 per 100,000 units. Production has steadily improved and no imports from the United States are necessary.

A Mexican tinfoil company, financed by U.S. capital, will establish a factory at a cost of over $500,000 likely to be located in the Federal District. It will have a capacity of 6 million lb. of foil yearly, covering Mexico's needs for industrial foil from domestic materials.

Forthcoming Events

February 24. Society of Chemical Industry (Newcastle-upon-Tyne Section) and **Royal Institute** (Tees-side Section). Norton Hall, Stockton-on-Tees, 2.45 p.m. Professor J. Kendall: "A Simple Reversible Reaction."

February 26. The Institution of Rubber Industry. Court Room, Caxton Hall, Westminster, S.W.1, 6.30 p.m. Dr. D. Parkinson: "Carbon Blacks in GR-S."

February 26. Electrodepositors' Technical Society. Northampton Polytechnic Institute, St. John Street, E.C.1, 5.30 p.m. E. S. Spencer-Timms: "A Simple Magnetic Tester for Determining the Thickness of Coatings on a Steel Base."

February 28. Association of Scientific Workers (Huddersfield Branch). Technical College, Huddersfield, 7.30 p.m. Dr. D. G. Drummond: "The Electron Microscope."

February 28. The Institute of Fuel (North-Western Section). Engineers' Club, Manchester, 10.30 a.m. and 2.30 p.m. Conference: "Coal Preparation."

February 28. British Association of Chemists. Chamber of Commerce, New Street, Birmingham, 6 p.m. Mr. H. L. Howard: "Post-War Technical Education."

February 28. Royal Institute of Chemistry (Liverpool and N.W. Section). Mining and Technical College, Wigan, 6.45 p.m. Professor H. L. Riley: "Coals, Cokes and Chars."

February 28. The Institute of Fuel (Midland Section). James Watt Memorial Institute, Birmingham, 2.30 p.m. Professor D. T. A. Townend: "The Stability of Burner Flames."

March 2. Royal Institute of Chemistry (Cardiff and District), and **S.C.I.** University College, Cardiff, 6.30 p.m. Mr. H. P. Rooksby: "Industrial Application of X-Ray Analysis."

March 3. British Association of Chemists (St. Helens Section). Y.M.C.A., St. Helens, 7.30 p.m. Mr. L. S. Newton: "The Nature of Statistical Methods and their Application in Industry."

March 5. Association of Austrian Engineers, Chemists and Scientific Workers in Great Britain. Austrian Centre, Swiss Cottage, 69 Eton Avenue, N.W.3, 7.45 p.m. Mr. E. A. Roth: "Technical and Economic Problems of Post-war Agrarian Policy in Central Europe."

March 6. The Royal Institution. 21 Albemarle Street, W.1, 5.15 p.m. Sir Henry Dale: "Nerve Endings and Chemical Transmitters."

March 6. The Institute of Physics (Electronics Group). Small Physics Theatre, Imperial College of Science and Technology, London, S.W.7, 5.30 p.m. Professor G. I. Finch, F.R.S.: "Electron Diffraction."

March 6. Electrodepositors' Technical Society (Birmingham Section). James Watt Memorial Institute, Great Charles Street, Birmingham, 3, 6 p.m. Mr. E. J. Dobbs: "Nickel Plating."

March 6. Chemical Society and **Leeds University Chemical Society.** Chemistry Lecture Theatre, Leeds University, 5.15 p.m. Discussion. Opener: Professor F. G. Tryhorn: "The Repercussions of Modern Theoretical Developments on the Methods of Teaching Chemistry in Schools."

March 9. Royal Institute of Chemistry (South Wales Section). Royal Institution of South Wales, Swansea, 6.30 p.m. Dr. C. A. Edwards, F.R.S.: "The Straining of Metals."

March 9. Society of Public Analysts and Other Analytical Chemists. Chemical Society's Rooms, Burlington House, Piccadilly, London, W.1, 3.15 p.m. Annual general meeting. Mr. S. Ernest Melling: "Water and Water Supplies" (presidential address).

March 10. Institute of Physics (South Wales branch inaugural meeting). Physics Department, University College, Swansea, 2.30 p.m. Dr. C. Sykes, F.R.S.: "Physics in Metallurgy." Visitors are welcome.

Company News

Longworth Entwistle, Ltd., manufacturers of disinfectants, fertilisers, etc., Manchester, have increased their nominal capital by the addition of £3500 in £1 ordinary shares beyond the registered capital of £1500.

Minerals Separation Co., Ltd., announces that during 1944 it entered into an agreement with Foundry Services whereby, *inter alia*, it took over the fluxes manufacturing side of that company's business from July 1, 1944. This has resulted in an unavoidable delay in the preparation of the accounts for the year 1944, and it is unlikely that the annual meeting can be held before June, 1945.

Chemical and Allied Stocks and Shares

FIRMNESS in British Funds and industrial shares, the main feature of stock markets in recent weeks, has been less marked, but the general tendency was steady. The rise in stores shares induced a little profit-taking, but in most cases prices were again higher on balance for the week.

Borax Consolidated deferred have been good, rising to 39s. 6d., partly on expectations regarding a maintenance of the dividend at 7½ per cent., and partly in sympathy with the rising tendency in shares of companies with interests in America. Imperial Chemical were firm at 38s. 9d., and British Aluminium strengthened to 46s. 1½d., awaiting the results. Lever & Unilever were 47s. 3d., Turner & Newall steady at 85s., and B. Laporte again 86s. 3d. British Aluminium moved up to 46s. 1½d., British Match to 41s. 6d., and Dunlop Rubber to 49s. 6d. Radiation ordinary were also better at 60s. 3d., but United Molasses eased to 37s. 9d., and the units of the Distillers Co. receded slightly to 111s. 3d., after an earlier rise.

Increase of 1 per cent. at 5 per cent. in the Gas Light & Coke dividend was up to best expectations, and the £1 units strengthened to 23s. 7d. xd. In iron and steels, Dorman Long held their rise to 28s. awaiting the results, while Guest Keen firmed up to 38s. 3d., Staveley to 54s. 3d., Stewarts & Lloyds to 58s., and Tube Investments to £5 15/32. United Steels improved to 26s. 1½d., and Consett Iron to 8s. 6d. After 10s. 7½d., Millom & Askam eased to 10s. 3d., but remained active on market talk of increased dividend possibilities. Babcock & Wilcox received more attention around 53s. 9d. The main feature in textiles was a further improvement in Courtaulds to 56s., awaiting the forthcoming results. British Celanese have been steadier around 33s., but Bleachers at 14s., and Bradford Dyers at 27s., were slightly below best levels.

Greeff-Chemicals 5s. ordinary firmed up to 9s. Monsanto Chemicals 5½ per cent. preference were again 23s., and Morgan Crucible 5 per cent. preference 24s. 6d. Fisons were inactive, but unchanged at 50s. 6d., Burt Boulton again 25s. 6d., W. J. Bush 75s. British Tar Products 5s. shares higher at 11s., and William Blythe 3s. ordinary quoted at 9s. Business around 31s. was again recorded in British Drug Houses; this is a case where taxation bears very heavily, but a gradual return to prewar dividend rates is being looked for when E.P.T. is abolished. British Tyre & Rubber were 53s. 9d., British Glues & Chemicals 4s. ordinary kept at 9s. 3d., with the participating preference 35s. 6d. Paint shares have been firm, with International Paint 116s. 3d. awaiting the results, and Pinchin Johnson better at 40s. 6d. on market hopes of an improved dividend. Lewis Berger shares, which attract attention because of the good earnings in recent years and the extension of the company's interests to plastics moved higher at 111s.

Boots Drug were again active, but at 56s. 9d. failed to hold an earlier rise. Timothy Whites were 40s. 6d., Sangers 30s., and Beechams deferred 18s. 10½d. British Plaster Board, which remained active, were 39s. 6d., and Associated Cement 63s. Among glass shares, Triplex kept steady at 42s. 6d., with Canning. Town Glass 5s. ordinary changing hands up to close on 10s. Forster's Glass 10s. ordinary 37s. 6d., and United Glass Bottle 72s. 6d. Yield on the last-named is small, the dividend having been 12 per cent. for some years; but this has been much below actual earnings. The small yield not only reflects market expectations of a higher dividend in due course, but also the strong balance-sheet position. Oils have been chiefly notable for steady buying of Anglo-Iranian, which have risen further to 116s. 3d. Burmah Oil were also higher at 86s. 3d.

British Chemical Prices

Market Reports

THERE has been no outstanding movements in the London general chemicals market this week, firmness in quotations being a general feature. Fresh business is restricted to some extent by the scarcity of supplies, although a fair number of inquiries have been received. Contract deliveries to the chief consuming industries continue on steady lines and the undertone throughout the market remains firm. In the soda products section, sellers report that contract parcels of industrial refined nitrate of soda are being steadily called for and there is a fair movement of supplies of phosphate of soda. Hyposulphite of soda is a brisk market and Glauber salt and salt cake are in good request. Offers of bichromate of soda are quickly absorbed. In the potash section, acid posphate of potash, caustic potash, and carbonate of potash, are in good call and permanganate of potash is attracting a fair amount of attention. In the acid section, supplies of sulphuric acid are being steadily absorbed, and a ready outlet is found for offers of oxalic, tartaric and citric acids, which are not too plentiful. Buying interest in acetic acid has been on steady lines, and salicylic acid is firm. There are no fresh developments in the market for coal-tar products.

Manchester.—Values on the Manchester chemical market during the past week have remained on a steady to firm basis, with little actual movement to report. Commitments as a rule are being steadily drawn against, and traders state that specifications are circulating fairly freely, with a satisfactory movement of supplies indicated in respect of caustic soda, soda ash and bicarbonate of soda, carbonate and bicarbonate of ammonia, and the general run of the acids, while offers of the potash chemicals are being steadily absorbed as they make their appearance. Most classes of fertilisers are in good demand, with an improving tendency in evidence in those sections which have latterly been lagging. The leading tar products, both light and heavy, are active.

Glasgow.—In the Scottish heavy chemical trade there is no change during the past week, home business maintaining its steady day-to-day transactions. Export trade inquiries are more numerous. Prices remain steady at previous levels.

The fact that goods made of raw materials in short supply owing to war conditions are advertised in this paper should not be taken as an indication that they are necessarily available for export.

EDUCATIONAL

FOR SALE

SERVICING

SITUATIONS VACANT

None of the advertisements below relates to a woman between 18 and 41 unless such a woman (a) has living with her a child of hers under the age of 14, or (b) is registered under the Blind Persons Acts, or (c) has a Ministry of Labour permit to allow her to obtain employment by individual effort.

CHEMICAL ENGINEER assistant required by well-known firm of Chemical Engineers in London. Duties include calculation of evaporation, distillation and heat transfer problems, preparation of tenders and general assistance to department manager. Applicants must have B.Sc. or equal in Mechanical or Chemical Engineering and special knowledge of heat transfer. Preferred age over 25 and deferred military service. First hand works experience, essential. Write fully stating age, experience, qualifications, availability for the post, salary required to Box No. 2198, THE CHEMICAL AGE, 154, Fleet Street, E.C.4.

CHEMICAL ENGINEER (Sales Manager) required by small old-established firm of Chemical Plant manufacturers in London. Duties include creating enquiries, preparing tenders and specifications, working out chemical processes and unit plant designs and getting orders. Applicants must have had experience in operating chemical plant and an intimate knowledge of the more important plants and processes used in the chemical industry. Salary to start around £600, according to qualifications. Preferred age 30 to 40. Excellent opportunity for suitable man. Write fully stating age, experience, qualifications, availability for the post to Box No. 2199, THE CHEMICAL AGE, 154, Fleet Street, E.C.4.

DRAUGHTSMAN required to carry out design work on chemical plant and with experience and ability for preparing the layout of plant arrangement and the tabulation of costs for Chemical Works (essential work), north-east coast. Apply stating age, experience and salary required to Box No. 2201, THE CHEMICAL AGE, 154, Fleet Street, E.C.4.

PLANT shift-chemist required for Chemical Works (essential work), north-east coast. Apply stating age, qualifications, experience and salary required to Box 2200, THE CHEMICAL AGE, 154, Fleet Street, E.C.4.

WANTED—Consulting Draughtsman or Draughtsman-Designer to design special non-competitive small range of centrifugal pumps in spare time. State qualifications and facilities or time available. Box No. 2197, THE CHEMICAL AGE, 154, Fleet Street, E.C.4.

WANTED

WANTED regularly, Residues, Sludge, Slag, etc., containing Antimony, Cadmium, Copper, Lead, Nickel and Zinc. Oakland Metal Company Ltd., Willington, Derby.

WANTED.—Supplies of Nitre Cake in ten-ton lots. Box No. 2126 THE CHEMICAL AGE, 154, Fleet Street, E.C.4.

WORKING NOTICE

THE Proprietors of the Patent Nos. 513604 and 513853 for Improvements in or relating to Alloying Molybdenum with Ferrous Metals and Improvements in or relating to Alloying Tungsten with Ferrous Metals are desirous of entering into arrangements by way of licence and otherwise on reasonable terms for the purpose of exploiting the same and ensuring their full development and practical working in this country. Address all communications in the first instance to Haseltine Lake & Co., 28, Southampton Buildings, Chancery Lane, London, W.C.2.

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