The Chemical Age

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Notes and Comments

Growing Importance of Solvents

ONE of the more striking developments of chemical industry is the growing importance of solvents. The number of organic solvents available to industry and the extent which they are used have increased greatly within recent years. A recent list of solvents marketed under trade names shows no fewer than 107 such articles. There is a solvent available for every purpose and the manufacturer who desires to employ solvent methods has a wide range of materials from which to choose. One of the uses which affects the average man or woman is that of cleaning. It is clearly far less trouble to dissolve dirt than to use the now old-fashioned "elbow grease" for its removal. To come a little nearer industry, without the solvent the paint and varnish trades would be nearly impossible. The solvent provides, in this instance, a means whereby a solid, as for example a cellulose ester, may be transferred from one place to another in a convenient and desirable manner, and can be applied by spraying methods so as to leave a wonderfully smooth and even surface uncontaminated with brush marks. The solvent may also exert a definite influence upon the solid dissolved. Such are the plasticising solvents, which for the most part are non-volatile solids such as camphor. Their role may be to remain in the film of paint, to take that as an instance, and to impart to it the necessary smoothness and plasticity. Without this agent the film would be brittle and virtually non-permanent. Solvents are used for recovering vapours from gases. Such is the creosote oil employed for recovery of benzol from coal gas, the petroleum used for the same purpose as well as for the recovery of gasoline from natural gas. Solid " solvents " such as carbon and silica gel have been used for the same purpose. Solvents are also used for the purification of organic and inorganic substances either to purify a product by removing impurities or to extract from a mixture the particular bodies desired; the use of petroleum, benzine or trichlorethylene for preparing agricultural feeding stuffs from fish offal or from slaughter house residues is an instance.

The chemistry of the solvents is highly complicated and no general rules regarding applicability have yet been formulated. When solvents are mixed, for example, many non-solvents achieve solvent powers, while some solvents lose their powers on admixture. The science of the subject, much as it has been explored, still provides more than ample room for research. The use of solvents may be extended to an important extent in the future. One such extension has been foreshadowed by the Chemical Research Laboratories at Teddington where it has been found that the most promising way to treat low temperature coal tar is by avoiding heat and extracting the several groups of bodies by solvents. There have been attempts to extend this process to high temperature tar, one process which appeared to meet with some success aiming at the removal of pitch without distillation. In other pages of this issue will be found interesting facts about the solvent industry, facts that we trust will be of service to manufacturers who may be interested in the subject.

Unemployed Chemists

THE current issue of the " Chemical Practitioner " contains an interesting and important article upon the future of the unemployed chemist. The normal average man, when unemployed, is apt to deteriorate so that in the course of a few years he becomes unemployable—that is the commonly accepted view. If that view is correct our civilisation does not go very deep. Acceptance of that view suggests that given the smallest deviation from his accustomed ways, man rapidly sinks back into the savage—into the untutored savage that can with difficulty be taught to perform the simplest tasks. We do not believe that the unemployed become unemployable. They deteriorate in that they can no longer compete immediately with their more fortunate fellows, but to class them as unemployable is to confess that we who control them have not the patience to give them the few weeks' grace that are needed to enable them to recover their full efficiency. Many chemists may recollect their early skill in mathematics when perhaps they passed in it as a subsidiary subject for B.Sc. There is no subject that rusts so quickly as mathematics.

Twenty years of chemical work nearly always involves complete forgetfulness of all but the most elementary parts of the subject. But those who have again found it necessary to resume the early knowledge, find—unless they have become so aged as to approach second childhood—that a few months' work will suffice to recover their former ability in the subject. If that is so with mental work, how much more obviously will it be so with the less difficult work of the average man. It is all a question of a little patience and sympathy on the part of the " boss." It is true that in the human race there may be those so low in the scale that the relapse to barbarism does indeed occur; when it does it is serious, for the civilised savage is the worst of all savages. But the higher the intellect the more definitely does the mind retain its activity, provided there is some opportunity for mental exercise. It is therefore with something of a shock that we read what is almost an official pronouncement that " the unemployed brain worker loses his significance as an individual." The

article in question suggests that the loss of morale of the unemployed chemist is the most serious thing of all and that this can best be cured or prevented by allowing facilities for the unemployed chemist to work in University laboratories at convenient times. So seriously is this suggestion considered that there is a hint in the editorial columns of the "Chemical Practitioner" that the matter will probably be considered by the council of the British Association of Chemists in the near future with a view to discovering how far the idea can be put into practice.

Periods of Opportunity

ONE cannot be otherwise than favourably impressed by the fundamental notion that chemists should be given the opportunity to work out their ideas, and periods of unemployment will then become, for some, periods of opportunity. The real tragedy is that of the brilliant chemist with ideas that might make him a fortune but who, for lack of means is compelled to work for £500 or £600 a year for a firm, without receiving any adequate recompense for his services. To such a man the opportunity to work out his ideas would indeed be a god-send. The view is often heard that the research department of any firm must be considered as a whole, that the firm pays a vast sum in research in order to have the possibility of valuable technical discoveries.

Thus do 100 men work, 99 of them as unprofitable servants, whilst one man may earn for the company tens of thousands of pounds without receiving any extra reward. Truly, in a capitalistic state, the research laboratory is the most socialistic of institutions. To the brilliant chemist—if such a man is ever unemployed for more than a few weeks at a time—the opportunity for a few months' work will be the opportunity of a life-time. But will it advantage the rank and file? No doubt there will be an additional flood of scientific papers of more or less value, but of the many hundreds of chemists, how many are fitted for research work? For the majority, it will be a matter of returning to school; undoubtedly that will be valuable, but the result is that the vocational training given to the rank and file of the unemployed will be applied to the chemist. Only those situated near a University or large technical college could hope to reap any advantage.

The View Point of the Individual

THERE is one other sentence in the "Chemical Practitioner" article to which reference should be made. The acceptance of work for which the chemist is not vocationally fitted is held to be one of the major tragedies of unemployment. That can be regarded from two points of view. There is first the view point of industry and of the nation. It is a tragedy of the first magnitude that a certain number of chemists are now being allowed to waste their time and to walk the streets who, given the opportunity, could make a real contribution to the welfare of industry. We do not refer here to the rank and file such as the competent analytical or "works" chemist, but to the men of high qualifications and great mental powers whom one finds for some unknown reason on the unemployed list. That such a situation is possible is a grave reflection on the methods of industry which to-day surely requires men of the highest calibre and should take more than usual pains to discover them and put them to good use. The view point of the individual is not uninteresting, more particularly as it concerns the rank and file. It is, of course, true that some are fitted for certain work more than for other kinds of work. Within this broad limitation, however, the idea that the unemployed chemist should sit down and wait until industry again needs him is one to be combated in every way. We recollect the remark of an old chemist when faced with a more than usually curious job: "Whenever they get anything that there is no one else on the place with sufficient intelligence to undertake," he said, "they send it to the lab." That attitude is general. The laboratory is regarded—and rightly—as the place where "they" have more than the average ability and common-sense, and more than the average initiative. Are we to suppose that this initiative deserts the chemist as soon as his job fails him? If so the chemist is inferior to his fathers. Somewhere in the world there is a place for all.

It is up to each to discover his suitable niche. For the chemist there should be more suitable niches than for the average man. Nevertheless, it is one of the tragedies of the times that so many seem to have lost the initiative, as compared with previous generations, to carve out their own fortunes. The greatest difference between this generation and the last is that this one is more highly educated, its store of learning is greater. Truly Mark Twain hit the nail on the head when he said that "Soap and education are not as sudden as a massacre, but they are more deadly in the long run." The world is in need of greater individualism, and to whom is it to look if not to those possessing scientific training?

Danger of the Tax Burden

NOTHING has been more striking in the published reports of recent annual meetings of important businesses than the reiterated warning by their responsible heads of the growing danger of the burden of taxation. This warning has now been emphasised from another angle by Mr. E. Cassleton Elliott, in his presidential address to the Society of Incorporated Accountants and Auditors. His view has an importance beyond that of the individual business man, inasmuch as the accountant has wider knowledge and experience based upon a variety of companies whose finance he supervises.

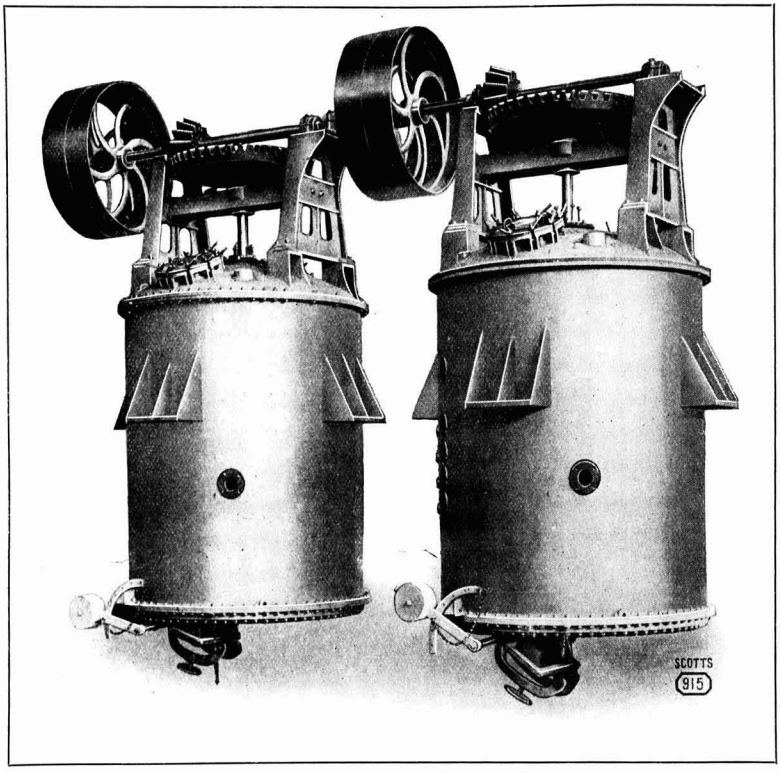
Mr. Elliott's professional knowledge has convinced him that the increasing slice of the national income absorbed in direct taxation has unduly depleted the sources of capital investment and the working capital of industry and commerce. He particularly criticised the meagre tax allowances for depreciation and obsolescence. He pointed out that the rapidity of scientific invention and the development of industrial research had given to depreciation and obsolescence a much greater significance in arriving at annual income than was allowed for by the Royal Commission on Income Tax in 1920. These are eminently practical considerations which may be commended to the serious attention of the Treasury.

Leaves from the Notebook of a Chemical Engineer

By JAMES MacGREGOR, M.I.Chem.E.*

RARELY a week passes without some new solvent extraction problem being presented to the chemical engineer specialising in equipment for this purpose. The world-wide depression in general commodities has almost eliminated inquiries for what may be termed the standard or bread and butter plants on which in better days engineers were able to count. The over-production of vegetable oils, tallows, greases, etc., combined with the depressed values of these commodities, have discouraged producers, although the remodelling of many plants is long overdue.

The difficulties under which manufacturers in every walk of life are labouring have emphasised the necessity of concentrating on economies. Users of extraction plants too frequently fail to recognise that economies in fuel and solvent consumption, and to some extent in labour, may very frequently be effected without any marked capital outlay. This is only too often due to the lack of expert knowledge. If it were realised that in few extraction plants is it necessary to incur a loss in excess of the maximum 1 per cent. solvent, calculated on the raw materials handled, users of such equipment might effect definite and very real economies in their process operations. On numerous installations with which Scotts have been concerned, a loss of close range petroleum benzine, which is now generally employed where this solvent is in use, and also of a non-inflammable solvent, such as tri-chlorethylene, between 0.6 per cent. and 0.8 per cent. is regularly maintained year in year out. In such cases particular attention is devoted to this item in the operating charges. If users of such plant would make a few simple calculations as to the economy which they might in turn effect by paying close attention to this problem, processes would in many instances show a larger balance on the credit side than is actually the case.



Scott Solvent Extraction Plant, Decantation Type.

Fortunately, to some extent, that position has been counteracted by the growing recognition on the part of producers of feeding meals derived from animal products of the contention which Scotts have for many years maintained that an excess of fat or oil in feeding meals derived from animal by-products, fish, etc., is extremely undesirable. Users of such meals on the Continent have long appreciated low fat content feeding stuffs and perhaps to a lesser extent in America. In this country the position is somewhat more complicated by reason of the fact that production is very largely in the hands of small firms. But for the hand-to-mouth existence which many of these small firms have been compelled to be content with, progress might recently have been more rapid. There are real indications that when the financial stringency becomes less acute the demand for the patent solvent extraction plants which Scotts have evolved for this particular trade will result in a real revival.

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The continued use of obsolete methods in the removal of fats and greases from such materials as skins, hides, etc., is surprising. Inquiries are received for plants to remove fat and grease from mediums which have in turn been used to remove partially the grease from skins, hides, etc. If it

* Managing director of George Scott and Son (London), Ltd., and Ernest Scott and Co., Ltd.

were realised that without the use of such mediums it is possible to degrease the most delicate skins without impairing their quality by treating these direct with a suitable solvent and under conditions which are well controlled and which are designed to avoid impairing the quality of the skins in any way, these obsolete methods would quickly be abandoned. In many quarters the impression is that solvent treatment results in a certain deterioration of the finished product. That would undoubtedly be the case were the necessary knowledge of the subject not brought to bear in the design and operation of the plant. It has often been found that skin degreasers have formed the idea that the skins are plunged into benzine and boiled therein for a certain period and then hung out to dry. Nothing could be more remote from the operation of a modern Scott skin degreasing plant. The most scrupulous care has been devoted to evolving suitable operating conditions and equally close attention paid to the recovery of the maximum amount of solvent from the cycle of operations. To-day the efficiency attained is such as to reduce the cost per skin to a negligible figure, while the resultant goods in their finished form are superior beyond all comparison to those treated by obsolete processes.

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The extraction of oils and fats from products intended for human consumption or medicinal purposes by means of suitable solvents has in many instances been dismissed because of a lack of appreciation of the efficiency which is attainable in Scott plants in the complete removal of the solvent employed. The choice of a solvent is naturally based upon the material to be dealt with. The question of whether the final traces or distinctive odour is eliminated by means of air or open steam is naturally dictated by the behaviour of the material in process. Such products are now on the market and employed extensively. Naturally the most particular care is demanded in the design and operation of plants where products for human consumption are involved.

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The removal of resin from woods rich in this valuable product by solvent methods prior to conversion into wood pulp is growing. The loss of resinous bodies, a term which is employed to cover many complicated organic substances, is enormous. The pulp maker naturally regards solvent treatment prior to digesting as a bugbear but if he could be made to realise that the extraction of resinous materials from woods rich therein would not only improve the final product but would of itself justify the capital expenditure and operating charges involved, much progress might be made in that direction. Recovery of sulphur from the vast quantities of spent oxide available from the gasworks in our own country is another matter receiving serious study. Vast quantities of sulphur are available in this by-product, which has hitherto been extremely difficult to deal with where sulphur of a purity equal to the best imported is aimed at. Fortunately a solution of that problem is in sight so that developments in this direction may be anticipated, to the advantage of the country as a whole.

Non-Inflammable Solvents

Five Products of British Manufacture

THE chlorinated derivatives of ethane and ethylene are pure chemical substances of very simple origin. They are made by the combination of acetylene with chlorine, and in spite of their simple nature, they were regarded a few years ago as of little commercial importance. Changing times and the need for reducing fire risks and for ever-increasing efficiency and speed in modern industry, however, give greater prominence to the virtues of non-inflammable solvents. In consequence, the demand for such substances is continually increasing, especially as these products are distinguished by the extraordinary speed and facility with which they dissolve grease and oil. Other substances such as petrol and benzol are widely used but they are accompanied by a grave risk of fire and explosion. Non-inflammable solvents, on the other hand, possess all the virtues and none of the vices of the old-fashioned solvents, until we now find the most important member of the group, trichlorethylene, penetrating into almost every industry.

The complete group of these non-inflammable solvents as manufactured by Imperial Chemical Industries, Ltd., comprise dichlorethylene, trichlorethylene, perchlorethylene tetrachlorethane and pentachlorethane. The first three are very closely related. They are all super-solvents and non-inflammable. The main point of difference between them is a remarkably happy one, *i.e.*, boiling point. Their boiling points respectively are 52° C., 87° C., 121° C. One can, therefore, choose any solvent of similar properties from a wide range of volatilities. Dichlorethylene is a mixture of two stereo isomers which boil at about 52° C. It is a light, colourless, faintly ethereal liquid of extreme stability, and is non-corrosive even in contact with common metals. The hot vapours of this solvent can be ignited but they burn with a cold flame which will extinguish itself. It is useful for replacing ether in perfume and low temperature extraction generally, and is an excellent solvent for lacquers, dyes, gutta-percha and balata. Combined with methyl and ethyl alcohol, the mixed solvent is highly satisfactory for dissolving gums and resins and nitro-cellulose and cellulose acetate.

Trichlorethylene

Trichlorethylene is the most important member of this group and is a colourless, heavy liquid of pleasing smell, boiling at 87° C. It is non-corrosive to metals even in the presence of water. Under ordinary conditions of working, it is a harmless solvent of great penetrative power and is extensively used for extracting bones, fish offal, animal and vegetable oils and fats, tankage and garbage. Other very important uses include garment and fabric dry-cleaning, metal and textile degreasing, and for making up paint removers, rubber cements, varnishes, and spirit soaps for laundry and textile purposes. It does not mix with water and has a low specific heat and low latent heat of vaporisation. It is therefore easily distilled and re-condensed.

Tetrachlorethane

With a boiling point of 146° C., tetrachlorethane is a heavy, colourless liquid, which is an exceedingly powerful solvent for many classes of materials, including paints, varnish, cellulose acetate, rubber, phosphorus and sulphur. It is extensively used as an insecticide for white fly and weevils. In the absence of moisture it is non-corrosive, but when wet, only lead and tin are free from attack. Its toxic action, however, limits its use for many purposes. Perchlorethylene is a colourless liquid of high specific gravity which is very similar to trichlorethylene in all its properties but slightly less volatile. It is non-corrosive and is used for the preparation of solvent soaps and in dry-cleaning. Pentachlorethane is a very high boiling liquid of similar chemical and physiological properties to tetrachlorethane. It is sometimes used to replace the latter solvent where a higher boiling point and lower volatility are desired.

WRITING in "Zeitschrift fur komprimierte und flüssige Gase" (1933, page 13) Dr. Ing. M. Hofsäss recommends the use of a fused alkali metal which has the property at a suitable temperature of combining solely with hydrogen, leaving hydrocarbons, as well as nitrogen, unattacked. On these lines, it is possible to avoid the customary low-temperature separation of the constituents of gaseous mixtures. The resulting alkali hydride is decomposed at a more elevated temperature. Special advantages attach to carrying out the initial reaction under high pressure, for it is then possible to resolve the waste gases of destructive hydrogenation into their constituents without preliminary reduction in tension. To obtain pure hydrogen from this type of waste gas, however, it requires previous purification from carbon dioxide, sulphuretted hydrogen, oxygen and moisture. A favourable influence is exerted by the addition of traces of alkaline earth metals to the fused alkali-metal.

The Design of Fractionating Columns

By J. H. WEST, M.I.Chem.E.

THE problem of designing a fractionating column, *i.e.*, a bubbler plate column, may be divided into two distinct parts; first, the calculation of the theoretical number of plates required, or, if it is a continuous still, the numbers of plates in the boiling or stripping column and the concentration column respectively, and secondly, due addition to the numbers so found having been made to allow for plate inefficiency, the determination of the size of plate required, the number and size of bubblers, slot area, and constructional details generally.

With regard to the first part there is a voluminous literature, but very little indeed has been published regarding plate efficiency or the practical considerations which determine the action design of the plate. In this article some of the main questions involved in the second part of the design will be briefly discussed, partly because they are of great importance to those who have to buy stills or to design them, but chiefly to call attention to the lack of published experimental data and the need for investigation on many of the vital points.

Plate Efficiency

Starting with the question of plate efficiency, we must bear in mind that the whole object of the bubbler plate is to secure the nearest possible approach to equilibrium between the vapour leaving the plate and the liquid on it; complete equilibrium representing 100 per cent. efficiency. Interaction between the vapour and the liquid may take place by mutual diffusion, or by partial condensation of the vapour and partial evaporation of the liquid, and most probably both these effects occur. The process may also be divided into two phases, one, the actual bubbling of the vapour through the liquid, and the other the interaction between the vapour and the spray and mist of fine liquid particles above the liquid level, thrown up by the bubbling and splashed against the underside of the plate above. How much of the interchange occurs in each phase is not known, but it is obvious that the velocity of the vapour must play an important part in both. In the first phase an increased depth of liquid on the plate, giving longer time contact with the vapour, is known to improve efficiency, but the general opinion seems to be that the size and arrangement of the bubblers and slots does not make a great deal of difference, though further investigation may not confirm this view. In the second phase entrainment of the liquid by the vapour on its way up the vapour pipes to the next plate definitely increases with increased velocity, though in what proportion is not known, and information on this point under working conditions is badly needed. Entrainment involves a definite and calculable loss of efficiency. Taking the two phases together it is recognised that efficiency tends to fall as velocity goes up. Certain investigators, working on a very small experimental column, have found it to vary inversely as the velocity, but this result requires confirming on larger columns. As a rule a vapour velocity through the slots of about 10 to 12 feet per second is generally regarded as being as high as it is safe to go without seriously pulling down efficiency. The vapour velocity through the slots depends upon the volume of vapour passing a given plate, and the total slot area per plate. The volume, for a given duty, depends mainly on the reflux ratio, and the higher the latter is the bigger the area of the plates will have to be in order to keep the velocity down, because it is found in practice that the total slot area cannot be made much more than one-tenth of the area of the plate without crowding the bubblers too close together.

In the separation of organic liquids from water the organic vapour is generally much denser than water vapour at the same temperature and pressure, consequently the total volume of vapour passing the top plates of the column, where the proportion of water vapour is small, will be considerably less than the volume passing the bottom plates where the vapour is mainly or wholly water vapour, consequently the velocity will increase all the way down the column if the plates are all the same size. This is a very important point, because, if the velocity is worked out for the top plate, and the size of plate is based on this, as is often done, the velocity at the bottom will be too high. To have optimum velocity at every plate it would be necessary to make each plate slightly bigger than the one above it ,but this would, of course, be far too expensive. To meet the difficulty, in some columns the boiling or stripping portion below the feed is made larger than the concentrating portion above the feed. In any event the size of plate should be chosen so that the vapour velocity will not be excessive at those plates where the volume of vapour is the greatest.

At this point we may conveniently consider the factors which mainly affect the first cost and the running cost of a column, and their relation to each other. First, the cost will vary directly with the number of plates. The number can be reduced by increasing the efficiency of the plates, and by increasing the reflux ratio. Second, the cost will vary almost directly with the area of the plate, for there is little saving in the cost of construction per unit area of a large plate as compared with a small one, made in a similar way of the same material. Third, the cost will increase as the depth of plate, *i.e.*, the vertical distance from plate to plate, becomes greater, but only in slight degree, depending on extra material in the shell, drop pipes and vapour pipes, for the labour cost will be practically independent of the depth.

Reducing the Number of Plates

Increasing the depth of liquid on the plate, involving a greater depth of plate, seems a good and cheap way of increasing plate efficiency, and thereby reducing the number of plates required, particularly in the case of continuous stills where an increased depth of liquid on the plate has a stabilising effect on the working of the column which is an additional advantage. In pot stills, on the other hand, a big depth of liquid on the plates means a longer time before the product begins to come over, and a large amount of liquid left on the plates to drain back to the pot at the end of the operation. The saving effected in the number of plates required by increasing the reflux ratio beyond the minimum ratio necessary for the given separation is offset by the increased area of the plate and by increased consumption of steam. If the minimum ratio is 2 : 1, and an actual ratio of 4 : 1 is used, the plate area for the same vapour velocity will have to be increased in the ratio of 3 : 5. Hence unless the corresponding reduction in the number of plates is in the ratio of 5 : 3, there will be no saving in cost, while the steam consumption will go up nearly as 3 : 5. This statement needs qualifying by mentioning that some investigators have found plate efficiency to improve with increasing reflux ratio, but this result requires further investigation and confirmation. The gain in plate efficiency effected by lowering vapour velocity is exactly offset in cost by the increase in area required, even supposing that efficiency varies inversely as velocity. What is required here is some means of making better use of the plate area by increasing the slot area in proportion to the plate area.

Arrangement of Drop Pipes

Apart from the limited slot area obtainable with the usual type of bubbler per unit area of plate, the method of distributing the liquid over the plates is far from ideal. The usual arrangement of the drop pipes on small plates is to have two pipes, in and out, opposite one another and close to the periphery of the plate. It is obvious that the liquid passing from one to the other will take the shortest path, and that the movement of the liquid past the bubblers on or near the line joining the drop pipes will be far more active than that past the bubblers away from this line and round the sides of the plate.

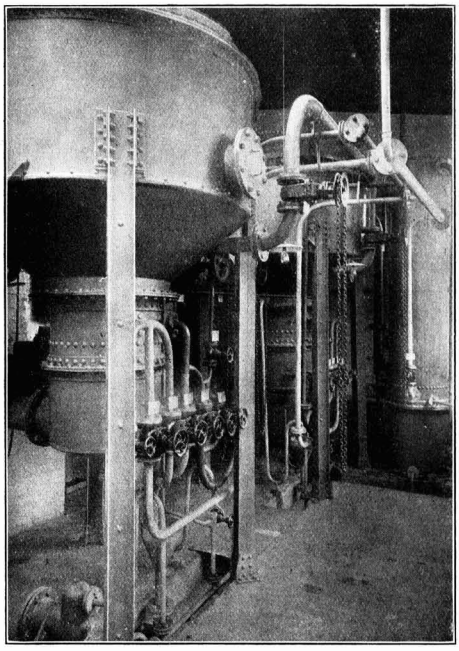
It is well-known that when quotations for a still to perform a given duty are obtained from a number of makers who are left to make their own designs, the variation in the number of plates and their size between the different offers is often remarkable, and this must continue to be the case until the economics of still design are better understood, and the necessary experimental data are available by which the general tendencies referred to above can be reduced to definite and reliable figures. Here is an excellent field for research at our chemical engineering laboratories.

Recent Progress in Solvent Recovery Technique

By S. REGINALD PRICE *

THE recent rapid advance in the technique of solvent recovery is one of great importance, not only to the user of volatile solvents, but also to the producer. Contradictory as it may seem, the efficient recovery of solvents will not in the long run be harmful to the producers of these solvents—quite the reverse. The careful and economic use of a raw material leads definitely to an extending field of application, and it must be remembered that commercial recovery can never reach 100 per cent. efficiency; there will always be a percentage of wastage. It is true that the adjustment between consumer and producer necessarily takes time and presupposes expanding markets, and it is also true that industry at present is passing through a difficult testing period. Thus, although modern methods of recovery may temporarily reduce the total consumption of solvent by any industry, it must be remembered that economical operations of this type may be essential to the continuance of the industry. Those who are designing and applying systems of efficient solvent recovery are not acting in antagonism to the interests of the producers of solvents. They are opening up new fields of application, tending to increase markets for the goods produced by such makers, and leading to possibilities of the use of more costly and efficient solvents.

In numerous industrial processes valuable volatile solvents are used to produce a certain effect; for example, to produce a film of rubber on cloth, in the manufacture of smokeless powders, to remove grease and dirt from soiled clothes,



A Typical "Acticarbone" Solvent Recovery Plant, showing two Adsorbers and Condensers. (Capacity, 25 gallons per hour.)

to provide a waterproof film on transparent wrapping paper, and so on. The solvent used is incidental to the main process and is removed in vapour form by drying after the desired result has been obtained. If the solvent evaporates into the atmosphere of the workrooms, besides being wasted, it may also produce injurious conditions for the workers, while if it is evacuated to the open air, the constant loss represents a steady direct charge on the cost of the process. It is not surprising, therefore, that a great deal of practical work has been carried out in trying to reach a satisfactory solution of the problem of the recovery of these solvents, and it is only in the last few years that a more or less general solution has been reached. Certain special problems in the past have been solved with good results by various methods, but for others, especially where the concentration of vapour in air is low, no solution has been found until recently.

Activated Charcoal as an Adsorbent

The European war focussed attention and research on a substance which has remarkable properties, namely, activated

Hooding and Vapour Collecting Ducts in a British Rubber-proofing Works.

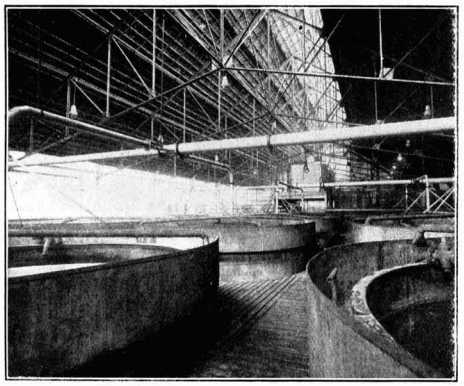
carbon or charcoal. This substance proved of great value in the adsorption of poison gas for the protection of troops, and the continued study of its properties and methods of application have gradually led to the elaboration of the technique for the recovery of solvents, which is finding very wide application. It has long been known that charcoal was a good adsorbent and that bone charcoal had special properties in the decolourisation of sugar solutions. By certain methods of treatment, however, the adsorptive capacity of the carbon can be enormously increased, and charcoals prepared in this way can pick up almost quantitatively from the air substances of higher molecular weight present therein, until a saturation point is reached. The general theory is that the porous structure of the carbon is greatly increased by the special treatment and that a very large surface is thus presented. If a stream of air containing the vapour of benzine, acetone, alcohol, or similar solvents is passed over a quantity of this activated carbon, the vapour is completely adsorbed, pure air passing away until the practical saturation point of the carbon is reached. The process, moreover, is reversible, and the adsorbed solvent can be removed by heating or steaming the carbon, after which it is ready for another adsorption. This alternation can be continued almost indefinitely.

As would be expected, numerous methods have been devised and patents taken out for the manufacture of these active carbons. Roughly the methods of manufacture are (a) by heating the carbon at a high temperature after impregnation with certain chemicals (chemical processes); (b) by heating alone in special furnaces in the presence of a selective oxidising air stream (physical processes). The qualities of a charcoal suitable for industrial use, however, requires special attention, for besides requiring a high coefficient of utilisation, the carbon should be hard, dense and pure.

The commercial application of this property of activated carbon, especially in the extraction and recovery of volatile solvents has required considerable research, patience, and

* Technical director of "Acticarbone" Section, Price, Stutfield and Co., Ltd.

engineering skill. The process is now giving remarkable results in practical efficiency of recovery, low capital and operating costs and great flexibility, and by its means, many problems of recovery in very low concentration have been really successfully solved for the first time. The carbon is remarkable for the speed with which it adsorbs the vapour, so that comparatively small quantities can extract solvent from very large quantities of air passing over it. The refinement is now such that within wide limits of concentration from 1 to 2 grams per cu. m. upwards, a well-designed and well-operated active carbon plant can show an efficiency from inlet to outlet of from 95 to 98 per cent., even with the gas passing with such a speed that the time of contact is perhaps only one second. This feature, therefore, has allowed of great refinements being made in the correlated problem of ventilation or collection of vapours. In fact, the problem of efficient practical recovery is now one of the careful application of the principles of ventilation combined with the design of a recovery plant to operate successfully in the conditions thus obtained. A simple equation will make clear the relative importance of these two sides of the practical recovery problem. If E = the percentage efficiency of the recovery plant—inlet to outlet, and e = the percentage efficiency of collection of the evaporated solvent, then the total practical percentage efficiency of the complete installation R will be $E \times e$. Now as E is 95 to 98 per cent. in a properly designed carbon installation, the value of e is most important in determining the final value of R. The problem, therefore, of practical recovery has to be considered from these two points of view, and the best results in industry are only obtainable by a careful combination of these.



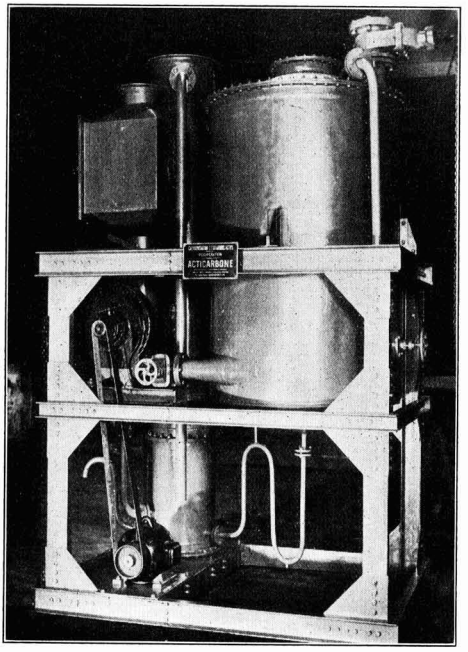
Collecting the Vapours from Fermentation Vats in a French Distillery.

General Principles

The general principles applied in the recovery plant have been described above. In practice, although the adsorptive power of the carbon and its general qualities play a great part, even perhaps more important still are the special methods of utilisation of the carbon and the design of the apparatus for this. It is of great importance that the carbon, besides being of high utilisation coefficient, should be capable of almost indefinite regeneration without loss of adsorptive capacity, for a good quality carbon is expensive to manufacture. The methods of application must pay full attention to the economic use of steam, water and motive power, so that the running costs of the plant shall be as low as possible. If the solvent being treated is not miscible with water, it is separated directly from the water after condensation of the steam and solvent vapour, in the condenser of the plant. If, however, the solvent is miscible in water, the watery solution is taken to a suitable rectifying column, and it is obvious that combination of these two principles, will give an efficient separation of miscible and non-miscible solvents. It should be noted also that although in certain conditions, activated carbon is a catalyst, under the conditions of operation in a well designed plant, no chemical or catalytic action whatever occurs. This method is applicable to the recovery of such solvents as benzine, petrol, naphtha, toluene, alcohol, ether, ethyl acetate, butyl acetate, carbon tetrachloride, trichlorethylene, etc. With all these, efficiencies of 95 to 98 per cent. at the plant are regularly obtained and operating costs are usually from 1½d. to 3d. per gal. of solvent recovered, according to local conditions, size of plant, etc. Recently, considerable progress has been made in the design and application of small plants suitable for processes where losses are very restricted or intermittent, and in some cases standardised units can be supplied for this purpose.

Collecting the Vapours

In the collection of vapours the problem is to collect, by suitable methods of ventilation, as much of the solvent vapour as possible and conduct the air solvent mixture to the recovery plant. The recovery plant, in the "Acticarbone" process, itself provides the necessary ventilation, the fans being an integral part of this plant. The many industries using solvents present as many different problems of collection and in fact, each works has a problem which requires definite and careful study. It is only by taking account of all the existing conditions in any factory that this problem of collection can be solved with success. The fact, however, that very low concentrations of vapour in air can be dealt with satisfactorily by the recovery plant gives great help in this direction; it must also be remembered that in order to protect the carbon, the air stream must be properly filtered to remove all dust. All this must also be done without interfering in any way with the processes in operation in the factory.



A Small Portable "Acticarbone" Solvent Recovery Installation.

In some industries, such as, for example, the coating of fabric with rubber solution, the coating of viscose paper with a waterproofing film, the manufacture of leather cloth and so on, high efficiencies of collection can be obtained as the operation can be carried out in closed hoods, or in towers with a controlled ventilation. Collection efficiencies up to 90 per cent. or more may thus be obtained so that the overall recovery of the system can reach 80 or 85 per cent. In other processes, such as dry cleaning works, tent cloth manufacture, certain processes of paper coating, and so on, such complete hooding is often not possible and special means have to be adopted, either to trap the vapour as near as possible

to the point of emission, or even to aspirate the whole atmosphere of the workroom to the recovery plant. High efficiencies can be obtained, though naturally not as high as for industries of the first group. For example, in dry cleaning works, 60 to 70 per cent. practical recoveries can be obtained. A process of special interest in this way, which has only recently been developed, is that of the recovery of alcohol contained in the gases given off from fermentation vats. Already many plants are operating in this manner, especially in France. Recovery can also be profitably made from the air exits of solvent extraction plants for bones, oil seeds, etc.

The whole subject of solvent recovery merits the closest attention of all who are using volatile solvents in manufacturing processes, whether the quantities are large or small. The method of dealing with a special problem, as shown, always requires detailed study on the spot, but even when the losses are extremely small an economic solution can usually be found to the problem. Where the quantities are large, there is no question of the enormous saving which can be effected. Many plants have been constructed which have saved their total cost after 3 to 6 months' operation.

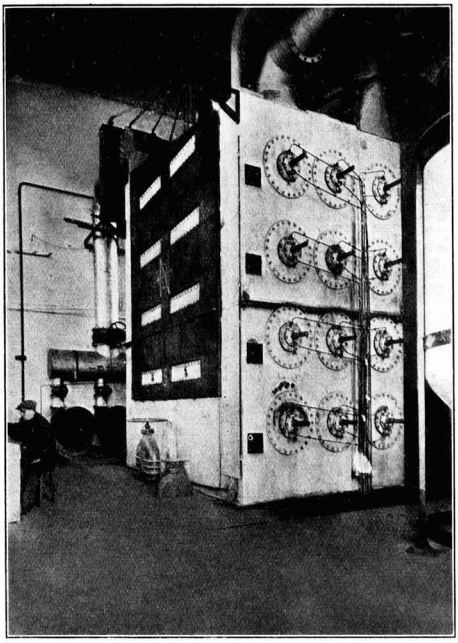
Illustrations are given to show typical designs in recovery installations, as well as special methods for collecting the vapours.

Silica Gel in Solvent Recovery

A Chemically-Inert Adsorbent with High Mechanical Strength

THE high adsorption capacity of silica gel, which now has been known extensively for some years, gives this material a very large field. Wherever vapours which can be condensed above 0° C. are present, their recovery by means of silica gel is accomplished at the highest efficiency and economy. It is thus possible, for instance, to remove practically all the moisture from air and in this manner, by mixing, obtain any degree of dehydration in the treated air volume.

Silica gel is especially adaptable for the purpose of recovering volatile solvents for several reasons. Being a chemically-inert product it is non-inflammable and therefore can never, under any circumstances, cause a fire, which in association with easily inflammable or explosive solvents could lead to



Silica Gel Solvent Recovery Plant. (Capacity, 400 lb. Ether-Alcohol per hour.)

serious accidents. This advantage is of special significance in explosive works, the film industry, etc. Further, silica gel possesses a high mechanical strength so that attrition and, therefore, loss of the adsorption material does not take place because of temperature variations of mechanical influences. The same applies to the adsorption power which, because of special manufacturing methods, also remains the same for years, so that owing to the two latter reasons, replacement of silica gel and the corresponding increased running cost, may be left entirely out of consideration.

In principle, the silica gel process works in a convenient manner. One or more gel filters take care of the adsorption, while one which previously has been adsorbing is treated by by means of hot gases, usually air, and in this manner the adsorbed substances are liberated whilst the gel filter itself is again made ready for adsorption. When it is a question of recovering condensible solvents this purging does not take place by means of air, but by means of another condensible gas such as steam, which is condensed together with the solvent. The moisture which is left in the silica gel after steaming is driven off by means of warm air, after which the activated gel filter is again ready for adsorption. In recovery plants the usual number of filters is four, of which two are always acting as first and second adsorption stages, while one filter is desorbed and the fourth dried by means of warm air. Changing of the filters on to the several process phases is done by special valves which are controlled automatically. In cases where only two adsorbers are used, the process remains the same, for whilst one filter is adsorbing the solvent the other is desorbed by means of steam, after which it is dried with hot air and then cooled. For the purpose of heating the activation air one may use the cheapest local form of fuel available. The use of waste gases, at 250-300° C., in an indirect air heater is especially advantageous, since in this manner the heat which would otherwise be lost is utilised. The air may also be treated by means of a coal-fired heater or by means of a heater using steam at 6—8 atm. gauge pressure.

The operating cost of the silica gel process is extremely small. The steam consumption during desorption amounts at the most to 2—3 times the adsorbed solvent, since it is a typical characteristic of silica gel to give off solvents relatively easily by being treated by means of steam. The power consumption for the purpose of handling the solvent laden air and the drying air is likewise very small, since the thickness of the gel layer, because of its high adsorption power, can be kept very small, thereby offering a small resistance to the passing of air, which resistance usually lies between 20-70 mm. water column. Since the first cost of the silica gel recovery plant is low in comparison to the value of the recovered solvent, not alone large plants above 100 kg. per hour, but also small plants round 3-5 kg. per hour are readily amortised. Most of the plants up to now built in Europe for different purposes and for small and large outputs have been in constant service for several years and worked to the entire satisfaction of the buyer. The percentage recovery, that is, the recovered solvent in the condensate expressed as a percentage of the amount of solvent reaching the plant in the air amounts to an average of 94-97 per cent. in the plants which have been put in operation, and it is thus considerably above the 92 per cent. which the plants have been guaranteed to yield.

Sweden Imports more Bleaching Powder

UNOFFICIAL reports placed Sweden's consumption of bleaching powder in 1930 at about 22,000 metric tons of which about 13,000 tons was produced locally. In 1930, about 9,500 tons were imported followed by 9,100 tons in 1931. In 1932 the quantity imported increased about 6,000 tons, to 15,062 metric tons.

The Carbon Adsorption Process of Solvent Recovery

By HUGH GRIFFITHS, B.Sc., A.R.C.Sc., M.I.Chem.E*

WHEN the carbon adsorption process of solvent recovery was first developed industrially it was realised that in view of the extremely high efficiencies which could be obtained even in the recovery of solvents from air or gas containing only very low concentrations, the process would almost completely supersede the condensation and adsorption systems which had previously been employed. The originators of the process, therefore, formed the Carbo-Union, in conjunction with the most important manufacturers of activated carbon, and a substantial development programme was financed and undertaken. The results have been in no way disappointing and the extremely rapid progress which has been made by the Carbo-Union system, notwithstanding the periods of trade depression, confirms the value and importance of chemical engineering research.

It may be said that the problems of almost every industry in which solvents are used has been tackled and solved—not merely in the technical sense, but

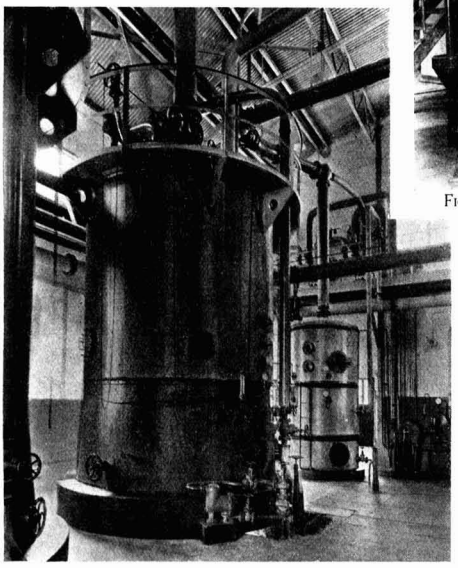


FIG. 1.—One of the Adsorbers of a Carbo-Union Solvent Recovery Plant, with Steam Economiser in background.

from the economic and practical points of view. The total quantity of solvent recovered in Carbo-Union plants during 1932 reached the figure of 400,000,000 lb.

Whilst the older systems of solvent recovery by condensation and adsorption necessitated high concentrations if even moderate efficiencies were to be secured, the carbon adsorption process is applicable even to conditions where the concentrations are extremely low, and in fact, in most cases the concentration is deliberately reduced, in order to secure safety of operation. It will be understood that no condensation can be effected from a mixture of air and solvent vapour until saturation has been reached. In the case of benzol, for example, the concentration would have to be built up to approximately 320 grams per cubic metre for condensation at 20° C. As, however, the lower explosive limit of the air-benzol mixture corresponds to approximately 46 grams per cubic metre it will be realised that during a very large part of the time of operation, the operation of the condensation plant would present considerable dangers. The adsorption systems are subjected in somewhat lesser degree to the same disadvantages as the condensation process.

Owing to the strongly adsorptive qualities of the carbons employed in practice there is no difficulty in working at concentrations of less than 5 grams per cubic metre without loss of efficiency and the volume of air drawn through the installation may be so chosen that at no time is there any risk of

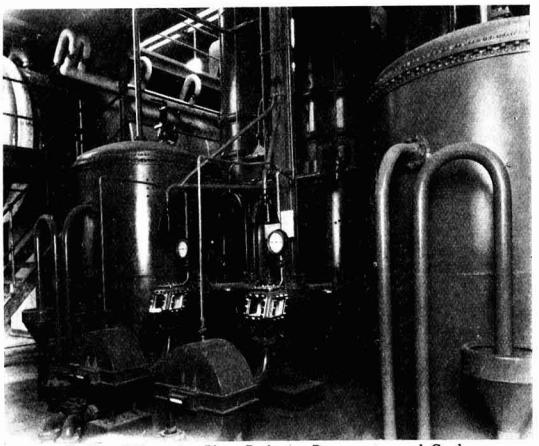


FIG. 2.—Benzol Extraction Plant, Beckton: Pre-separators and Condensers, with one of the Adsorbers in background.

the concentration reaching the lower explosive limit. In practice it has been found that it is possible, in all cases, to maintain the desirable low concentration without loss of recovery efficiency, and without excessive power consumption and in view of the suction employed not only can recovery be effected, but working rooms can be kept free from all traces of odour and the risk of poisoning in the case of toxic solvents completely avoided.

The accompanying illustrations show a few examples from the many installations which have been erected in this country by British Carbo-Union, Ltd. It will be observed that the quantity of solvent recovered in considerable and the efficiencies are extremely high. Fig. 5 shows a view of the adsorber house of an acetone recovery plant erected in this country with a capacity of 12 to 14 tons per day. Tests on this installation have shown that the recovery efficiency is approximately 99.5 per cent. Fig. 3 shows the exhauster room

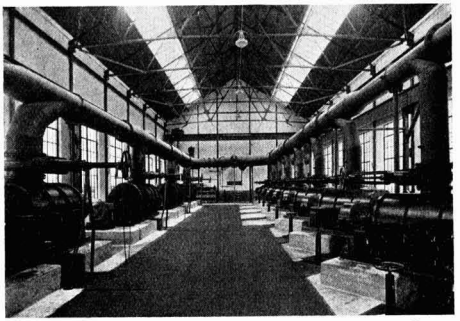


FIG. 3.—Acetone Recovery Plant at Artificial Silk Works: Exhauster Room

of the same installation. Fig. 1 shows one of the adsorbers of a recovery plant, and in the background a steam economiser. The steam economiser operates on the principle of the reversed heat engine, a proportion of the heat in the vapours coming from the adsorbers being adsorbed in an

* Director of British Carbo-Union, Ltd.

evaporator, the vapour from which is compressed by means of a steam pressure transformer to enable them to be used again. This interesting application of thermodynamic principles has made it possible to secure an economy in steam consumption of about 40 per cent.

the world, and was erected by British Carbo-Union, Ltd., for the Gas Light and Coke Company, at Beckton. This installation is capable of debenzolising 77,000,000 cubic feet of gas per day and has a recovery capacity of 22,000 gallons of benzol per day.

FIG. 4.—Benzol Extraction Plant at the Works of the Gas Light and Coke Co., Beckton : Control Platform.

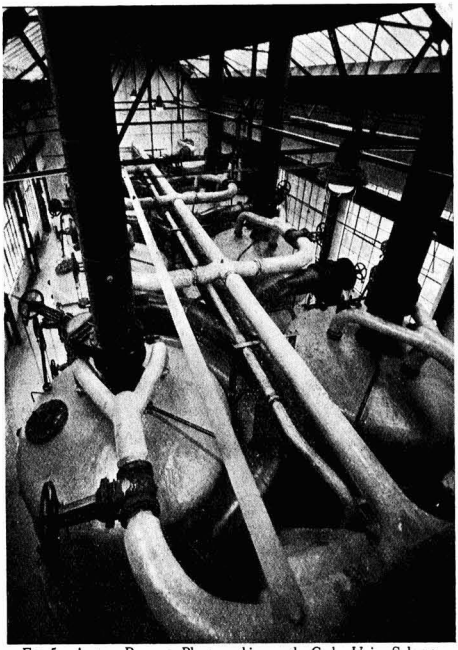


FIG. 5.—Acetone Recovery Plant, working on the Carbo-Union Solvent Recovery System.

Of special interest is the application of the carbon adsorption process to the extraction of benzol from coal gas. Figs. 2 and 4 show what is the largest benzol extraction plant in

The carbon adsorption process possesses many advantages over the older adsorption systems, more especially in that the efficiency of extraction under normal working conditions can easily be maintained between 95 and 96 per cent., and that a purification of the gas is effected during the process of debenzolisation which is considered to be of the greatest importance. One of the most outstanding advantages of the carbon adsorption system of benzol extraction is, however, in the quality of the benzol produced. Since this benzol is in no way contaminated with materials similar to those which are derived from those adsorbing oil on steam distillation, a benzol may be obtained directly from the plants which with little or no treatment may be directly used as a motor spirit.

Among recent advances which have been made in connection with the carbon adsorption process may be mentioned improvements in the quality of the adsorption carbons, not only in respect of adsorptive capacity, but in other qualities on which the life of the carbon depends. The newer carbons show no loss in activity after very long periods of operation, and the cost of carbon replacement has been reduced to negligible proportions. Further improvements in the technique have been made in the direction of securing increased safety of operation and more efficient methods of collection have also been devised. The thermal efficiency has been increased so that it is in fact possible in most cases to recover 1 lb. of solvent with a steam consumption of less than 3 lb. The carbon adsorption process has also been applied to the recovery of solvents from water and from solutions. For this purpose a special carbon has been developed which does not disintegrate under the working conditions and high recovery efficiencies can be secured at extremely low cost.

Notwithstanding the great progress which has been made as the result of the development work by Carbo-Union, it is believed that there is still a very large field of application for this system of recovery. Whilst the examples which have been given form a proof that the chemical engineering problems have been solved in such a way as to make application on the largest scale profitable, it may be mentioned that the process is equally applicable on the smallest scale, and installations are profitably in operation where the total quantity of solvent is only a few lb. per hour.

A Glimpse of the Dry Cleaning Industry

Filtration and Solvent Recovery Problems

THE filters manufactured by Manlove, Alliott and Co., Ltd., are gaining ground in their applications. Fig. 1 shows a pair of large "Easifilt" units erected in one of the largest dry cleaning works in London. Teh merits of this filter are the single joint, the fact that permanent monel metal filter cloths are used, and that cleaning is extraordinarily easy.

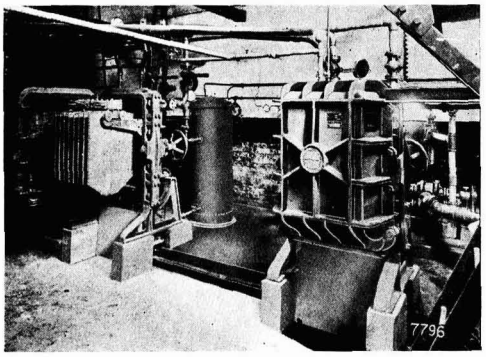


Fig. 1.—A Pair of "Easifilt" Filters in a London Dry Cleaning Works (Capacity 18,000 gal. per hour).

The capacity is very high when it is applied to clarification problems. With dry cleaners' solvent the throughput is from about 80 to 100 gallons per square foot per hour over a number of hours run. The cake can be air dried in position, and also washed very rapidly should washing be necessary. The filter leaves are attached to a header which can

Fig. 2.—The "Filtrall" Vertical Filter.

be run in or out of the filter on extensible arms for discharging purposes.

This firm has also recently developed a very simple leaf filter of a generally similar type, but in a less expensive construction, known as the "Filtrall." This is excellent for handling solvents and has also handled varnish clarification successfully. This filter (Figs. 2 and 3) is made in one standard size, containing seven leaves spaced at approximately 2 in. centres, having a filter area of 32½ sq. ft., and a cake capacity of 1.7 cu. ft. The overall space is only 1 ft. 9 in. square by 4 ft. 6 in. high. The construction of the filter will be clear from the illustrations. The leaves stand on an outlet header inside the filter, joining with it by means of special outlet nozzles. The upper cover of the filter is lifted off for cleaning. The cake falls into a cake sump underneath the leaves, and can be removed through the bottom cleaning door.

The principle of cyclic filtration, as applied in dry clean-

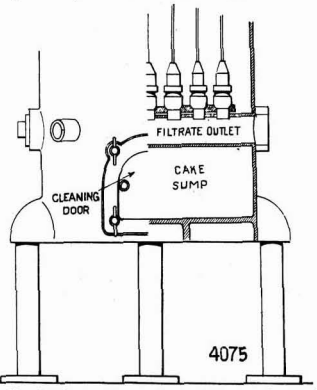


Fig. 3.—The "Filtrall" Vertical Filter: Sectional Diagram showing Cake Sump.

ing, is shown in Fig. 4, where the "Filtrall" filter is attached to a dry cleaning washing machine. The filter is fed by a pump which draws from the discharge outlet to the washer, pumping the solvent to the filter, from whence it returns to the washer inlet. A pin strainer is placed in the pump line, and next to the washer will be seen the proportioner, a small stirring vessel which is kept continuously flushed with solvent so that its contents are changed at a

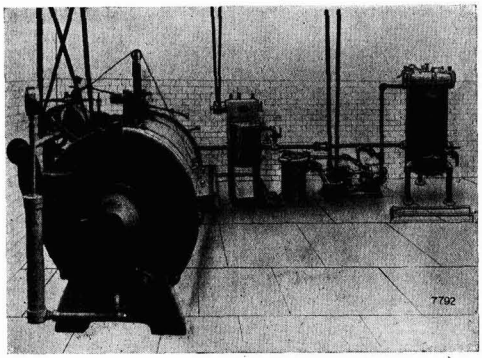


Fig. 4.—Cyclic Filtration in a Modern Dry Cleaning Works, showing "Filtrall" Filter.

slightly slower rate than are the solvent contents of the washing machine. In this proportioner is placed the filter-air, for which purpose Supercel Hyflo, as supplied by the Johns-Manville Co., has proved itself to be the only finally satisfactory product. In working the system a precoat of the filter-aid is first placed on the leaves before any work is put in the washing machine, and then a small charge of filter-aid is placed in the proportioner at the beginning of each

load. Work can be cleaned by this system with one bath lasting only 10 to 25 minutes, according to the class of work and the number of changes of solvent provided in the washing machines. These should not be less than 12 to 14 changes per hour; up to 30 changes per hour have been used, but there does not seem to be very great point in most installations in going beyond 20 changes. The process speeds up and simplifies the operation of dry cleaning, keeps the solvent in a condition which cannot be approached by any other process, and gives a most excellent grade of dry cleaning. In larger installations the "Filtrall" filter is replaced by the "Easifilt" filter.

Manlove, Alliott and Co. have also developed, in conjunction with Courtney and Hill, Ltd., the manufacture in this country of the "Band Box" dry cleaning unit Fig. 5), using trichlorethylene. In this case two vertical washing machines are combined with the "Filtrall" filter and also with a still and condenser, so as to make a self-contained motor-driven

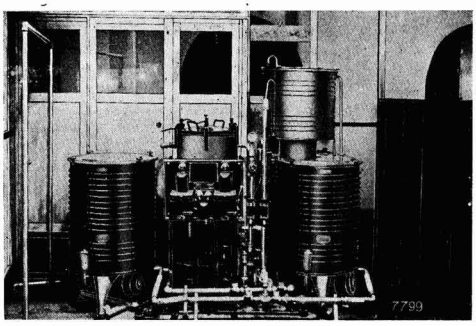


Fig. 5.—The "Band Box" Dry Cleaning Unit, with Continuous Cyclic Filtration.

unit which can be installed in a booth approximately 6 ft. wide by 12 ft. long, which is ventilated by a fan. The washers contain special internal gear, permitting the internal drum to be used in an inclined position for washing, and in a vertical position for extracting or centrifuging the solvent from the goods. It is not necessary to withdraw the solvent from the machines for this purpose, and the operation of the plant is such that one cleaning machine will be washing while the other is extracting, and vice versa. This unit is comparatively inexpensive, is extremely efficient and has an output up to 80 lb. dry weight of fabrics per hour. Owing to the general construction, solvent losses are small and distillation is infrequent on account of filtration. The machines are surrounded by a water cooling system so that the solvent is always kept at a low or moderate temperature and so that evaporisation losses are small.

Italian Hydrogen Peroxide

Award of Brambilla Prize

THE Soc. Anon. Fabbrica Acqua Ossigenata e Derivati (F.A.O.D.), a subsidiary of the Appula group, has been awarded the Brambilla prize by the Royal Lombard Institute of Science and Letters for its production of concentrated hydrogen peroxide. The company first began production of electrolytic concentrated hydrogen peroxide in 1925 at Linate. Up to that time only dilute hydrogen peroxide was made in Italy, and the concentrated product used for industrial purposes was imported. The output of F.A.O.D. rose from 30 tons in 1926 to 590 tons in 1931, while the importation of peroxide of hydrogen declined to about half the previous figure. Furthermore, the availability of electrolytic hydrogen peroxide from domestic sources was an important factor in reducing the price of this product and consequently increasing its uses, with the result that Italian consumption of peroxide of hydrogen has more than doubled since 1925. In addition to hydrogen peroxide, the F.A.O.D. produces potassium and ammonium persulphate, sodium perborate, and magnesium peroxide.

Modern Lacquers

Improved Synthetic Resins and Plasticisers

THE advantages of some new synthetic resins and plasticisers are discussed in a booklet which is just ready to be distributed by Rex Campbell and Co., Ltd.

Rocrex is a new synthetic resinous product which combines the qualities of all known types of natural and so-called artificial resins. It has attracted attention because it produces rock-hard films, resistant to alkali and of great durability. These combine the hardness of nitro-cellulose lacquers with the elasticity of oil lacquer films. Not less important is the outstanding light fastness, under high temperature stoving, of enamels made from it. Light pigmented, pastel and white enamels can be stoved up to 125° C. without a trace of discolouration, and coloured enamels to 150° C. Just half-an-hour is all that is required for Rocrex stoving enamels to dry—without addition of driers. Turpentine and white spirit are equally suitable solvents for dissolving the resin. Other solvents and diluents, such as benzol, xylol, solvent naphtha and mineral oils are also used, but the proportion of these should not be too high, or reduced drying speed and slight film softness results. The viscosity of a solution of Rocrex can be considerably lowered by the addition of industrial spirit; this produces good flow for brushing.

Films made from Rocrex when stoved are remarkably resistant; they are not attacked after many hours heating at 50° C. in a 10 per cent. soda solution. The resin is soluble in hydrocarbons and esters, but insoluble in alcohols; solutions of Rocrex can therefore be considerably reduced in their viscosity by the addition of alcohols. For leather, leather cloth, and all flexible finishes, fatty oils readily combine with Rocrex on heating.

Plast-o-crex is a new resinous product combining the durability of a resin and the plastic quality of the usual oil and synthetic plasticisers. It is primarily used in making cellulose nitrate lacquers and finishes—clear and pigmented—for application to wood, metal, paper, leather and leather cloth. It is also employed as a filler and primer for metal. An important feature is its duality of function as resin and plasticiser in the building of lacquer formulæ. In addition to great hardness, adhesion and durability, it has exceptional impermeability; it is remarkably light-fast and produces glass gloss. As a resin it brings to a lacquer film the hardness of copal, the adhesion of gum elemi, and the durability of dammar. In high-grade lacquers and finishes the amount of standard plasticisers, oil or synthetic, required is greatly reduced. As a plasticiser it contributes the well-known qualities of the accepted plasticisers to a nitro-cellulose film, combining maximum elasticity and hardness. Lacquers made with Plast-o-crex also have the important advantage that, even after several days, when completely dried out, they can receive another top coating without the first coat being brought up. Entirely smooth binding and perfect drying is obtained.

Varcrex is a resin of natural origin, scientifically processed and blended for the manufacture of modern oil varnishes and red lead paints. It has quite remarkable properties, and has a versatility unachieved by any other resinous product of its type. Requiring no previous running, it produces glass gloss impermeable films of superlative quality. Varcrex possesses the durability of dammar and the hardness of copal. Paints and lacquers prepared from it by similar methods to copal surpass the genuine Kauri oil products. Unlike all natural gums, including copal and dammar, which vary according to origin and climatic conditions, varcrex is uniform in colour, melting point, solubility and all essential features. Alkali and acid resistant and light-fast, it produces a dust dry lacquer in half an hour and dries in a few hours to a transparent hard film.

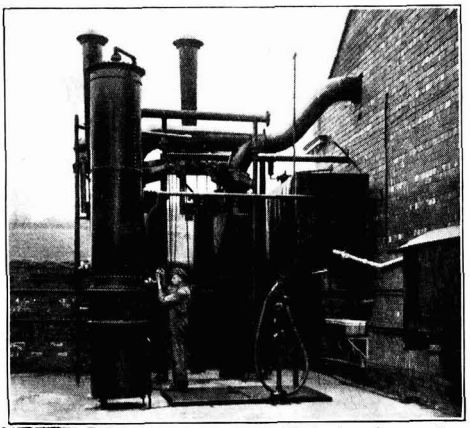
Research on New Plasticisers

THE Chemical Supply Co., Ltd., at their Barking laboratories are now carrying out further research work with a view to producing a number of new plasticisers. They are at the moment specialising in an improved type of amyl and butyl stearate. In order to give deliveries to progressive firms who are installing tanks for amyl, butyl and ethyl acetates, the company are now delivering by their own tank wagon.

The Economics of Solvent Recovery

By J. G. M. BEVAN, B.Sc.*

IT is a significant fact that since the beginning of last year more has been done in this country in the matter of the recovery of industrial solvents than was done in any dozen years previously. There may be several reasons contributing to this. It might be urged that owing to the low prices the manufacturer obtained for his goods that drastic economies were necessary. On the other hand, the manufacturer of rubber goods of all descriptions has never paid less for his raw material than he has done during this period. It is true that the cost of the raw rubber in a finished article is a small percentage of the total cost of production, and other factors must be taken into account. The most important of these



Solvent Recovery Plant operating on the Sutcliffe-Speakman System, using Activated Carbon.

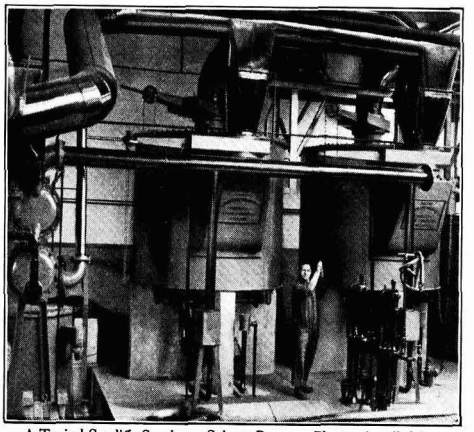
are labour and solvent. Labour, one can recognise as being unavoidable—but though an enormous amount of solvent is used nothing appears in the finished article. To take an example, a dozen pairs of rubber gloves may necessitate the use of about 40 to 50 lb. of solvent spirit, but there is none of this in the finished glove. Similarly in the proofing industry thousands of gallons a week are used but practically none of the big firms in this country recovered it until comparatively recently.

For the length of time Sutcliffe, Speakman and Co., Ltd., have been installing solvent recovery plant their record must surely be unique in the history of engineering in this country. The reason is not difficult to find. Most people in this country will, if possible, give preference to home-made goods —but the British manufacturer cannot expect to sell his goods just because they are British unless he can claim and not only claim, but prove, equality if not superiority over his competitors. Conditions in plants vary considerably and the manufacturer of solvent recovery plants generally has to fit his scheme in, but as an example of what can be done the following is a good instance. One firm using a fairly large quantity of solvent wanted a recovery plant and they wanted a good one. In conjunction with Sutcliffe, Speakman and Co., Ltd., they designed a new shop to house their spreading tables and mixers, and gave the suppliers of the plant every assistance. The result was that the plant has shown consistent recovery of 93 per cent., and—this is the important point—the 93 per cent. is obtained on a main tank to tank measurement.

It was stated in a recent article on solvent recovery that 98 per cent. to 99 per cent. recovery of the solvent led to the plant is frequently reported. The best plants to-day cannot afford to give 2 per cent. away. Any efficiencies quoted on this basis are entirely misleading, for any adsorber filled with a good carbon should show 100 per cent. efficiency. The difficulty is in getting the solvent to the adsorbers, not collecting it when once it is there. There is no measurement of efficiency that is of any practical use to a potential customer unless it expresses a measurement of what he will save in actual spirit purchased. He wants to know what he will save in actual spirit or in other words in "hard cash." It is on this point that Sutcliffe, Speakman and Co., Ltd., claim to have set a very high standard.

The plants installed by or ordered from Sutcliffe, Speakman and Co., Ltd., during the last year include those of A. O. Ferguson, of Holinwood; Proofings, of Ratcliffe; Walters, of Manchester; British Belting Co., of Cleckheaton; Franklins, of Dalston; Whiteheads, of Manchester; Halsteads, of Whitefields; Ferguson Shiers; Leicester Rubber Co., and Northern Rubber Co., of Retford. It will be recognised that the majority of these firms are engaged in the proofing industry and the method of using the solvent lends itself to efficient recovery. The spreading tables are easily hooded and it is not very difficult to ensure that all the spirit evaporated on the table reaches the adsorbers, from which it is subsequently extracted, but some spirit is left in the cloth after passing the back roller and is vapourised in the room. It is here that the firm's methods show up to advantage, as they claim to recover all that is possible provided the room ventilation goes to the adsorbers.

When it comes to estimating the efficiency of recovery on spreading tables it is not so easy as it appears at first sight. The only satisfactory way to do this is to measure the solvent on a tank-to-tank basis. How much spirit is actually issued from the main storage tank? How much is put back by the recovery plant? That is the only true measure of efficiency. The difficulty is that recovery does not always extend as far as it should do. If spirit is being recovered only from the spreading tables its apparent efficiency must be lower than that of another plant which is recovering also from the mixers. Its actual efficiency may not be any lower, but it is not easy to ascertain it by measurement. It may be taken as an established principle that when once an activated carbon recovery plant is to be installed, then it pays to put



A Typical Sutcliffe-Speakman Solvent Recovery Plant as installed in a Waterproof Garment Factory.

into it all the waste spirit possible. A plant to recover, say, 100 gallons a week, may not be an economical proposition, but if a plant is installed to recover say 1,000 to 1,500 gallons a week, then the recovery of most of this extra 100 gallons is comparatively easy and most decidedly worth while.

It has been stated by one solvent recovery plant manufacturer that when recovering from other processes, say, for example the manufacture of seamless rubber goods in open dipping tanks, very high efficiencies are not to be expected,

* Sutcliffe, Speakman and Co., Ltd,

While it may be, and probably is true, that efficient recovery in these cases is not so easy as on spreading tables, it by no means follows that it cannot be done. Sutcliffe, Speakman and Co., Ltd., have installed one such plant, that is on open dipping, which over the last twelve consecutive weeks' test has shown the extraordinary recovery of 87.7 per cent. and this measured on the tank-to-tank basis referred to above. Needless to say, in this case, every possible source of loss has been provided for, but still there remain incidental losses which are unavoidable and the fact that these have been reduced to 13 per cent. speaks well for the design of the plant and the quality of the materials used in it.

The high efficiency obtained in this and other plants installed by Sutcliffe, Speakman and Co., Ltd., may be attributed mainly to two things. Firstly, it is claimed that the carbon, made by themselves at Leigh, is a distinct advance on any hitherto put into use, and secondly, the design of the plant and particularly of the adsorbers which enables them to handle very large volumes of air, without making the items unduly large or necessitating a large expenditure of power and which in operating with the above special carbon give 100 per cent. efficiency. In order to ensure good recovery it is in many cases essential to move a lot of air, in fact to take so much air to the adsorbers that it is almost impossible for solvent laden air to pass out of the rooms by any other exit. This sometimes reduces the concentration to a very low figure, but even with concentrations as low as 1 part in 10,000 by volume, the carbon used will extract the solvent entirely.

One result of working at these low concentrations is that one is far removed from any possibility of explosion. The lower limit of the explosive range of the average spirit being about 1 part in 100. Another result of moving these large volumes of air is the greatly improved conditions in the work rooms. One of the reasons why the recovery was low prior to Sutcliffe, Speakman and Co., Ltd., was due to lack of efficiency in the adsorbers and due to the continental manufacturers of carbon laying too much stress upon producing a carbon of so called low retention value and overlooking the benefits of a carbon, which allows "nothing to pass."

Aliphatic Alcohols and their Derivatives

An Important Group of Solvents

THE demand for new and better solvents available in commercial quantities and at economic prices has increased enormously since the war, and has not remained unsatisfied. This development began with the use of cellulose dopes for aeroplane wings, followed some years later by the use of cellulose lacquers for motor car bodies, as the result of a search for a finsh which would be cheaper and at the same time more durable than the old coach-builders' paints and varnishes which required innumerable coats and an immense amount of hand-work in rubbing down between the coats. More recently the application of these lacquers to house decoration and furniture has opened up another new and almost unlimited field, and one which may herald a complete revolution in the paint and varnish industry. Finally the extraordinary development during the last few years of articles of all kinds moulded from plastic materials such as synthetic resins has led, and is still leading to a greatly increased demand for special solvents.

Among the different groups of solvents, the terpenes, the paraffins, aromatic coal tar products, chlorinated compounds, and son on, the aliphatic alcohols and their derivatives, now stand out as the most important group. In a recent work on solvents, more examples of this group are dealt with than of all the others put together, and some idea of the wide range of these products which are now available and the diversity of purposes for which they are used is given below.

OILS, FATS, AND WAXES: Ethyl acetate, acetone, butyl alcohol, butyl acetate, butyl formate, amyl formate, amyl acetate, iso-butyl acetate.

CELLULOSE ACETATE AND NITRATE: Ethyl formate, ethyl lactate, acetone, diacetone alcohol, butyl lactate, iso-butyl lactate, amyl acetate, amyl lactate.

LACQUERS AND DOPES: Acetone, diacetone alcohol, ethyl acetate, butyl lactate, butyl acetate, dibutyl phthalate, iso-butyl lactate, amyl acetate, amyl lactate, diamyl phthalate.

RESINS, NATURAL AND SYNTHETIC: Acetone, diacetone alcohol, acetaldehyde, ethyl acetate, butyl alcohol, butyl acetate, butyl formate, butyl propionate, butyl lactate, iso-butyl alcohol, iso-butyl acetate, amyl lactate.

SHELLAC AND GUMS: Butyl alcohol, butyl acetate, butyl lactate, iso-butyl alcohol, amyl alcohol, iso-butyl acetate, iso-butyl lactate, diacetone alcohol, ethyl acetate, ethyl lactate, methyl acetate, iso-propyl acetate, iso-propyl lactate.

PLASTICISERS: Amyl oleate, diamyl phthalate, amyl stearate, diamyl tartrate, butyl oleate, dibutyl phthalate, butyl stearate, dibutyl tartrate, ethyl oleate, diethyl phthalate, diethyl tartrate.

ESSENCES AND CONFECTIONERY: Amyl acetate, amyl formate, butyl propionate, iso-butyl acetate, ethyl acetate, ethyl formate, iso-propyl acetate, propyl acetate.

PERFUMES: Amyl formate, butyl propionate, dibutyl phthalate, butyl salicilate, iso-butyl alcohol, iso-butyl acetate, triethyl citrate, diethyl phthalate, ethyl salicilate, iso-propyl acetate, propyl acetate.

SOAPS AND POLISHES: Amyl stearate, dibutyl tartrate.

PAINT REMOVERS: Acetone, mesityl oxide.

RUBBER ACCELERATORS: Acetaldehyde, butylaldehyde.

Some of these solvents derived from alcohol are now being manufactured in this country at the rate of thousands of tons per year, whilst the demand for others is growing very rapidly. The derivatives of amyl, propyl, and iso-butyl alcohols, are at present dependent for their raw materials upon the supply of fusel oil, a by-product of the manufacture of ethyl alcohol, while others, such as methyl ethyl ketone and mesityl oxide, are by-products of acetone manufacture. The available quantities of these by-products are limited, and if the demand for the corresponding solvents continues to increase, and it would undoubtedly increase if more abundant supplies were available, it may become necessary to work out new processes for making them, starting from other and more plentiful raw materials.

In concluding this brief glimpse at a promising industry in which this country has made a good start and looks like holding its own, reference should be made to a very satisfactory feature which shows that the importance of standardising the quality of product is fully recognised, *viz.*, that for all these solvents British Standards Institution specifications have been issued or are in course of preparation, covering in some instances various grades suitable for different purposes. This is particularly important in the case of such products where small variations in purity, colour, or uniformity of properties may have serious consequences in their industrial applications.

International Nickel Co. of Canada

A Net Loss Reported

THE quarterly statement of the International Nickel Company of Canada, Ltd., reports a net loss of $80,158 after provision for taxes, interest, depreciation, depletion and other reserves, for the three months ended March 31, 1933. This figure compares with a net profit of $157,007 in the last quarter of 1932, a net loss of $109,097 in the third quarter, a net loss of $629,327 in the second, and a net profit of $536,071 in the first quarter of 1932. In his letter to shareholders, which accompanies the statement, Robert C. Stanley, president of the company, points out that nickel cast irons now have relatively the same position as that held by nickel steel 25 years ago, and nickel may parallel in the cast iron field the substantial market, it has already established in the steel industry. The industrial world, which has benefited so largely from the development of nickel alloy steels during the past 40 years, is now beginning to appreciate like possibilities in the development of nickel cast irons.

British Chemical and Dyestuffs Traders' Association

Mr. Victor Blagden Criticises Trade Agreements

THE tenth annual general meeting of the British Chemical and Dyestuffs Traders' Association was held at the Howard Hotel, London, on May 23. The business meeting was, as usual, preceded by a trade luncheon, presided over jointly by Mr. Victor Blagden, president, and Mr. S. J. C. Mason, chairman.

Mr. O. F. C. BROMFIELD proposed the toast of the Association, coupled with the name of the president, and said that the work of the Association was increasingly recognised and appreciated. If it had justified its existence in the past, it was even more likely to do so in the future, in view of the prevailing uncertain conditions. Mr. Victor Blagden this year completed ten years' active work and leadership of the Association, having taken the chair in May, 1923, at the formation of the present Association out of the two former associations. His advice was always sought by members of the chemical trade.

Mr. VICTOR BLAGDEN, in the course of his reply, said the Association was celebrating the tenth year of its existence and they could claim that it had been of service not only to its members, but to all chemical merchants and traders in this country. The need for its existence was by no means ended, for they would need a trade association as much in the future as in the past. To him it was evident that whether they liked it or not, they were bound to have more Government interference in trade than ever before. In spite of orgies of conferences the world's economic and political position was as chaotic as ever and the commercial war between nations continued. If the continual raising of tariffs was going to end in their abolition, then they must not mind putting up with the inconveniences they caused in the meantime.

At that moment trade agreements were being rushed through with great vigour and one wondered why this was being done before the economic conference. These agreements no doubt satisfied some people and were disliked by others. Some of the clauses in the Argentine agreement seemed most unsatisfactory. He referred particularly to the fact that the proceeds of goods shipped from England were firstly to be used to pay interest on the Argentine debt to America and only the residue remitted to England. Then there was the question of how these trade agreements affected the most favoured nation clauses with other countries.

Too Much Public Spending

The economic experts were not very helpful—some told them they should spend more and others were equally sincere in urging them to economise. Whilst not pretending to be an expert, it seemed pretty evident to commercial people that if they spent a great deal more than their income they would generally end at Carey Street or at some similar unpleasant place.

As a nation we spent too much and he could never understand why with the same population approximately in England and France it cost us twice as much to run this country as it did France.

They heard a great deal about inflation in these days and the bankers told them that that could never come in England. Why not, if the rest of the world indulged in it and thereby raised the price of its commodities? He could not see how with a combined national and municipal debt of nearly 10,000 million pounds we could avoid inflating.

Returning to the Association, Mr. Blagden said that under the chairmanship of Mr. Mason a great deal of useful work had been accomplished; Mr. Mason had devoted himself whole-heartedly to his task and they were indebted to him for having so ably guided them in difficult times. Under the direction of Mr. Gilliat the Association would be in good hands in the future. He also paid a tribute to the secretary, Mr. Paige, who in a short time had made himself most useful to the Association. Their relations with the various Government departments had continued to be friendly and they were always listened to even if they did not always get what they wanted, while individually they would have little chance of being considered. He believed there were signs of a disposition of the large combines to work with the merchants and he trusted that might develop. It was obvious that collaboration between the two would lead to the best results for them.

At the annual meeting, held at the Howard Hotel on Tuesday afternoon, the following officers were elected to serve during the ensuing year: President, Mr. Victor Blagden, vice-presidents, Mr. F. T. T. Reynolds and Mr. A. F. Butler; chairman, Mr. H. Gilliat (Leeds); vice-chairman, Mr. H. A. Berens; hon. treasurer, Mr. A. E. Reed; hon. auditor, Mr. A. Hughes; executive council, Messrs. H. Bridger (O. Murray and Co., Ltd., London), S. J. C. Mason (Bush, Beach and Gent, Ltd., London), J. F. A. Segner (Frank Segner and Co., Ltd., Manchester), and H. Wilson (Cole and Wilson, Ltd., Huddersfield).

A Sound Position

Mr. S. J. C. MASON, chairman, in the course of his report on the activities of the Association during the past twelve months, said that the members could congratulate themselves on the sound financial position of the Association. Nevertheless, the question of finance was always an important one, and it was essential that the present membership should not only be maintained but, if possible, increased. Mr. Blagden, their president, had continued to devote much of his time and interest to the welfare of the Association, and had sacrificed personal and business engagements in order to represent the Association at the meetings of the British Standards Institution. His work in that direction would eventually materially advance the interests of the British chemical merchant. He had frequently sacrificed his domestic and business affairs and travelled from different places on the Continent at a moment's notice to supervise the affairs of the Association.

In Mr. Butler, one of the vice-presidents, the Association had a staunch supporter and active worker. Although ill-health prevented Mr. Reynolds, of Manchester, from taking an active part he still took a keen interest in the Association's affairs. Mr. Gilliat as vice-chairman had always been an enthusiastic worker, and had at last acquiesced in the hope expressed at the last annual meeting, and had agreed to be nominated for the office of chairman for the coming year. There was no-one better qualified to supervise the interests of the Association than Mr. Gilliat, who had been actively connected with the Association from its commencement. The council had suffered a loss during the year through the death of Mr. F. P. Bayley, of Bayley, Clanahan and Co., but had been fortunate in securing the consent of Mr. Frodsham, of Jas. Beadel and Co., Ltd., of Liverpool, to co-option as a member.

Usefulness of the Association

The service rendered to members had been performed efficiently and to the satisfaction of all concerned. The number of inquiries from individual members on various trade matters had been exceptionally heavy. Valuable assistance had been rendered on all matters relating to the constantly changing import duties and restrictions. Members were now making more use of the excellent facilities at their disposal, all documents and queries referred to the Association being treated by the secretary as strictly confidential. The Association continued to enjoy the confidence of the Government departments and other authorities and its views were accepted as fully representative of the chemical and dyestuffs trades. Work in connection with Key Industry Duty matters had continued, although most of the time was now taken up with general tariff matters. Exemption orders suspending Key Industry Duty on products not manufactured within the Empire continued to be renewed each year, and new orders came along from time to time. A number of articles were recently added to the dutiable list and it was possible that there were one or two items unjustly included. The Association was always pleased to advise members as to the procedure to be followed for making applications for exemptions.

After much controversy and a good deal of opposition the Dyestuffs Act was again renewed for a further period of twelve months. Opposition to this legislation from the con-

suming industries was becoming greater, and it might be suggested that the period of usefulness of the Dyestuffs Act as such had passed and it was therefore desirable that the Act should be allowed to expire. The Government had asked the Import Duties Advisory Committee to investigate the position and that body had already requested the Association to state its views, and, of course, such views had been given.

Operation of Import Duties Act

Much attention had been devoted to matters affected by the operation of the Import Duties Act. Applications for alterations in duties were constantly being made to the Import Duties Advisory Committee, and the Association had been frequently called upon to voice the opinion of the trade and on several occasions to represent the views of important consumers. The success obtained by the Association in this respect had been exceedingly gratifying. It was a natural consequence of tariff legislation that difficulties should arise with the Customs department. The views of the Customs authorities and those of the Association did not always harmonise, particularly regarding questions of classification for duty and the values on which duty was assessed. Although he was glad to report considerable progress in this respect there was one matter which was causing inconvenience to importers generally. He referred to the extraordinary length of time taken by the Customs authorities to settle cases where goods had been released on deposit. The Association fully appreciated that the administration of a general tariff was no light task and the staff of the Customs department had worked exceedingly well. At the same time there was no reason why a merchant having paid a deposit should have to wait months until he knew the amount of duty he would be called upon to pay. Present methods only hindered and restricted trade at a time when it should be the general object to increase trade. It was hoped, therefore, that the commissioners of H.M. Customs would co-operate with the Association in its endeavour to expedite the settlement of such cases.

The Government had clearly shown that it was willing to consider the making of trade agreements with countries where there was a possibility of finding a market for British exports. It was possible that future trade agreements might provide an opportunity for increasing the export of chemical materials.

Questions and Answers

Technical, Industrial and General

With a view to promoting closer co-operation between members of the chemical industry who are in search of information on technical, industrial and general points and those who are in a position to supply their requirements, a selection from the large number of questions received is given under this heading. It is important that the full data in regard to each question that is asked should be put before us, or the answers given will have less value than they might otherwise possess. In cases where the answers are of general interest, the answers are published; in others, the answers are simply passed on to the inquirers. Readers are invited to co-operate in supplying information on the subjects of the queries and in augmenting replies already given.

192.—"Acidite" Tubes.—In The Chemical Age of April 29 (p. 365), an inquirer sought information regarding the source of supply of "Acidite" tubes for water service pipes, etc., in a paper mill.

We have been unable to find the makers of "Acidite" tubes. There are other materials of an acid-resisting nature which should fulfil the requirements specified. We have supplied the names and addresses of the manufacturers of three such products.

193.—Oxidation of Tin.—In The Chemical Age of April 29 (p. 365), a British enamel manufacturing firm asked for information regarding the makers of plant suitable for the oxidation of tin.

Replies from two suppliers of such plant have been forwarded to the firm concerned.

194.—Water Softening Medium.—Can you give particulars as to where a water softening medium can be purchased for use in portable water softening plants? We believe this medium is known by various names, such as Silex, Doucil, Naturalith, etc.

The name and address of the manufacturers of Doucil has been supplied, but information is still required regarding the other products mentioned. For water softening, certain natural forms of zeolite are at present being used in addition to artificial zeolites. We believe that certain natural zeolites have been mined in Ireland recently with a view to their use in water softening.

195.—Carbon Tetrachloride.—We shall be glad to receive particulars of the names and addresses of manufacturers of carbon tetrachloride in this country and also some indication of the quantities consumed.

No direct information on the consumption of carbon tetrachloride in this country is at present available. Statistics regarding imports and exports of this commodity are obtainable from the monthly trade returns issued by the Board of Trade. In reply to the first part of the question, the names and addresses of British suppliers have been furnished.

196.—Drying Machinery.—We shall be glad if you will let us have the names and addresses of manufacturers of drying machinery. The type of machine we require is that in which frames containing small items can be consecutively passed through a heated draught or suction chamber, emerging from the end of some with a constant content of moisture.

The names and addresses of manufacturers and suppliers of drying plant have been supplied. Particulars of new drying plants which are placed on the market from time to time will be found as occasion arises in the Works Equipment Section of The Chemical Age, which is published on the third Saturday in each month. Special articles on drying machinery have also appeared at intervals in The Chemical Age.

197.—Import Duty on Chemicals.—Important producers of acetone and formol on the Continent are anxious to have some information as to the future regarding import duties. They understand that there has been a considerable reduction in the import duties on acetone and formol coming into Great Britain from Germany and they would be glad to have some information as to whether there is a possibility of the 33⅓ per cent. import duty being reduced for these products manufactured in Belgium.

Under the most settled conditions it is difficult to forecast the future, but it is particularly so in view of the rapidly changing circumstances consequent upon the trade agreements now being entered into between Great Britain and other nations. Various chemical products have been included in the schedules to the trade agreements signed during the past month, but no indication has been given with regard to future negotiations. The Association of British Manufacturers, 166 Piccadilly, London, W., and the British Chemical and Dyestuffs Traders' Association, 80 Fenchurch Street, London, E.C., are both actively engaged in studying the effects of the Import Duties Act and the new trade agreements upon the chemical industry of this country and both are in close consultation with the Government authorities. Much of this work is necessarily of a confidential character, and the views of the two associations are not necessarily identical on account of the different nature of the businesses carried on by the constituent members. Each association, however, is recognised as being representative of the interests of the manufacturers and merchants respectively, and it is desirable that negotiations should be conducted through one or other of these bodies.

Queries Awaiting Replies

198.—Caoutcaouthine.—A firm of merchants wishes to obtain the names and addresses of British manufacturers of light caoutcaouthine.

British Celanese, Ltd., v. Courtaulds, Ltd.

Opening of Courtaulds' Case

IN the Court of Appeal, on Friday, May 19, the Master of the Rolls and Lords Justices Lawrence and Romer resumed the hearing of British Celanese against the dismissal by Mr. Justice Clauson, in the Chancery Division, of their action against Courtaulds, alleging infringement of letters patent for evaporative or dry-spinning of cellulose acetate rayon, which his lordship ordered to be revoked on the ground of invalidity.

Sir Arthur Colefax said his clients attached very great importance to the lubricating feature of their invention and they submitted that in itself it was a substantial inventive step. Where a cap spinning device was used for simultaneously twisting and winding these continuous threads it had been discovered that by lubrication they could always be certain of obtaining a product, the fibres of which had not been cut. It was found to be quite impossible to keep the cap edges always free from irregularities, and it was these which were responsible for the cutting, small and microscopic though they were. What plaintiffs discovered was that if they applied oil to the fibre on its way to the cap edge the latter was lubricated, and deprived of its cutting powers. That was quite a new use of lubrication and it was not at all an obvious one. There was no analogous user of a cap spinning device as alleged.

Summarising the features of plaintiffs' process, which he claimed were novel, Sir Arthur said that first they were applying cap spinning to a material to which it had never been previously. Secondly it was being applied to a material which was not analogous to any to which such a device had previously been applied. In fact they were using the device for a new purpose as compared with the use to which it had previously been put, because they were using it to "throw" and not to spin.

The twisting of silk filaments was called throwing, but plaintiffs were not throwing an already parallel wound thread. Next they were contemplating using a cap spinning device running at speeds which had never been known before. They were also in one sense manufacturing a new product, because at the date of the patent there had been no rayon produced which had not had to undergo handling consequent upon parallel winding having preceded twisting.

Accordingly, in that respect they were producing what he submitted was a better material, because in the process of manufacture handling was undesirable. The plaintiffs had also shown how it was possible using a cap spinning device to obtain in all circumstances a smooth product by means of lubrication.

Mr. Craig Henderson, K.C., addressed the Court in support of the appeal.

This concluded the case for appellants.

The Case for Courtaulds

Mr. Whitehead, K.C., addressing the Court on behalf of Courtaulds, said Mr. Justice Clauson's judgment had been criticised because it contained no reference to the utility of the invention or its advantages. When their lordships knew the facts they would not be surprised that no reference was made to those matters. When the action started defendants were sued on four patents and during the hearing Sir Arthur Colefax stated that he had come to the conclusion that the fourth patent, which covered, as he put it, a very useful function, had not been infringed by Courtaulds, and that he proposed to drop the action on that patent. In order to shorten the proceedings, defendants said they would not proceed with their counter-claim for revocation of that patent.

The case then proceeded with respect to three patents and in that Court plaintiffs had not proceeded with their appeal on the third patent. As to the patent, witnesses had expressed their opinion in unequivocable terms that defendants had not taken the invention which was the subject of that patent. To secure uniformity of spinning conditions was a commercial necessity. If their lordships would bear those facts in mind they would realise why there was so little in the judgment relating to utility. Counsel would not for a moment have the Court think that he contested, what was called patent utility. It was one thing to remember that and quite another to listen to the glowing accounts of utility which had been given to the Court.

In the specification the patent covered not only cellulose acetate, but other cellulose derivatives. Mr. Swinburn, their witness, when asked if he knew of any use for the invention for anything other than cellulose acetate, replied that he knew of none. There was not a particle of evidence that there was any utility for the invention for any of the other derivatives of cellulose. If the invention had this enormous utility they might have thought it would have been applied to nitrocellulose in order to rescue that industry when it was being pressed by viscose, but there was no evidence of that.

Plaintiffs conducted an experiment to show that it could be used for nitro-cellulose, which was an explosive body, but one witness said he would not like to be responsible for a factory in which such a process was employed.

Mr. Whitehead proceeding, stated there had been no commercial user of the plaintiff's process in respect of nitrocellulose, and in order to demonstrate that it could be used in that manner, a special experiment was held during the course of the case at Spondon, in the presence of the defendant's experts. The conditions under which the experiments were performed were such that one witness said he would not be responsible for the factory where such conditions were employed. For one thing the temperature was as high as 80° C. Nitro-cellulose was a highly explosive substance and it had to be de-nitrated before it became cellulose. It then lost its explosive powers.

Dealing with alleged common general knowledge of plaintiffs' process, he said that it was not necessary for such knowledge to be universal or even universal among those engaged in a particular industry. It was only the people concerned in the industry who were to be considered, and the common general knowledge was that which the vast bulk of them might be expected to possess.

Almost the only way of proving such a knowledge was by obtaining admission from one's opponents, and he contended that he had obtained such admissions from the plaintiffs' witness. Plaintiffs had to establish that there was commercial utility in their process as claimed and as claimed in all its width.

Furthermore, they had to establish that commercial utility, as contrasted with the utility of any of the earlier processes, it was said to be an improvement upon. The object of plaintiffs' invention was said to be to get a dry filament which could be wound outside the casing, but with regard to nitro-cellulose it was not desired to obtain the filaments dry. That might be one of the explanations why it had not been tried for nitrocellulose, and there were others.

His contention was that there was no novelty in the idea of downward spinning and he said that with a thin solution it was the natural way of spinning.

The hearing was adjourned.

Grape Juice Production

Progress in South Africa

RAPID progress has been made with the grape juice factory at Worcester, South Africa, and the building, with wages for building and the machinery, cost about £30,000. The factory has been designed to produce 2,500 leaguers of grape juice per season. As the grapes are delivered they are pressed and put through filters, and the juice is then pumped into a pre-cooling refrigerating room containing ten 20-leaguer tanks. The juice is allowed to settle for five hours, when it is pumped into 30 big tanks, each with a capacity of 86 leaguers, for aeration. It remains here for two months and is then pumped into the filling room, and filtered into the filling machine, which fills and corks the bottles. Uniform colour and flavour is carefully maintained in these products, and white grapes, principally of white hanepoot variety, are used. In season use will also be found for sultanas and French grapes.

Chemical Industry Lawn Tennis Tournament

Cup Holders Beaten in First Round

THE fourteen matches in the preliminary rounds of the third annual Chemical Industry Lawn Tennis Tournament, arranged by THE CHEMICAL AGE, were concluded last week-end, and four of the matches in the first rounds had been decided at the time of going to press. The outstanding feature of the matches played to date is the defeat of S. E. Chaloner and W. Speakman (Monsanto Chemical Works, Ltd., Ruabon), holders of THE CHEMICAL AGE silver challenge cup, in the first round of the doubles. They were beaten by R. C. Pennington and R. George (J. Crosfield and Sons, Ltd., Warrington) by 8—6, 6—1. W. Speakman was also defeated by R. C. Pennington in his first round match in the singles, by 4—6, 6—4, 6—2. S. E. Chaloner is due to meet P. A. Tunstall (Salt Union, Ltd.) in the singles. C. G. Copp (Doulton and Co., Ltd.) and J. W. Urban (Monsanto Chemical Works, Ltd.), each of whom reached the semi-finals of the doubles last year, have won their way into the first round of the singles, while L. Giltrow and G. F. Hammond (Williams, Hounslow, Ltd.), last year's runners up, have won their preliminary match in the doubles.

In the first round, Urban is due to meet L. F. Grape (Borax Consolidated, Ltd.), who had a close fight in the preliminary round, while Copp will meet H. Barningham (Monsanto Chemical Works, Ltd.), who is partnering Urban in this year's doubles. Giltrow and Hammond are drawn against L. R. Fradin and R. C. Mugridge (Borax Consolidater, Ltd.), in the first round of the doubles

Preliminary Round Results

Complete results of the preliminary round matches are as follows:—

SINGLES.

Match 1.—L. F Grape (Borax Consolidated, Ltd.), beat G. H. Trigg (Bovril, Ltd.), 6—4, 3—6, 6—3.

Match 2.—J. W. Urban (Monsanto Chemical Works, Ltd., London), beat R. W. Welsh (British Oxygen Co., Ltd.), 12—10, 6—2.

Match 3.—E. C. Keeley (Bovril, Ltd.), beat L. R. Fradin (Borax Consolidated, Ltd.), 6—4, 6—1.

Match 4.—R. S. Law (Howards and Sons, Ltd.), walk-over, W. J. Dauncey (G. A. Harvey and Co., Ltd.), scratched.

Match 5.—W. Backinsell (Le Grand, Sutcliff and Gell, Ltd.), beat K. L. Fuller (British Drug Houses, Ltd.), 7—5, 6—0.

Match 6.—C. G. Copp (Doulton and Co., Ltd.), beat R. F. Porter (Howard and Sons, Ltd.), 6—2, 6—4.

Match 7.—R. Frost (British Oxygen Co., Ltd.), beat A. W. Middleton (Yardley and Co., Ltd.), 6—0, 6—1.

Match 8.—J. Wilson (British Celanese, Ltd., London), beat L. Seabrook (British Oxygen Co., Ltd.), 7—5, 6—4.

Match 9.—W. J. Sharman (Williams, Hounslow, Ltd.), walk-over, C. H. B. Jones (Anglo-Persian Oil Co., Ltd.), scratched.

Match 10.—D. B. Hodgson (George Scott and Son, Ltd.), walk-over, E. Cox (Anglo-Persian Oil Co., Ltd.), scratched

Match 11.—W. L. Alldis (Brandhurst Co., Ltd.), beat A. F. Childs (Borax Consolidated, Ltd.), 6—1, 6—3.

Match 12.—S. B. Perridge (Brandhurst Co., Ltd.), beat D. G. Collard (Dussek Bros.), 6—1, 6—2.

DOUBLES.

Match A.—A. Collins and H. Sibley (British Oxygen Co., Ltd.), beat F. C. White and A. W. White (Howard and Sons, Ltd.), 6—2, 6—4.

Match B.—L. Giltrow and G. F. Hammond (Williams, Hounslow, Ltd.), beat L. Seabrook and R. Frost (British Oxygen Co., Ltd.), 6—1, 7—5.

First Round Results

SINGLES.

R. C. Pennington (J. Crosfield and Sons, Ltd., Warrington), beat W. Speakman (Monsanto Chemical Works, Ltd., Ruabon), 4—6, 6—4, 6—2.

I. Williams (Monsanto Chemical Works, Ltd., Ruabon) beat J. L. Wilkinson (J. Crosfield and Sons, Ltd., Warrington), 6—2, 6—2.

DOUBLES.

R. C. Pennington and R. George (J. Crosfield and Sons, Ltd., Warrington) beat S. E. Chaloner and W. Speakman (Monsanto Chemical Works, Ltd., Ruabon), 8—6, 6—1.

N. Hogg and H. Short (Riley, Harbord and Law) walk-over, C. H. B. Jones and E. Cox (Anglo-Persian Oil Co., Ltd.), scratched.

Details of matches still to be played in the first round are given below.

All first round matches must be played by Monday, June 12, and the results, signed by all players (winners and losers) must be forwarded to reach the Editor of THE CHEMICAL AGE not later than 9.30 a.m. on Tuesday, June 13. Players are requested to read carefully the brief rules, copies of which have been supplied to them, and adhere to them, as failure to do so may lead to disappointment. For ready reference we reproduce below the principal rules affecting the early rounds of the tournament.

Rules

The competition shall be conducted on the knock-out principle, and the best of three advantage sets shall be played in all matches, except in the Final of the Singles, when the best of five sets shall be played.

The Editor of THE CHEMICAL AGE shall have the right to scratch any players who fail to play off their matches by the stipulated dates, or who otherwise fail to conform with the rules and regulations governing this competition.

Except in the case of the special period set apart for the final stages of the competition, players drawn against each other must make their own arrangements for playing off their match on a court mutually agreed upon. In the event of disagreement, the first name drawn shall have the right to choose the ground.

The result of each match must be sent by the winners to the Editor of THE CHEMICAL AGE, signed by all players (winners and losers) immediately after the match, and must reach the office of THE CHEMICAL AGE not later than by the first post on the day following the final day for playing off the round. In the case of the first round the results must be received not later than 9.30 a.m. on Tuesday, June 13.

If any player be not present at the agreed place or time of the match, opponents shall be entitled to a walk-over, after having allowed reasonable time (say, a maximum of one hour) for the others' appearance. If the players find it impossible to play off their match on the day originally chosen, they must play it on any other day, to which both sides agree, within the stipulated period.

Any dispute arising between players, or otherwise, shall be referred to the arbitration of the Editor of THE CHEMICAL AGE, whose decision shall be final.

While competitors will make their own arrangements as to hard or grass courts for the preliminary rounds, it must be understood that the Finals will be played on hard courts.

First Round Draw

SINGLES.

Chaloner, S. E. Monsanto Chemical Works Ltd., Ruabon, North Wales. (Ruabon 3.)	*v*	**Tunstall, P. A.** Salt Union, Ltd., 20, Water Street, Liverpool. (Central 4370.)
Backinsell, W. Le Grand Sutcliff & Gell, Ltd., The Green, Southall, Middlesex. (Southall 2211.)	*v*	**Law, R. S.** Howards & Sons, Ltd., Uphall Works, Ilford, Essex. (Ilford 1113.)
Frost, R. The British Oxygen Co., Ltd., Angel Road, Upper Edmonton, London, N.18. (Tottenham 2488.)	*v*	**Giltrow, L.** Williams (Hounslow), Ltd., Hounslow. (Hounslow 2929.)
Wilson, J. British Celanese, Ltd., 22/3, Hanover Square, London, W.1. (Mayfair 8000.)	*v*	**Mugridge, R. C.** Borax Consolidated, Ltd., 16, Eastcheap, London. (Royal 1450.)
Blow, D. The British Drug Houses, Ltd., Graham Street, City Road, London, N.1. (Clerkenwell 3000.)	*v*	**Hodgson, D. B.** George Scott & Son (London), Ltd., Bradfield Road, Silvertown, London. (Albert Dock 2026.)
Alldis, W. L. Brandhurst Co., Ltd., Vintry House, Queen Street Place, London, E.C.4. (Central 1411.)	*v*	**Smith, P.** Bakelite, Ltd., 68, Victoria Street, London, S.W.1. (Victoria 5441.)
George, R. J. Crosfield & Sons, Ltd., Bank Quay, Warrington. (Warrington 800.)	*v*	**Francis, B. T.** Bakelite, Ltd., 68, Victoria Street, London, S.W.1. (Victoria 5441.)
Sharman, W. J. Williams (Hounslow), Ltd., Hounslow. (Hounslow 2929.)	*v*	**Keeley, E. C.** Bovril, Ltd., 148/166, Old Street, London, E.C.1. (Clerkenwell 1202.)

Nottingham, R. A.
Le Grand Sutcliff & Gell, Ltd., The Green, Southall, Middx. (Southall 2211.) *v*

Pretlove, F. G.
George Scott & Son (London), Ltd., Bradfield Road, Silvertown, London. (Albert Dock 2026.) *v*

Thomsett, E. A.
British Oxygen Co., Ltd., Angel Road, Edmonton, London. (Tottenham 2488.) *v*

Tickner, A.
British Celanese, Ltd., 22/3, Hanover Square, London, W.1. (Mayfair 8000.) *v*

Barningham, H.
Monsanto Chemical Works, Ltd., Victoria Station House, London, S.W.1. (Victoria 1535.) *v*

Urban, J. W.
Monsanto Chemical Works, Ltd., Victoria Station House, London, S.W.1. (Victoria 1535.) *v*

Collins, A.
British Oxygen Co., Ltd., Angel Road, Edmonton, London. (Tottenham 2647.)

Perridge, S. B.
Brandhurst Co., Ltd., Vintry House, Queen Street Place, London, E.C.4. (Central 1411.)

Marchant, W. W.
Doulton & Co., Ltd., High Street, Lambeth, London. (Reliance 1241.)

Whittaker, H. R.
Williams (Hounslow), Ltd., Hounslow. (Hounslow 2929.)

Copp, C. G.
Doulton & Co., Ltd., 28, High Street, Lambeth, London, S.E.1. (Reliance 1241.)

Grape, L. F.
Borax Consolidated, Ltd., 16, Eastcheap, London, E.C. (Royal 1450.)

DOUBLES.

Mountney, G. E., & Almond, E. G.
Bakelite, Ltd., Redfern Road, Tyseley, Birmingham. (A.G. 1181.) *v*

Welsh, R., & Thomsett, E.
British Oxygen Co., Ltd., Angel Road, Edmonton, London. (Tottenham 2488.) *v*

Wilson, J., & Tickner, A.
British Celanese, Ltd., 22/3 Hanover Square, London, W.1. (Mayfair 8000.) *v*

Sharman, W. J., & Whittaker, H.R.
Williams (Hounslow), Ltd., Hounslow. (Hounslow 2929.) *v*

Miller, W. B., & Lord, G.
British Celanese, Ltd., Spondon, near Derby. (Derby 2200.)

Nottingham, R. A., & Pritchard, F.
Le Grand, Sutcliff & Gell, Ltd., The Green, Southall, Middx. (Southall 2211.)

Copp, C. G. & Marchant, W. W.
Doulton & Co., Ltd., High Street, Lambeth, London, S.E.1. (Reliance 1241.)

Blow, D., & Fuller, K. L.
The British Drug Houses, Ltd., Graham Street, City Road, London. (Clerkenwell 3000.)

Fradin, L. R., & Mugridge, R. C.
Borax Consolidated, Ltd., 16, Eastcheap, London. (Royal 1450.) *v*

Prosser, V. J., John Haig & Co., Ltd., 2 Pall Mall East, London (Whitehall 1040), & **Baxter, A.,** United Yeast Co., Ltd., 238, City Road, London. (Clerkenwell 0303.) *v*

Keeley, E. C., & Trigg, G. H.
Bovril, Ltd., 148/166, Old Street, London. (Clerkenwell 1202.) *v*

Drew, H. W., & Baldock, W. G.
Williams (Hounslow), Ltd., Hounslow, Middx. (Hounslow 2929.) *v*

Clarke, A. G. R., & Browne, E.C.
G. A. Harvey & Co. (London), Ltd., Woolwich Road, London, S.E.7. (Greenwich 0020.) *v*

Porter, R. F., & Law, R. S.
Howards & Sons, Ltd., Ilford, Essex. (Ilford 1113.) *v*

Rowlinson, H. R., & Whiteman, R.
British Drug Houses, Ltd., 16/30, Graham Street, City Road, London. (Clerkenwell 3000.) *v*

How, M. H., & Shaw, J.
Johnson, Matthey & Co., Ltd., 78, Hatton Garden, London, E.C.1. (Holborn 6989.) *v*

Alldis, W. L., & Perridge, S. B.
Brandhurst Co., Ltd., Vintry House, Queen Street Place, London, E.C.4. (Central 1411.) *v*

Killick, A. A., & Brittain, G. A.
B. Laporte, Ltd., Kingsway, Luton. (Luton 891.) *v*

Giltrow, L., & Hammond, G. F.
Williams (Hounslow), Ltd., Hounslow. (Hounslow 2929.)

Smith, G. Ormiston-, & Smith, E.
Riley, Harbord & Law, 16, Victoria Street, London. (Victoria 2661.)

Eckett, B. J., & Harbour, S.
Williams (Hounslow), Ltd., Hounslow, Middx. (Hounslow 2929.)

King, M. B., & Hornsby, R. H.
Howards & Sons, Ltd., Uphall Works, Ilford. (Ilford 1113.)

Collins, A., & Sibley, H.
British Oxygen Co., Ltd, Angel Road, Edmonton, London N.18. (Tottenham 2647 and 2488.)

Hodgson, D. B., & Pretlove, F. G.
George Scott & Son (London), Ltd., Bradfield Road, Silvertown, London. (Albert Dock 2026.)

Urban, J. W., & Barningham, H.
Monsanto Chemical Works, Ltd., Victoria Station House, London. (Victoria 1535.)

Haines, J., & Hawley, F. G.
Anglo-Persian Oil Co., Britannic House, Finsbury Circus, London, E.C.2. (National 1212.)

Francis, B. T., & Smith, P.
Bakelite, Ltd., 68, Victoria Street, London, S.W.1. (Victoria 5441.)

Grape, L. F., & Childs, A. F.
Borax Consolidated, Ltd., 16, Eastcheap, London. (Royal 1450.)

Letters to the Editor

Stainless Steel Developments

SIR,—Having read the letter from Mr. J. Nicol, chief chemist of the Clyde Alloy Steel Co., Ltd., on the subject of stainless steel balances, in your issue of May 13 (page 430), we beg to inform you that we are in a position to carry out the work mentioned by your correspondent.

It is notorious that some chromium plated articles, as made hitherto, are unsatisfactory in use owing to lack of consistent results from the plating operation, and liability to spot, peel or even disintegrate when the plated article had been in use for some time. The Metalion process overcomes all the troubles of spotting and peeling, which are chiefly due to insufficient adhesion of the nickel deposit under the plate and to its faulty texture and crystalline structure. The Metalion nickel deposit is an integral part of the article to be plated, and cannot be stripped or loosened by heat or mechanical means. The chromium is deposited in such a bright condition that very little polishing is needed to give a high finish. The electro-cleaning operation requires only 10 seconds and ensures perfect adhesion, whereby the cumbersome and uncertain method of hand cleaning and brushing is eliminated. One-thousandth of an inch of nickel is deposited in 10 minutes, as against 40 minutes in the most rapid method known so far. The nickel deposit is very close in texture, and can be built up to any desired thickness. The chromium bath has particularly good throwing power, *i.e.*, it will deposit well in recessed work, and the deposit is bright unless otherwise desired.

Tubes or other articles can be bent after plating and polishing without affecting the adherence of either the nickel plating or the chromium deposit, notwithstanding the fact that the base metal and consequently also the plating may become somewhat stretched and distorted, the extent of which depends upon the severity of the bend. The Metalion process is the first which has succeeded in obtaining adherent deposits on iron, hardened and spring steel, and is, therefore, able to prolong the life of tools, dies, gauges, etc., with satisfactory results. Humber, Ltd., Coventry, have adopted these methods with success for the chromium plating of their motor car parts. Since commencement production has been foolproof and completely efficient and, although now mainly in the hands of unskilled labour, there have been no stoppages or queries. A non-exclusive licence has also been granted to the Amalgamated Dental Co., Ltd., which is also working the Metalion process to its satisfaction.

Rigid and exhaustive tests have been applied to our plating such as those alluded to by Mr. Nicol, and we have informed him that we should be glad to have the opportunity of assisting him and perhaps receiving a visit from him at our works, when we shall be glad to demonstrate our process.—Yours faithfully,

E. C. WITHERS.
Sales Manager.

Metalion, Ltd.,
1 Lacland Place, Chelsea, S.W.10.

Electrical Insulating Oils

Revised Standard Specifications

THE British Standard specification for insulating oils is quoted in practically every contract in this country for transformer and switch oil, and any revision of the specification is therefore a matter of general interest. The 1933 edition of the specification embodies no changes as regards the physical properties of the oil—a testimony to the soundness of the technical basis of the previous edition—but introduces a new test for freedom from moisture. The old edition specified that the oil should be "sufficiently free from moisture" to satisfy the requirements of the specification, but apart from the electric strength test there was no criterion of freedom from moisture. An additional test, in the form of a "crackle" test, has now been incorporated, but owing to the somewhat unscientific nature of this test it is regarded as optional only, when so specified by the purchaser. As the result of experience in the application of this test it is hoped that a definite technique may be evolved.

A further important amendment to the specification relates to the description of the method of carrying out the sludge test. This test has in the past been liable to produce slightly inconsistent results as between tests carried out in different laboratories, but as the result of considerable research by the Electrical Research Association the causes of these inconsistencies have been discovered and the technique of the test modified accordingly. Copies of this specification (B.S.S. No. 148-1933) may be obtained from the British Standards Institution, price 2s. 2d., post free.

Low Temperature Coal Process

Patent Extended

IN the Chancery Division on Tuesday, Mr. Justice Luxmoore continued the hearing of an action by Mr. Charles Turner, mining engineer, of Millhead Street, Glasgow, and the Turner Trust, Ltd., by way of petition for an extension of letters patent relating to an invention for "improvements in processes of destructive distillation."

Counsel explained that the invention dealt with the low temperature carbonisation of coal had two objects, *viz.*, the production of better smokeless coal and the production of oil, in lieu of tar.

When carried out on a commercial scale the invention, said counsel, would create a new market for coal and aid in reviving the coal mining industry. It was said that Mr. Turner had spent thousands of pounds on the invention and it was only now that its commercial utility and value were becoming generally known. During the war Mr. Turner was on important service and could not occupy his time on the patent, and he therefore now sought an extension.

His Lordship, after hearing counsel for the Comptroller of Patents, granted an extension of the patent till March, 1935.

British Association of Chemists

Growth of the London Section

THE fifteenth annual meeting of the London Section of the British Association of Chemists was held on May 19 at Broad Street Station Restaurant. Mr. H. M. Morgan presided. The following officers were elected for the year: Chairman, Mr. J. C. Mellersh; hon. secretary, Miss W. Wright; hon. treasurer, Mr. A. J. C. Cosbie; committee, Messrs. W. Garvie, W. C. Peck, A. W. H. Upton, G. T. Gurr, A. W. Long, H. N. Sher, V. M. Weall, Professor G. T. Morgan, L. J. Couzens, F. B. Gatehouse, G. W. Himus, A. Kagan, Captain R. Porter, Dr. P. Haas, and Dr. E. R. Redgrove.

Mr. MORGAN mentioned in his address the Pharmacy and Poisons Bill. The Bill affected the British Association of Chemists in that the word "chemist" would in future refer to both the drug sellers and those practising pure chemisty. He thanked the committee for the loyal support which had resulted in such progress as had been experienced throughout the year. He mentioned the unemployment benefit fund which, he said, was organised for those chemists who, not entitled to obtain unemployment relief, were still out of work. The fund was far from being secure, and needed to be doubled to become effective.

Net Increase in Membership

Miss W. WRIGHT, hon. secretary of the London Section, read the report on the Section's activities. She mentioned that the total membership of the section was 712, as compared with 643 last year, thus showing a net increase of 69. This, she said, was a substantial increase on last year's figures and the section was to be congratulated on the splendid pioneer propaganda activities of its members and those who served on the committee.

The report on the unemployment benefit fund was read by Mr. C. B. WOODLEY, secretary of the Association. He said that there were 460 on the lists. In answer to complaints that applications to the Association for jobs did not always prove fruitful, he said that sometimes acceptance of the application depended on the manner in which the letter of application was written. Mr. Woodley advised members to take note of the importance of this. He said that many new avenues had been opened in the Association's activities during the last year. He mentioned cases taken to court in which the Association had given valuable support.

Mr. S. R. PRICE, chairman of the council, further congratulated the London Section on its year's progress. He said that the Association had made more progress last year than in any year since its inauguration. The London Section had grown to be the largest, most active, and most powerful body in the Association.

The next meeting was arranged for June 22. A smoking concert followed the evening's business.

Alleged Pollution of River Water

Action by Chemical Company Settled

IN the Chancery Division, on Thursday, May 18, before Mr. Justice Luxmoore, a settlement was arrived at in the action by McEllins Chemicals, Ltd., Teanford Mill, against Berry Hill Collieries, Ltd., of New Haden Colliery, for an injunction to restrain them from permitting any coal dust, silt or dirty water to be discharged into the river so as to cause a nuisance. Plaintiffs also claimed an injunction against Hilton Gravel Co., Ltd., to restrain them from permitting any gravel, silt, clay or dirty water to be discharged into the river.

Both defendants denied that they were responsible for any nuisance caused by pollution of the river.

After several days' hearing, his lordship thought the place could have been kept clean at the cost of a small fraction of the costs of the action.

Mr. Vanden Berg, K.C. (for the Colliery Co.): We are all appalled at the length and cost of the action.

His lordship suggested that the case might be settled. Some arrangement would be much better than litigation.

There was a consultation and later a settlement was announced, the terms not being disclosed.

The Institute of Chemistry

April-May Examination Results

THE results of the April-May examinations of the Institute of Chemistry have been announced. The following names appear in the pass list:—

Examination in General Chemistry for the Associateship.—J. H. Anderson, Central Technical College, Birmingham; T. E. Barnes, B.Sc., Battersea Polytechnic; T. L. Bowyer, Central Technical School, Liverpool; T. F. Brown, Royal Technical College, Glasgow, and Royal Technical College, Salford; W. D. Cadwallader, Central Technical College, Birmingham; W. J. Carter, Merchant Venturers' Technical College, Bristol; E. B. Colegrave, B.Sc., Sir John Cass Technical Institute, and Chelsea Polytechnic; L. E. Cook, B.Sc., King's College, and Birkbeck College,; G. W. Cranch, University College, Nottingham; Maisie U. Cullen, Regent Street Polytechnic; H. Edwards, Central Technical School, Liverpool; G. R. Goodman, Loughborough College, Leicester; H. L. Haigh, Central Technical College, Birmingham; D. Kirby, B.Sc., Loughborough College, Leicester; W. G. Longley, B.Sc., Chelsea Polytechnic; L. McGraghan, B.Sc., Rutherford Technical College, Newcastle; R. F. Ramsay, Royal Technical College, Glasgow, and College of Technology, Manchester; R. G. Rance, B.Sc., Chelsea Polytechnic; C. E. Rousseau, Middelbare Technische School, Amsterdam; D. B. Taylor, Central Technical School, Liverpool; P. F. Timson, B.Sc., Sir John Cass Technical Institute, and Regent Street Polytechnic; H. K. Turnbull, Armstrong College, Newcastle, and Sir John Cass Technical Institute; J. A. Watson, Central Technical School, Liverpool; G. Woodhouse, A.M.C.T., College of Technology, Manchester

Examinations for the Fellowship:—Inorganic chemistry—A. S. Blatchford, M.Sc.; organic chemistry, with special reference to edible oils and fats: J. W. Croxford, W. D. L. Webb. The chemistry, including miscroscopy, of food and drugs, and of water: F. Brookhouse, B.Sc., D. M. Gangolli, M.Sc., D. D. Moir, M.Sc., R. E. Willgress, B.Sc., A.R.C.S. Agricultural chemistry: C. R. Louden, B.Sc., J. R. Mackness, Ph.D., A.R.C.S. Industrial chemistry, with special reference to petroleum: C. W. Taylor, A.R.C.S. Coal tar technology: D. Baird, B.Sc. General analytical chemistry: S. G. Burgess, Ph.D. (Lond.).

WORK on the opening of the phosphate deposits at Louis-Gentil, Morocco, has proceeded normally. The railway connection from Louis Gentil to Ben-Guerir, a point on the Casablanca-Marrakesh railway line, has been completed, thus permitting the initial takings from the mine to be transhipped via Ben Guerir to Casablanca for export. It is understood that extensive shipments of phosphate from Louis Gentil will not be made until completion in mid-year 1935 of the mine development and that of the railway connection direct to the port of Saffi.

Society of Chemical Industry

Award of Medal to Professor Bone

PROFESSOR WILLIAM A. BONE, D.Sc., F.R.S., of the Imperial College of Science and Technology, South Kensington, has been awarded the medal of the Society of Chemical Industry in recognition of his researches into the mechanism of combustion. This medal, which was instituted in 1896, is awarded periodically for conspicuous service rendered to applied chemistry by research, discovery, invention or improvements in processes.

Professor Bone was appointed head of the chemical department at the Battersea Polytechnic in 1896. It was in 1898, when lecturer in chemistry and metallurgy at Owens College, Manchester, that he started systematic research on the combustion of hydrocarbons and the influence of hot surfaces in promoting gaseous combustion, for which research he was elected a fellow of the Royal Society in 1905. The following year he went to Leeds University to organise and direct what was the first University Fuel Department in this country. Here he carried out research chiefly upon gaseous explosions at high pressures and incandescent combustion. In 1911 he visited America to expound his discoveries for which the Franklin Institute of Philadelphia afterwards awarded him its Howard Potts Gold Medal. In 1912 he returned to London to organise and direct the new department of chemical technology at the Imperial College, South Kensington, which has steadily progressed to be one of the largest chemical research centres in the country.

His researches have comprised the chemical constitution of coal, surface combustion, gaseous combustion and explosions under high pressure, the photographic investigation of flame propagation during gaseous explosions, the combustion of hydrocarbons and blast furnace reactions. A lecture entitled "Forty Years of Combustion Research," by Professor Bone, is one of the features on Wednesday, July 12, of the annual meeting of the Society which will be held at Newcastle from July 10 to 14.

Trade Outlook in Brazil

Chemical Imports Well Maintained

IN a report on economic conditions in Brazil lately issued by the Department of Overseas Trade (H.M. Stationery Office, 3s net), the commercial secretary to the British Embassy at Rio de Janeiro remarks that the foreign trade of the republic is still decreasing in value and volume, and that the outlook shows little signs of immediate improvement. In summarising the whole position he refers to the paralysing effect upon commerce of the Civil War of 1932, the disadvantages of the various restrictions and consequent loss of trade, and the limited character of the exportable resources.

The financial situation is fully considered with particular reference to questions of currency, moratoria, and exchange restrictions, while an outline is given of the proposed customs tariff revision. Trade is discussed in its various aspects, both the export and import trade being dealt with by commodities, and the coffee problem receiving special attention. The present obstacles to import trade from the United Kingdom are indicated. The report concludes with appendices giving financial and trade statistics, and an annex containing consular reports from Sao Paulo, Rio Grande do Sul, Bahia, Pernambuco and Para.

The imports of chemical products and drugs were relatively well maintained in comparison with the two previous years, but the level is still well below that of the five-year average. In the case of fuel oils the imports have been well maintained during the first half of the year, the level being slightly below that of the previous year, but considerably higher than the five-year average. United Kingdom trade with Brazil has suffered by reason of the increased protection given to competitive Brazilian industries, notably in the case of the textiles trade, which in the past was the mainstay of our exports to Brazil, and which incidentally through the agency of the old established Manchester and Liverpool shipping houses, provided an active distribution medium for a wide variety of other products, particularly hardware and metals.

Researches at Glasgow

Work of the Royal Technical College

A RESEARCH JOURNAL has been issued by the Royal Technical College, Glasgow dealing with some of the research work carried out at the college by the staff and senior students. The contents include details of observations on the transmission of heat from honeycomb radiators and heat transmission to and from tubes set perpendicular to a stream of air. Referring to the observations on the corrosion of lead, the report states that the primary object of the investigation was the determination of the effect of stress in increasing the rate of corrosion of lead by sulphuric acid. It was desirable to investigate the variation in the rate of attack with increasing concentration of acid and with increasing temperature. By means of photomicrographs illustrating the nature of the corroded surface, it was possible to show, in the case of corrosion by sulphuric acid, the connection between the rate of attack and the character of the sulphate film formed. With corrosion by hydrochloric acid comparison was made of the rate of attack with the solubility of lead chloride in the acid, and photomicrographs were found to support the suggestion that the rate of attack was dependent on this solubility.

A Road Research Board

New Duties for the D.S.I.R.

IN accordance with a recommendation of the Select Committee on Estimates of the House of Commons in its second report for 1932, arrangements have been made for the Road Research Station at Harmondsworth to be transferred from the Ministry of Transport to the Department of Scientific and Industrial Research. The committee of the Privy Council for Scientific and Industrial Research has decided to appoint a Road Research Board to advise generally on the conduct of road research undertaken by the Department, and, with the concurrence of the Ministry of Transport, has appointed Major F. C. Cook, deputy chief engineer, Roads Department, Ministry of Transport, to be the first chairman of the board.

The immediate direction and control of road research undertaken by the Department of Scientific and Industrial Research will be in the hands of Mr. R. E. Stradling, director of building research under the Department. Road tests under normal traffic conditions will be carried out by the Ministry of Transport in conjunction with the highways authorities. In connection with these tests arrangements have been made for collaboration between the Ministry of Transport and the Department of Scientific and Industrial Research.

Studies in road research are closely allied to the work of the National Physical Laboratory, the Chemical Research Laboratory, and the Building Research Station, which are already part of the Department. It was the advantage of centralisation that was uppermost in the minds of the Select Committee on Estimates when it recommended that the transfer should be made. A professor of highway engineering and three responsible road engineers will combine the academic and practical points of view on the new board. The essential sciences of geology, chemistry, civil and mechanical engineering and physics are all represented by specialists in them. The interests of the road user are safe in the hands of Lieut.-Colonel O'Gorman, while Dr. T. F. Sibly not only brings to the board his unique geological knowledge of this country but will provide contact with the Advisory Council of the Department. The immediate control of road research will be exercised by the Director of Building Research.

A SHARP increase in exports of phosphate rock from Egypt was registered during 1932, deliveries having totalled 420,795 tons, as compared with 200,678 in 1931, and 313,673 in 1930. The gain was due largely to an increase in the trade with Japan although approximately 180,000 tons were consigned to European destination notwithstanding the alleged high transportation cost due in part to Suez Canal tolls. The destination of the 1932 exports follow: Japan, 233,325; Italy, 80.741; France, 28,621; Belgium, 23,007; Portugal, 26,435; Great Britain, 8,571; Greece, 8,340; India, 6,763; and Sweden, 4,992 tons.

News from the Allied Industries

Artificial Silk

IT IS REPORTED FROM BERLIN that the technical reforms instituted by the J.P. Bemberg Company a year ago have worked out satisfactorily; other measures aimed at placing the concern on a sound basis are now to be undertaken. It is proposed to reduce the capital from £2,000,000 to £1,000,000. The resulting book profit will be used to cover balance-sheet losses, depreciations and to the building up again of reserves.

Tanning

TRADE IS STILL IMPROVING in the tanning industry. Many firms are extending their accommodation, others are working overtime and new ones are opening. An old-established tannery, the Castle Chrome, which has been closed down since 1927, is opening out afresh at Northampton for the tanning of shark skins. A company has been formed to develop this new line of business and it is hoped to make a start very shortly.

Glass

SHORTER WORKING HOURS was the chief subject discussed at the British Glass Convention at Buxton on May 19. Professor J. H. Jones, head of the Commerce Department of Leeds University, in an address, suggested that the question of hours was now one for specific industries, and that unity of purpose did not necessarily lead to uniformity of practice. International co-operation involved three processes—agreement in principle, definition of terms, and simultaneous enforcement of terms. Recent technical developments in glass-making abroad were reviewed by Professor W. S. Turner, head of the glass department of Sheffield University, who said that probably the greatest thing on the Continent was the almost complete mechanisation of the sheet-glass industry within the last decade in Belgium, France, Czecho-Slovakia, and Germany. The extent of this process was shown by the fact that in Germany in 1925 there were 40 works producing sheet glass, whereas now there were no more than half-a-dozen and yet the total production had increased.

Compressed Gases

IMPROVED WORKING during the year was emphasised by Mr. K. S. Murray, chairman and managing director of the British Oxygen Co., Ltd., in his remarks at the 47th ordinary general meeting of the company, held in London on May 18. Turning to the accounts, the chairman stated that the balance of profit for the year amounted to £100,241, which sum, however, included the non-recurring item of £7,306, a profit derived from the sale of certain Government securities, the proceeds of which were invested in others. The profit for the previous year was £70,159, which sum included the non-recurring item of £3,000 for damages received in a libel action, but was arrived at after deducting £4,272 for debenture stock interest and remuneration of trustees, debit items which do not appear in the present accounts, as the debenture stock was finally cleared off on March 31, 1931. Therefore, taking the non-recurring items of each year into account, the profits in 1932 exceeded those of 1931 by £21,502. The value of the shares in and the amounts owing by the subsidiary companies appeared at £248122 as compared with £206,419 last year, the decrease of £48,297 being due to the liquidation during the year, for reasons of policy, of Oxygen, Ltd., one of their subsidiary companies. The value of patents, which had been written down to £1, had been increased by £29,900. This represented the cost of the patent rights acquired from Metal Industries, Ltd. The amount would gradually be written off out of the profits of the company. The benefits of co-ordination with Allen-Liversidge, Ltd., were now beginning to be felt, but the short period of working with Metal Industries, Ltd., had not affected last year's accounts. If the conversion of a competitor into a part of the company's own organisation had proportionately the same good results in the case of Metal Industries as it had with Allen-Liversidge, there should be room for further improvement in earnings. Meanwhile, the sales of the main products, oxygen and dissolved acetylene, are rising steadily, and business in the minor products is developing well.

Non-Ferrous Metals

THE TEMPORARY EXECUTIVE COMMITTEE appointed at a meeting of those interested in the formation of the Copper Development Association held under the chairmanship of Mr. A. Chester Beatty early in the month has started to function. The scheme has been welcomed with much enthusiasm in many quarters, and inquiries already received by the new organisation indicate that there is a widespread interest in its activities. One of the first tasks of the executive committee is to find suitable technologists to carry out the work which will fall within the scope of the new body, and steps with this in view have already been taken. The association is also inviting applications for the position of general manager. All inquiries should be addressed to the assistant secretary (pro tem.) at Thames House, Millbank, S.W.1.

Improved Grade of Cyclohexanone

A More Even Evaporation Rate

DURING the last twelve months, one of the main objects of Howards and Sons, Ltd., has been to improve the existing processes of solvents and plasticisers manufacture for the purpose of raising the quality in each case, the cost to the consumer being no higher than previously, in some cases appreciably lower. Examples of the successful outcome of this policy are the present improved grades of Sextone (cyclohexanone) and Sextone B (methylcyclohexanone). These two solvents now possess a higher ketone content and quicker and more even evaporation rates than formerly, and in the case of Sextone B there is now not the slightest chance of residual odour trouble occurring, even under the most likely conditions. The quality of diacetone alcohol has also been greatly improved in all directions, while that of ethyl lactate has not only been maintained to the present high pitch but actually even further improved recently. The same process of quality raising has also been applied to Barkite (methylcyclohexanol oxalate) with considerable effect. These improvements have been largely responsible for the very marked increase in the use of these products in the cellulose lacquer and similar trades.

During the first few months of the year two new plasticisers of great interest have been put on the market, Barkite B. (dimethylcyclohexanol oxalate) and Sextol stearate (methylcyclohexanol stearate). Barkite B. is a plasticiser for the cellulose and synthetic resin lacquer and film industries principally. It possesses outstanding resistance to light, and ultra-violet radiation and its solvent powers for nitrocellulose and resins are far in excess of those of almost any other plasticiser on the market, whilst it is also considerably lower in price. Barkite B., like Barkite, has found considerable application in the varnish trade for preventing "wrinkling" in wood oil varnish films, "bloom" in wood oil and other finishes and "skinning" in varnishes. Sextol stearate is a plasticiser combining the properties of exceptionally low volatility, the minimum of odour and colour and good stability and the price is as low as that of Barkite B. Its chief uses in lacquers are to increase loss and water-resistance, and also in those cases where a high degree of plasticity is required in the lacquers and oils are undesirable. It is used in conjunction with other plasticisers. For the reasons given above it is a useful constituent of cellulose leather finishes. Another use of Sextol stearate, which is steadily growing, is as a mould lubricant in moulding compositions, particularly those of the bakelite and shellac types.

Extensive research is being continuously carried on on the dual lines of producing new solvents and plasticisers and of investigating both new applications of the existing products in fields where they are already in use and their possible utility in entirely new industries.

Spanish Potash Exports

DURING 1932 the exports of potash from Spain totalled 65,989 metric tons, as compared with 25,649 tons in 1931 and 22,536 tons in 1930. Chief destinations of 1932 exports were: Sweden, 23,270 tons; United States, 10,635 tons; and Great Britain, 8,855 tons.

Inventions in the Chemical Industry

Specifications Accepted and Applications for Patents

THE following information is prepared from the Official Patents Journal. Printed copies of Specifications accepted may be obtained from the Patent Office, 25 Southampton Buildings, London, W.C.2, at 1s. each. The numbers given under "Applications for Patents" are for reference in all correspondence up to the acceptance of the Complete Specification.

Specifications Accepted with Dates of Application

MANUFACTURE OF ETHER DERIVATIVES OF CELLULOSE.—C. F. Burgess Laboratories, Inc. Aug. 14, 1930. 392,206.

MANUFACTURE OF CARBON DIOXIDE.—Silica Gel Corporation. Nov. 13, 1930. 392,214.

RESINOUS COMPOSITIONS FROM PHENOLS AND ACETALDEHYDE OR POLYMERS THEREOF.—Bakelite, Ltd., and S. E. Chubb. Nov. 18, 1931. 392,226.

MANUFACTURE OF ETHYL ALCOHOL.—Distillers Co., Ltd., W. P. Joshua, H. M. Stanley and J. B. Dymock. Jan. 29, 1932. 392,289.

PROCESS FOR ELIMINATING SULPHONIC ACID GROUPS FROM ANTHRAQUINONE-β-SULPHONIC ACIDS.—Soc. of Chemical Industry in Basle. Feb. 3, 1931. 392,290.

PREVENTING THE FORMATION OF LUMPS DURING THE SWELLING OF SOLUTION OF ORGANIC POWDERS.—Henkel et Cie Ges. Aug. 26, 1931. 392,342.

CRACKING OF HYDROCARBON OILS.—P. Guichard. Oct. 5, 1931. 392,358.

PROCESS FOR SEPARATING CADMIUM FROM MATERIAL CONTAINING CADMIUM AND OTHER METALS OR COMPOUNDS THEREOF.—A. H. Stevens. (American Smelting and Refining Co.). June 29, 1932. 392,374.

MANUFACTURE OF OIL-SOLUBLE SYNTHETIC RESINS.—I. G. Farbenindustrie. July 20, 1931. 392,382.

MANUFACTURE OF CARBO-CYANINE DYES AND INTERMEDIATE PRODUCTS.—Kodak, Ltd. Sept. 21, 1931. 392,410.

PROCESS FOR THE MANUFACTURE OF THE MALE GERM GLAND HORMONE IN PURE FORM.—Schering-Kahlbaum Akt.-Ges. Oct. 23, 1931. 392,434.

MANUFACTURE OF AZO DYESTUFFS.—I. G. Farbenindustrie. Nov. 30, 1931. 392,452.

MANUFACTURE OF ARTIFICIAL SPONGES AND OTHER POROUS STRUCTURES.—I. G. Farbenindustrie. Dec. 28, 1931. 392,483.

Specifications open to Public Inspection

MANUFACTURE OF ALCOHOLS.—Henkel et Cie Ges. Nov. 14, 1931. 26427/32.

CONVERSION OF MASSES OF WAXES OR WAX-LIKE MATERIALS INTO COMPARATIVELY SMALL PIECES OF ARBITRARY SIZE.—I. G. Farbenindustrie. Nov. 11, 1931. 28772/32.

PROCESS FOR PRODUCING CHLORHYDROCARBONS. Ruhrchemie Akt.-Ges. Nov. 13, 1931. 28890/32.

DESTRUCTIVE HYDROGENATION OF CARBONACEOUS MATERIALS.—Naamlooze Vennootschap de Bataafsche Petroleum Maatschappij. Nov. 14, 1931. 29059/32.

PROCESS FOR THE SIMULTANEOUS PRODUCTION OF SULPHURIC AND NITRIC ACIDS.—P. Kachkaroff and C. Matignon. Nov. 12, 1931. 29269/32.

PROCESS FOR THE HALOGENATION OF SATURATED HYDROCARBONS.—Naamlooze Vennootschap de Bataafsche Petroleum Maatschappij. Nov. 11, 1931. 30405/32, 30406/32.

PROCESS FOR REMOVING ACID CONSTITUENTS FROM GASES, AND RENDERING SAID CONSTITUENTS UTILISABLE.—Metallges Akt. Ges. Nov. 10, 1931. 31635/32.

MANUFACTURE OF FLUORINATED AROMATIC HYDROCARBONS.—I. G. Farbenindustrie. Nov. 9, 1931. 31667/32.

MANUFACTURE OF NEW AZO DYESTUFFS.—I. G. Farbenindustrie. Nov. 11, 1931. 31855/32.

MANUFACTURE AND USE OF ORGANIC COMPOUNDS.—British Celanese, Ltd. Nov. 13, 1931. 32125/32.

PROCESS FOR THE MANUFACTURE OF AZO DYESTUFFS.—I. G. Farbenindustrie. Nov. 13, 1931. 32203/32.

Applications for Patents

MANUFACTURE OF AZO DYESTUFFS OF THE STILBENE SERIES. I. G. Farbenindustrie. May 10. (Germany, May 11, '32.) 13625.

MANUFACTURE OF THERAPEUTICALLY ACTIVE PREPARATIONS.—I. G. Farbenindustrie. May 11. (Germany, May 11, '32.) 13754.

MANUFACTURE OF THERAPEUTICALLY-ACTIVE PREPARATIONS.—I. G. Farbenindustrie. May 11. (Germany, Nov. 9, '32.) 13755.

MANUFACTURE OF DERIVATIVES OF THE ANTHRAQUINONE SERIES.—I. G. Farbenindustrie. May 11. (Germany, May 11, '32.) 13781.

MANUFACTURE OF DYESTUFFS.—I. G. Farbenindustrie. May 11. (Germany, May 11, '32.) 13785.

BOILING OUT, ETC., VEGETABLE FIBRES.—I. G. Farbenindustrie. May 12. (Germany, May 12, '32.) 13857.

MANUFACTURE OF COMPOUNDS OF THE ACRIDINIUM SERIES.—I. G. Farbenindustrie. May 13. (Germany, May 28, '32.) 13978.

MANUFACTURE OF DERIVATIVES OF AMINO-ARYLARSENO-STIBIO COMPOUNDS.—I. G. Farbenindustrie. May 13. (Germany, March 14, '32.) 13992.

MANUFACTURE OF SOLID CHLORINATED RUBBER PRODUCTS.—Imperial Chemical Industries, Ltd. May 10. 13623.

MANUFACTURE OF SYNTHETIC RESINS, ETC.—Imperial Chemical Industries, Ltd. May 12. 13909.

FINISHING LEATHER.—Imperial Chemical Industries, Ltd., and D. G. F. White. May 13. 13984.

COLOURING LEATHER.—Imperial Chemical Industries, Ltd., and D. G. F. White. May 13. 13985.

PREPARATION OF HYDROCARBON MOTOR FUELS FROM OXYGEN-CONTAINING ORGANIC COMPOUNDS.—A. A. Jana. May 12. (Portugal, May 12, '32.) 13876.

MANUFACTURE OF SOLID GREASES.—J. Y. Johnson (I. G. Farbenindustrie). May 8. 13308.

MANUFACTURE OF HYDROCARBONS OF HIGH MOLECULAR WEIGHT FROM ISOBUTYLENE.—J. Y. Johnson (I. G. Farbenindustrie). May 8. 13362.

MANUFACTURE OF CYANURIC ACID.—J. Y. Johnson (I. G. Farbenindustrie. May 8. 13363.

MANUFACTURE OF VAT DYESTUFFS.—J. Y. Johnson (I. G. Farbenindustrie. May 10. 13613.

FIXING ANODE MATERIAL.—Kelsen Special Sheet Holding Soc., Anon. May 11. (Austria, May 12, '32.) 13775.

PRODUCTION OF MULTICOLOURED ARTIFICIAL CELLULOSIC MATERIALS.—K. S. Low. May 8. 13309.

TREATMENT OF LUBRICATING OILS.—E. W. J. Mardles and W. Helmore. May 12. (March 30.) 13911.

USE OF REFINING WASTES IN MINERAL OIL INDUSTRY.—V. Mehner and S. Rostler. May 11. 13748.

REDUCING POUR POINT OF OILS, ETC.—Naamlooze Vennootschap De Bataafsche Petroleum Maatschappij. May 12. (Holland, July 5, '32.) 13916.

MANUFACTURE OF CEMENT.—E. Newell and Co., Ltd., and A. H. Moss. May 11. 13695.

EXTRACTS OBTAINABLE FROM MAMMALIAN SUPRARENAL GLANDS.—Parke, Davis and Co. May 12. (Aug. 28, '32). (United States, Sept. 4, '30.) 13836.

EXTRACTS OBTAINABLE FROM MAMMALIAN SUPRARENAL GLANDS.—Parke, Davis and Co. May 12. (Aug. 28, '31.) (United States, Aug. 28, '30.) 13837.

EXTRACTS OBTAINABLE FROM MAMMALIAN SUPRARENAL GLANDS.—Parke, Davis and Co. May 12. (Aug. 28, '31.) (United States, Sept. 4, '30.) 13838.

EXTRACTS OBTAINABLE FROM MAMMALIAN SUPRARENAL GLANDS.—Parke, Davis and Co. May 12. (Aug. 28, '31.) (United States, Aug. 10, '31.) 13839.

MANUFACTURE OF SYNTHETIC RESINS, ETC.—A. Renfrew. May 12. 13909.

MANUFACTURE OF AZO DYESTUFFS.—Soc. of Chemical Industry in Basle. May 10. (Switzerland, May 10, '32.) 13606.

MANUFACTURE OF AZO DYESTUFFS.—Soc. of Chemical Industry in Basle. May 10. (Switzerland, March 17.) 13607.

TREATMENT OF HYDROCARBON OILS.—Universal Oil Products Co. May 8. (United States, May 25, '32.) 13352.

TREATMENT OF HYDROCARBON OILS.—Universal Oil Products Co. May 8. (United States, May 25, '32.) 13353, 13354.

REMOVING FREE AMMONIA, ETC., FROM WASTE WATERS.—Vereinigte Stahlwerke Akt.-Ges. May 8. (Germany, May 11, '32.) 13347.

ELECTROLYSING COMPOUNDS OF ALKALI METALS AND ALKALINE EARTH METALS.—J. F. Wait. May 13. 13973.

APPARATUS FOR TREATING WALLS, ETC.—A. G. Walker, Walker Bros. and E. B. Walker). May 8. 13294.

Forthcoming Events

May 29.—National Institute of Industrial Psychology. Dinner. Dorchester Hotel, London.

May 29.—Royal Institution. General Meeting. 5 p.m. 21 Albemarle Street, London.

May 30.—British Association of Chemists (Birmingham Section). Annual general meeting. 7.30 p.m. Birmingham Chamber of Commerce, New Street, Birmingham.

May 31.—British Association of Chemists (Manchester Section). Annual general meeting. 8 p.m. Clarion Café, Market Street, Manchester.

June 1.—The Chemical Society. Ordinary Scientific Meeting. 8 p.m. Burlington House, London.

June 2.—The Physical Society. 5 p.m. Imperial College of Science, South Kensington, London.

June 14.—Electroplaters' and Depositors' Technical Society. Annual Election. "Question" Night. 8.15 p.m. Northampton Polytechnic Institute, St. John Street, Clerkenwell, London.

June 16.—The Physical Society. 5 p.m. Imperial College of Science, South Kensington, London.

Weekly Prices of British Chemical Products

Review of Current Market Conditions

THE following market report is based on information supplied by the British manufacturers concerned, and unless otherwise qualified the figures quoted apply to fair quantities, net and naked at makers' works. Where no locality is indicated, the prices are general for the United Kingdom. Particulars of the London chemical market are specially supplied to THE CHEMICAL AGE by R. W. Greeff and Co., Ltd., and Chas. Page and Co., Ltd., and those of the Scottish chemical market by Chas. Tennant and Co., Ltd.

THE London chemical market continues to receive a fair volume of inquiry with prices practically unchanged and the undertone quite strong. Benzol prices in the general chemical market have been reduced following the fall in the price of petrol. In London, however, it is reported that although the fall in the price of petrol came into force last week, prices of benzols and solvent naphthas, other than those already on contract on a sliding scale basis, remain unchanged from those given last week. Business for other coal tar products is still quiet. A fractionally easier tendency has been in evidence on the Manchester chemical market in one or two sections during the past week, but it is still the case that steady conditions rule almost throughout the market. In odd instances there has been a little more contract buying going on though the general disposition is to limit new business to early delivery periods. Delivery specifications against orders already on the books are circulating fairly freely. A general improvement has to be reported in the Scottish heavy chemical market, inquiries received, however, being mostly for immediate requirements.

General Chemicals

ACETONE.—LONDON: £65 to £68 per ton; SCOTLAND: £66 to £68 ex wharf, according to quantity.

ACID, ACETIC.—Tech. 80%, £38 5s. to £40 5s.; pure 80% £39 5s.; tech., 40%, £20 5s. to £21 15s.; tech., 60%, £28 10s. to £30 10s. LONDON: Tech., 80%, £38 5s. to £40 5s.; pure 80%, £39 5s. to £41 5s.; tech., 40%, £20 5s. to £22 5s.; tech., 60%, £29 5s. to £31 5s. SCOTLAND: Glacial 98/100%, £48 to £52; pure 80%, £39 5s.; tech. 80%, £38 5s. d/d buyers' premises Great Britain. MANCHESTER: 80%, commercial, £39; tech. glacial, £52.

ACID, BORIC.—SCOTLAND: Granulated commercial, £26 10s. per ton; B.P. crystals, £35 10s.; B.P. powder, £36 10s. in 1-cwt. bags d/d free Great Britain in 1-ton lots upwards.

ACID, CHROMIC.—11d. per lb., less 2½%, d/d U.K.

ACID, CITRIC.—LONDON: 9½d. per lb.; less 5%. MANCHESTER: 9¼d. to 9¾d.

ACID, CRESYLIC.—97/99% 1s. 3d. to 1s. 7d. per gal.; 99/100% 1s. 7d. to 2s.

ACID, FORMIC.—LONDON: £50 per ton.

ACID, HYDROCHLORIC.—Spot, 3s. 9d. to 6s. carboy d/d according to purity, strength and locality. SCOTLAND: Arsenical quality, 4s.; dearsenicated, 5s. ex works, full wagon loads.

ACID, LACTIC.—LANCASHIRE: Dark tech., 50% by vol., £24 10s. per ton; 50% by weight, £28 10s.; 80% by weight, £48; pale tech., 50% by vol., £28; 50% by weight, £33; 80% by weight, £53; edible, 50% by vol., £41. One-ton lots ex works, barrels free.

ACID, NITRIC.—80° Tw. spot, £18 to £25 per ton makers' works, according to district and quality. SCOTLAND: 80°, £23 ex station full truck loads.

ACID, OXALIC.—LONDON: £47 7s. 6d. to £57 10s. per ton, according to packages and position. SCOTLAND: 98/100%, £49 to £52 ex store. MANCHESTER: £48 to £52 ex store.

ACID, SULPHURIC.—Average prices f.o.r. British makers' works, with slight variations owing to local considerations; 140° Tw. crude acid, £3 per ton; 168° Tw. arsenical £5 10s.; 168° Tw. non-arsenical, £6 15s. SCOTLAND: 144° quality, £3 12s. 6d.; 168°, £7; dearsenicated, 20s. per ton extra.

ACID, TARTARIC.—11d. per lb. SCOTLAND: B.P. crystals, 10¾d., carriage paid. MANCHESTER: 11¼d. to 11½d.

ALUM.—SCOTLAND: Lump potash, £9 per ton ex store.

ALUMINA SULPHATE.—LONDON. £8 5s. to £9 10s. per ton. SCOTLAND: £8 to £8 10s. ex store.

AMMONIA, ANHYDROUS.—Spot, 10d. per lb. d/d in cylinders. SCOTLAND: 10d. to 1s. containers extra and returnable.

AMMONIA LIQUID.—SCOTLAND: 80°, 2½d. to 3d. per lb., d/d.

AMMONIUM BICHROMATE.—8d. per lb. d/d U.K.

AMMONIUM CARBONATE.—SCOTLAND: Lump, £32 per ton; powdered, £34, in 5-cwt. casks d/d buyers' premises U.K.

AMMONIUM CHLORIDE.—£37 to £45 per ton, carriage paid. LONDON: Fine white crystals, £19 to £20. (See also Salammoniac.)

AMMONIUM CHLORIDE (MURIATE).—SCOTLAND: British dog tooth crystals, £32 to £35 per ton carriage paid according to quantity. (See also Salammoniac.)

ANTIMONY OXIDE.—SCOTLAND: Spot, £24 per ton, c.i.f. U.K. ports.

ANTIMONY SULPHIDE.—Golden 6½d. to 1s. 1½d. per lb.; crimson, 1s. 3d. to 1s. 5d. per lb., according to quality.

ARSENIC.—LONDON: £19 c.i.f. main U.K. ports for imported material; Cornish nominal, £23 f.o.r. mines. SCOTLAND: White powdered, £24 ex wharf. MANCHESTER: White powdered Cornish, £23 at mines.

ARSENIC SULPHIDE.—Yellow, 1s. 5d. to 1s. 7d. per lb.

BARIUM CHLORIDE.—£11 per ton.

BISULPHITE OF LIME.—£6 10s. per ton f.o.r. London, packages free.

BLEACHING POWDER.—Spot 35/37% £7 19s. per ton d/d station in casks, special terms for contract. SCOTLAND: £8 15s. in 5/6 cwt. casks.

BORAX, COMMERCIAL.—Granulated, £15 10s. per ton; powder, £17 packed in 1-cwt. bags, carriage paid any station Great Britain. Prices are for 1-ton lots and upwards.

CADMIUM SULPHIDE.—3s. to 3s. 4d. per lb.

CALCIUM CHLORIDE.—Solid 70/75% spot, £5 5s. per ton d/d station in drums.

CARBON BISULPHIDE.—£30 to £32 per ton, drums extra.

CARBON BLACK.—3⅝d. to 5¼d. per lb., ex wharf.

CARBON TETRACHLORIDE.—£41 to £46 per ton, drums extra.

CHROMIUM OXIDE.—10d. to 10½d. per lb., according to quantity d/d U.K. Green, 1s. 2d. per lb.

CHROMETAN.—Crystals, 3¼d. per lb. Liquor, £19 10s. per ton d/d

COPPERAS (GREEN).—SCOTLAND: £3 15s. per ton, f.o.r. or ex works.

CREAM OF TARTAR.—LONDON: £4 per cwt.

DIPHENYLGUANIDINE.—2s. 2d. per lb.

FORMALDEHYDE.—LONDON: £28 per ton. SCOTLAND: 40%, £28 ex store.

LAMPBLACK.—£45 to £48 per ton.

LEAD ACETATE.—LONDON: White, £34 per ton; brown, £1 per ton less. SCOTLAND: White crystals, £34 to £36; brown, £1 per ton less. MANCHESTER: White, £31 10s.; brown, £30.

LEAD NITRATE.—£28 per ton.

LEAD, RED.—SCOTLAND: £27 per ton d/d buyer's works.

LEAD, WHITE.—SCOTLAND: £39 per ton, carriage paid.

LITHOPONE.—30%, £17 10s. to £18 per ton.

MAGNESITE.—SCOTLAND: Ground Calcined £9 per ton ex store.

METHYLATED SPIRIT.—61 O.P. Industrial 1s. 8d. to 2s. 3d. per gal. Pyridinised Industrial, 1s. 10d. to 2s. 5d. Mineralised, 2s. 9d. to 3s. 3d. 64 O.P. 1d. extra in all cases. Prices according to quantities. SCOTLAND: Industrial 64 O.P., 1s. 9d. to 2s. 4d.

NICKEL AMMONIUM SULPHATE.—£49 per ton d/d.

NICKEL SULPHATE.—£49 per ton d/d.

PHENOL.—9d. to 10d. per lb. nominal.

POTASH, CAUSTIC.—LONDON: £42. MANCHESTER: £40 to £42.

POTASSIUM BICHROMATE.—Crystals and Granular, 5d. per lb. net d/d U.K. Discount according to quantity. Ground 5¾d. LONDON: 5d. per lb. with usual discounts for contracts. SCOTLAND: 5d. d/d U.K. or c.i.f. Irish Ports. MANCHESTER: 5d.

POTASSIUM CHLORATE.—3¾d. per lb. ex wharf London in 1-cwt. kegs. LONDON: £37 to £40 per ton. SCOTLAND: 99¾/100% powder, £37. MANCHESTER: £38.

POTASSIUM CHROMATE.—6¼d. per lb. d/d U.K.

POTASSIUM NITRATE.—SCOTLAND: Refined Granulated £29 per ton c.i.f. U.K. ports. Spot, £30 per ton ex store.

POTASSIUM PERMANGANATE.—LONDON: 8¼d. per lb. SCOTLAND: B.P. crystals, 9d. MANCHESTER: Commercial, 8¼d. B.P., 8¾d.

POTASSIUM PRUSSIATE.—LONDON: 8¼d. to 9d. per lb. SCOTLAND: Yellow spot material, 8¼d. ex store. MANCHESTER: Yellow, 8¼d. to 8½d.

SALAMMONIAC.—First lump spot, £42 17s. 6d. per ton d/d in barrels.

SODA ASH.—58% spot, £5 17s. 6d. per ton f.o.r. in bags, special terms for contracts.

SODA, CAUSTIC.—Solid 76/77° spot, £14 5s. per ton d/d station. SCOTLAND: Powdered 98/99%, £17 10s. in drums, £18 15s. in casks, Solid 76/77%, £14 10s. in drums; 70/73%, £14 12s. 6d., carriage paid buyer's station, minimum 4-ton lots; contracts 10s. per ton less. MANCHESTER: £13 5s. to £14 10s. contracts.

SODA CRYSTALS.—Spot, £5 to £5 5s. per ton d/d station or ex depot in 2-cwt. bags.

SODIUM ACETATE.—£22 per ton. LONDON: £23.

SODIUM BICARBONATE.—Refined spot, £10 10s. per ton d/d station in bags. SCOTLAND: Refined recrystallised £10 10s. ex quay or station. MANCHESTER: £10 10s.

SODIUM BICHROMATE.—Crystals cake and powder 4d. per lb. net d/d U.K. discount according to quantity. Anhydrous, 5d. per lb. LONDON: 4d. per lb. with discounts for quantities. SCOTLAND: 4d. delivered buyer's premises with concession

for contracts. MANCHESTER: 4d. less 1 to 3½% contracts, 4d. spot lots.

SODIUM BISULPHITE POWDER.—60/62%, £16 10s. per ton d/d 1-cwt. iron drums for home trade.

SODIUM CARBONATE (SODA CRYSTALS).—SCOTLAND: £5 to £5 5s. per ton ex quay or station. Powdered or pea quality 7s. 6d. per ton extra. Light Soda Ash £7 ex quay, min. 4-ton lots with reductions for contracts.

SODIUM CHLORATE.—£32 per ton.

SODIUM CHROMATE.—3¾d. per lb. d/d U.K.

SODIUM HYPOSULPHITE.—SCOTLAND: Large crystals English manufacture, £9 5s. per ton ex stations, min. 4-ton lots. Pea crystals, £15 ex station, 4-ton lots. MANCHESTER: Commercial, £9 5s.; photographic, £15.

SODIUM NITRITE.—Spot, £19 to £22 per ton d/d station in drums.

SODIUM PERBORATE.—LONDON: 10d. per lb.

SODIUM PHOSPHATE.—£12 10s. per ton.

SODIUM PRUSSIATE.—LONDON: 5d. to 5¼d. per lb. SCOTLAND: 5d. to 5⅜d. ex store. MANCHESTER: 4¾d. to 5⅜d.

SODIUM SILICATE.—140° Tw. Spot £8 5s. per ton d/d station, returnable drums.

SODIUM SULPHATE (GLAUBER SALTS).—£4 2s. 6d. per ton d/d. SCOTLAND: English material £3 15s.

SODIUM SULPHATE (SALT CAKE).—Unground Spot, £3 15s. per ton d/d station in bulk. SCOTLAND: Ground quality, £3 5s. per ton d/d. MANCHESTER: £3 2s. 6d.

SODIUM SULPHIDE.—Solid 60/62% Spot, £10 15s. per ton d/d in drums; crystals 30/32%, £8 per ton d/d in casks. SCOTLAND: For home consumption, Solid 60/62%, £10 5s.; broken 60/62%, £11 5s.; crystals, 30/32%, £8 2s. 6d. d/d buyer's works on contract, min. 4-ton lots. Spot solid 5s. per ton extra. Crystals, 2s. 6d. per ton extra. MANCHESTER: Concentrated solid, 60/62%, £11; commercial, £8.

SODIUM SULPHITE.—Pea crystals spot, £13 10s. per ton d/d station in kegs. Commercial spot, £9 10s. d/d station in bags.

SULPHATE OF COPPER.—MANCHESTER: £16 per ton f.o.b.

SULPHUR.—£11 15s. per ton. SCOTLAND: Flowers, £11; roll, £10 10s.; rock, £9; ground American, £10 ex store.

SULPHUR CHLORIDE.—5d. to 7d. per lb., according to quality.

SULPHUR PRECIP.—B.P. £55 to £60 per ton according to quantity. Commercial, £50 to £55.

VERMILION.—Pale or deep, 4s. 1d. to 4s. 6d. per lb.

ZINC CHLORIDE.—SCOTLAND: British material, 98%, £18 10s. per ton f.o.b. U.K. ports.

ZINC SULPHATE.—LONDON AND SCOTLAND: £12 per ton.

ZINC SULPHIDE.—11d. to 1s. per lb.

Pharmaceutical and Fine Chemicals

ACID, TARTARIC.—11¼d. per lb.

ACID, CITRIC.—9¾d. per lb.

PHENACETIN.—4s. to 4s. 6d. per lb.

POTASSIUM BITARTRATE 99/100% (cream of tartar).—80s. per cwt.

SODIUM POTASSIUM TARTRATE (Rochelle Salt).—70s. per cwt.

TARTAR EMETIC B.P.—3s. 9d. to 4s. 6d. per lb.

Essential Oils

BERGAMOT.—6s. 6d. per lb.

CAMPHOR.—Brown, 80s. per cwt. White, 85s. per cwt.

CINNAMON.—3s. 9d. per lb.

CITRONELLA, JAVA.—2s. 9d. per lb. CEYLON: 2s. 3d. per lb.

Intermediates and Dyes

IN the following list of intermediates delivered prices include packages except where otherwise stated:—

ACID, BENZOIC, 1914 B.P. (ex Toluol).—1s. 9¼d. per lb.

ACID, GAMMA.—Spot, 4s. per lb. 100% d/d buyer's works.

ACID, H.—Spot, 2s. 4¼d. per lb. 100% d/d buyer's works.

ACID, NEVILLE AND WINTHER.—Spot, 3s. per lb. 100% d/d buyer's works.

ACID, SULPHANILIC.—Spot, 8d. per lb. 100% d/d buyer's works.

ANILINE OIL.—Spot, 8d. per lb., drums extra, d/d buyer's works.

ANILINE SALTS.—Spot, 8d. per lb. d/d buyer's works, casks free.

BENZALDEHYDE.—Spot, 1s. 8d. per lb., packages extra.

BENZIDINE BASE.—Spot, 2s. 5d. per lb. 100% d/d buyer's works.

p-CRESOL 34-5° C.—1s. 9d. per lb. in ton lots.

m-CRESOL 98/100%.—2s. 3d. per lb. in ton lots.

DICHLORANILINE.—2s. 3d. per lb.

DIMETHYLANILINE.—Spot, 1s. 6d. per lb., package extra.

DINITROBENZENE.—8d. per lb.

DINITROTOLUENE.—48/50° C., 8d. per lb.; 66/68° C. 8¾d. per lb.

DIPHENYLAMINE.—Spot, 2s. per lb., d/d buyer's works.

α-NAPHTHOL.—Spot, 2s. 4d. per lb., d/d buyer's works.

β-NAPHTHOL.—Spot. £78 15s. per ton in paper bags; £79 15s. in casks, in 1-ton lots.

α-NAPHTHYLAMINE.—Spot, 11½d. per lb., d/d buyer's works.

β-NAPHTHYLAMINE.—Spot, 2s. 9d. per lb. d/d buyer's works.

o-NITRANILINE.—5s. 10d. per lb.

m-NITRANILINE.—Spot, 2s. 7d. per lb. d/d buyer's works.

p-NITRANILINE.—Spot, 1s. 8d. per lb. d/d buyer's works.

NITROBENZENE.—Spot, 4½d. per lb.; 5-cwt. lots, drums extra.

NITRONAPHTHALENE.—9d. per lb.

SODIUM NAPHTHIONATE.—Spot, 1s. 9d. per lb.

o-TOLUIDINE.—Spot, 9½d. per lb., drums extra, d/d buyer's works.

p-TOLUIDINE.—Spot, 1s. 11d. per lb., d/d buyer's works.

m-XYLIDINE ACETATE.—3s. 4d. per lb.

Coal Tar Products

ACID, CARBOLIC.—Crystals, 9d. to 10d. per lb.; crude, 60's, 2s. 5d. to 2s. 6d. per gal.; 2% water 3s. 0¾d. MANCHESTER: Crystals, 9½d. per lb.; crude, 2s. 7d. per gal. SCOTLAND: 60's, 1s. 7d. to 1s. 8d.

ACID, CRESYLIC.—99/100%, 11d. to 1s. 8d. per gal.; pale 95%, 11d. to 11½d.; dark, 10d., all according to specification; refined, 1s. 7d. to 1s. 8d. LONDON: 98/100%, 1s. 3d.; dark, 95/97%, 11d. SCOTLAND: Pale 99/100%, 1s. 3d. to 1s. 4d.; 97/99%, 1s. to 1s. 1d.; dark 97/99%, 11d. to 1s.; high boiling acid, 2s. 6d. to 3s.

ANTHRACENE OIL.—Strained, 4½d. per gal.

BENZOL.—At works, crude, 9d. to 9½d. per gal.; standard motor 1s. 4d. to 1s. 4½d.; 90%, 1s. 5d. to 1s. 6d.; pure, 1s. 7½d. to 1s. 8d. LONDON: Motor, 1s. 7½d. SCOTLAND: Motor, 1s. 6½d. to 1s. 7½d.; 90%, 2s. 0½d. to 2s. 1½d.

CREOSOTE.—B.S.I. Specification standard, 2½d. per gal. f.o.r. Home, 3¾d. d/d. LONDON: 3d. to 3½d. f.o.r. North; 4d. to 4½d. London. MANCHESTER: 2½d. to 3½d. SCOTLAND: Specification oils, 3¾d. to 4¼d.; washed oil, 4d. to 4½d.; light, 3¾d. to 4¼d.; heavy, 4½d. to 5d.

NAPHTHA.—Solvent, 90/160%, 1s. 4d. to 1s. 5d. per gal.; 95/160%, 1s. 7d. to 1s. 8d.; 90/190%, 9d. to 1s. 1d. LONDON: Solvent, 1s. 3½d. to 1s. 4d.; heavy, 11d. to 1s. 0½d. f.o.r. SCOTLAND: 90/160%, 1s. 3d. to 1s. 3½d.; 90/190%, 11d. to 1s. 2d.

NAPHTHALENE.—Crude, Hot-Pressed, £6 1s. 3d. per ton. Flaked, £10 per ton. Purified crystals, £9 10s. per ton in bags. LONDON: Fire lighter quality, £3 to £3 10s.; 74/76 quality, £4 to £4 10s.; 76/78 quality, £5 10s. to £6. SCOTLAND: 40s. to 50s.; whizzed, 65s. to 70s.

PITCH.—Medium soft, £4 5s. to £4 10s. per ton. MANCHESTER: £3 15s. to £4 f.o.b. LONDON: £4 to £4 2s. 6d. f.o.b. East Coast port.

PYRIDINE.—90/140, 3s. 9d. per gal.; 90/160, 4s. to 4s. 6d.; 90/180, 2s. to 2s. 6d. SCOTLAND: 90/160% 4s. to 5s.; 90/220%, 3s. to 4s.

REFINED COAL TAR.—SCOTLAND: 4¾d. to 5d. per gal.

XYLOL.—Common, 1s. 11d. to 2s. per gal.; pure, 2s. to 2s. 2d.

TOLUOL.—90%, 1s. 11d. to 2s. per gal.; pure, 2s. 3d.

Wood Distillation Products

ACETATE OF LIME.—Brown, £8 15s. to £9 per ton. Grey £14 to £15. Liquor, brown, 30° Tw., 6d. per gal. MANCHESTER: Brown, £9 10s.; grey £14 10s.

ACETIC ACID, TECHNICAL, 40%.—£17 to £18 per ton.

AMYL ACETATE, TECHNICAL.—95s. to 110s. per cwt.

CHARCOAL.—£6 to £11 per ton.

WOOD CREOSOTE.—6d. to 2s. per gal., unrefined.

WOOD NAPHTHA, MISCIBLE.—2s. 7d. to 4s. per gal. Solvent, 3s. 9d. to 4s. 9d. per gal.

WOOD TAR.—£2 to £6 per ton.

Nitrogen Fertilisers

SULPHATE OF AMMONIA.—Export, £6 per ton f.o.b. U.K. ports in single bags; home, £6 10s. per ton, delivered in 6-ton lots to consumer's nearest station.

NITRATE OF SODA.—£8 16s. per ton, delivered in 6-ton lots to consumer's nearest station.

CYANAMIDE.—£7 per ton, delivered in 6-ton lots to consumer's nearest station.

NITRO-CHALK.—£7 5s. per ton, delivered in 6-ton lots to consumer's nearest station.

CONCENTRATED COMPLETE FERTILISERS.—£10 9s. 6d. to £11 per ton according to percentage of constituents.

Latest Oil Prices

LONDON, May 24.—LINSEED OIL was very firm. Spot, small quantities, £21 10s.; June, £18 17s. 6d.; July-Aug., £19 2s. 6d.; Sept.-Dec., £19 10s., naked. RAPE OIL was quiet. Crude extracted, £27 10s.; technical refined, £29, naked, ex wharf. COTTON OIL was slow. Egyptian crude, £19 10s.; refined common edible, £22; deodorised, £24, naked, ex mill. TURPENTINE was quiet. American, spot, 60s. 6d. per cwt.

HULL.—LINSEED OIL.—Spot quoted £19; May, £18 12s. 6d.; June £18 17s. 6d.; July-Aug., £19 2s. 6d.; Sept.-Dec., £19 10s. per ton. COTTON OIL.—Egyptian crude, spot, £19; edible refined, spot, £21; technical, spot, £21; deodorised, £23 per ton, naked. PALM KERNEL OIL.—Crude, f.m.q., spot, £19 per ton, naked. GROUNDNUT OIL. Extracted, spot, £23 10s.; deodorised, £27 10s. per ton. SOYA OIL.—Extracted, spot, £19; deodorised, £22 per ton. RAPE OIL.—Extracted, spot, £26 10s.; refined, £28 per ton. COD OIL.—June, 17s. per cwt. CASTOR OIL.—Pharmaceutical, spot, 38s.; first, 33s.; second, 30s. per cwt. TURPENTINE.—American, spot, 62s. per cwt.

Books Received

Bulletin of the Imperial Institute. Vol. No. 1. 1933. London: John Murray. Pp. 138. 3s. 6d.

The Conductivity of Solutions. By Cecil W. Davies. London: Chapman & Hall. Pp. 282. 15s.

The Inventor and His World. By H. Stafford Hatfield. London: Kegan Paul, Trench, Trubner & Co., Ltd. Pp. 269. 6s.

Principles of Fruit Preservation. By T. N. Morris. London: Chapman & Hall, Ltd. Pp. 240. 15s.

The Fundamentals of Prccess Cost Accounting. By L. A. Wight. London: Sir Isaac Pitman & Sons, Ltd. Pp. 101. 7s. 6d.

Official Publications

Report on Trade Conditions in Peru during 1932. Prepared by H.M. Vice Consul at Lima, May, 1933. London: Department of Overseas Trade. Pp. 12. Ref. No. C. 4116.

Annual Report of the County Analyst for the year 1932. County Palatine of Lancaster. Preston: T. Snape & Co., Ltd. Pp. 166.

Report on Economic Conditions in Algeria, Tunisia and Tripolitania in 1932. Department of Overseas Trade. London: H.M. Stationery Office. Pp. 127. 3s. 6d.

Economic and Trade Conditions in the United States of America, February, 1933. Report by H. O. Chalkley. Department of Overseas Trade. London: H.M. Stationery Office. Pp. 154. 4s.

Safety in the Manufacture and Use of Cellulcid. International Labour Office. London: P. S. King & Son, Ltd. Pp. 160. 4s.

Economic Conditions in Belgium in 1932. Report by N. S. Reyntiens. Department of Overseas Trade. London: H.M. Stationery Office. Pp. 140. 4s.

New Companies Registered

Dr. Madaus & Co., Ltd., 69 Lincolns Inn Fields, W.C.2. Registered May 12. Nominal capital £1,000 in £1 shares. Chemists, druggists, chemical manufacturers and dealers, drysalters, etc.

Neo-Plastics, Ltd. Registered May 20. Nominal capital £500 in £1 shares. Manufacturers of and dealers in *cellulose composition*, etc. A subscriber: J. S. Stooke-Vaughan, 12 John Street, Bedford Row, W.C.1.

Bennett Oil Co., Ltd., 12a The Plain, Wandsworth, S.W.18. Registered May 13. Nominal capital £100 in £1 shares. Buyers and sellers of oil, owners and operators of oil fields, wells and equipment, etc. Directors: A. J. Parsons, 61 Curzon Road, Muswell Hill, N.10., engineer; P. D. Bennett.

Scottish Chemicals and Dry Colours, Ltd., 176 Bath Street, Glasgow. Registered May 11. Nominal capital £100 in £1 shares. Merchants, brokers and agents for the purchase and sale of paints, varnishes, chemicals, etc. A subscriber: J. Coddell, 73 Castlemilk Crescent, Croftfoot, Glasgow, S.4.

Whyte's Products, Ltd., Central Chambers, High Street, Guildford. Registered May 17. Nominal capital £100 in 1s. shares. Manufacturers of and dealers in chemicals and pharmaceutical products. Directors: S. Whyte, 43 Upper Bridge Road, Redhill, Surrey, M. N. Green, Wm. Penny.

Lando Soap Company, Ltd. Registered April 26. Nominal capital £1,000 in £1 shares. Soap manufacturers, merchants, *importers, exporters and refiners of and dealers in* oils, and oleaginous and saponaceous substances, etc. Directors: D. C. Davies, Station Road, Barry Port, Glam., T. R. Roberts, and W. Davies.

W. J. Blakemore, Ltd., Ferry Road, Cardiff. Registered May 22. Nominal capital, £500 in £1 shares. Manufacturers and merchants of tallow, soap, glues, size, bone and meat meals, fertilisers, etc. A subscriber: W. J. Blakemore, 169 Newport Road, Cardiff.

Ontario Silknit (England), Ltd. Registered May 11. Nominal capital £25,000 in £1 shares. The objects are to carry on the business of bleachers and dyers, makers of vitriol, bleaching and dyeing materials, etc., and to adopt an agreement with M. H. Epstein, B. Robbins and L. Pearl. Directors: M. H. Epstein, Grosvenor House, Park Lane, W.1., and B. Robbins.

Thomas Harley, Ltd., 55 South Methven Street, Perth. Registered May 11. Nominal capital £40,000 in 20,000 ordinary and 20,000 preference shares of £1 each. The objects are to acquire the business of Thomas Harley, manufacturing chemist, Rodine Works, South Methven Street and New Row, Perth. Directors: A. F. McIntosh, 4 Bonaccord Terrace, Perth, F. N. Miller.

United Dyewood Corporation.—The Report for the year 1932 shows a net loss of $220,414 after depreciation, taxes, minority interest, etc. This compares with a net income of $146,069, equivalent to $3.87 a share on 37,740 shares of 7 per cent. preferred stock outstanding at the close of 1931. The current assets as of December 31 last, including $526,494 cash, amounted to $4,068,571, and current liabilities $605,696.

New Chemical Trade Marks

Compiled from official sources by Gee and Co., Patent and Trade Mark Agents, Staple House, 51 and 52 Chancery Lane, London, W.C.2.

Opposition to the registration of the following trade marks can be lodged up to June 10, 1933.

Blycokems. 540,028. Class 1. Chemical substances used in manufactures, photography, or philosophical research, and anti-corrosives. William Blythe and Co., Ltd., Holland Bank Chemical Works, Church, Lancashire. March 18, 1933.

Epok. 540,107. Class 1. Synthetic resin being a chemical substance for use in the manufacture of paints, varnishes and enamels. British Resin Products, Ltd., Epok Works, Portland Road, Kingston-on-Thames. March 21, 1933.

Syntropan. 538,955. Class 3. Chemical substances prepared for use in medicine and pharmacy. The Hoffman-La Roche Chemical Works, Ltd., The "Roche" Laboratories, 51 Bowes Road, London, N.13. February 9, 1933.

Chemical Trade Inquiries

The following trade inquiries are abstracted from the "Journal of the Italian Chamber of Commerce in London." Names and *addresses may be obtained from the Secretary, Italian Chamber of* Commerce in London (Inc.), 10 Queen Street, London, E.C.4.

Soap Fats.—A firm in Leghorn wishes to take up an agency for the sale of fatty acids, greases, and all kinds of raw materials, for soap-making. (Ref. No. 1675).

Oil and Fats for Soap-making.—An old-established and well connected agent in Bologna wishes to get into touch with exporters of oils and fats for soap-making. (Ref. No. 1740.)

The following trade inquiries are abstracted from the "Board of Trade Journal." Names and addresses may be obtained from the Department of Overseas Trade (Development and Intelligence), 35 Old Queen Street, London, S.W.1 (quote reference number).

Holland.—An agent established at Amsterdam wishes to obtain the representation of United Kingdom manufacturers of pharmaceutical chemicals and preparations and chemists' and druggists' sundries. (Ref. No. 738.)

Company News

Reckitt & Sons, Ltd.—An interim dividend of 1s. per share on the ordinary shares is announced, payable on July 1.

W. E. Anfield & Co., Ltd., Lower Bridge Street, Chester. Registered May 11. Nominal capital £3,000 in £1 shares. To acquire the business of a paint and varnish manufacturer formerly carried on *by W. E. Anfield, trading as "W. E. Anfield & Co.," at Lower* Bridge Street, Chester. Directors are: W. E. Anfield, P. M. Anfield, of St. Kilda, Glan Abber Park Road, Chester.

Nitrate Producers' Steamship Co.—The accounts for the year to April 30, 1933, show a surplus of £44,680, to which is added the balance brought forward £15,732, making £60,412. From this is deducted general expenses, directors' fees, tax, interest and interim dividend, amounting in all to £14,666, *leaving £45,746. It is now* proposed to pay a dividend of 5 per cent., making 7½ per cent., free of tax, for the year, to place £30,000 to reserve for depreciation, etc., and £10,000 to special emergency reserve, leaving £15,931 to be carried forward.

Amalgamated Metal Corporation, Ltd.—The profit and loss account for the year ended April 30 last shows that net profit amounted to £190,338, while £18,403 was brought in. After allocating £1,399 to income-tax and paying the preference dividend the directors propose maintaining the ordinary distribution at 3 per cent, leaving to go forward £20,268. Gross dividends received from subsidiaries amounted to £192,841. The combined balance sheet of the constituent companies shows that the balance at their profit and loss account for 1932, including £28,526 brought in, was £241,199.

B. Laporte, Ltd.—The profit for the year to March 31, 1933, including dividends and interest from investments, after charging directors' fees, making adequate provision for depreciation and doubtful debts, and providing a special sum for obsolescence, was £52,068, to which is added the balance brought forward of £15,464, making a total of £67,532. It is proposed to pay a dividend on the ordinary shares of 10 per cent. for the year, a bonus on the ordinary shares of 2½ per cent., £800 directors' special remuneration, to transfer to reserve £5,000, to investments reserve £5,000, write off goodwill £3,500, transfer to tax suspense account £9,000, accrued preference dividends to March 31, 1933, £2,809, leaving to be carried forward £15,373.

From Week to Week

GLASGOW CHAMBER OF COMMERCE has admitted to be members Barrs Chemical Co., Ltd., 93 Pitt Street, Glasgow, and the Dunlop Rubber Co., Ltd., 48 and 8 North Wallace Street, Glasgow.

DR. A. HARDEN, F.R.S., gave the twenty-second Bedson Club lecture at Armstrong College, Newcastle, on May 19. Professor Bedson, in whose honour the club was founded, was present. Dr. Harden lectured on "The Chemistry of Fermentation."

A SECOND SUGAR FACTORY is proposed to be erected at Slavliai in Lithuania, the main centre of the beet-growing area of that country. The one factory already existing is at Mariampole, and was erected and equipped by the Skoda works of Czecho-Slovakia.

DR. H. E. MAGEE, who for the past eleven years has been head of Physiology Department of the Rowett Research Institute, Aberdeen, has resigned to take up a post with the Ministry of Health. He was formerly Professor of Chemistry in Bombay.

THE GOVERNMENT OF THE IRISH FREE STATE has decided to produce industrial alcohol in Ireland, and preparations for the establishment of distilleries are to be made immediately. An additional 60,000 acres of land are to be tilled to furnish material for the distilleries. At the same time the Government proposes to establish several paper mills in the Irish Free State, and it is understood that they will undertake the production of ethyl alcohol as a by-product of these mills.

SIR F. GOWLAND HOPKINS, president of the Royal Society, made an appeal for more teaching of the history of science in our schools and universities when he spoke on May 23 at a luncheon at Wadham College, privately arranged to celebrate the 250th anniversary of the Old Ashmolean Museum. He said it would be a good thing if the older universities decided to set up Chairs in the history of science, and he was sure that Oxford in particular should have such a chair.

PROFESSOR ABRAHAM WOLF was appointed as a representative of Convocation on the Senate of London University on May 17 for the period 1933-7 in place of Dr. W. H. Coates, retired. The title of University Reader was conferred on the following in respect of posts held at the colleges indicated: Biochemistry, Dr. Katharine H. Coward (College of the Pharmaceutical Society); Chemistry, Dr. David C. Jones (East London College), Mr. Bryan Topley (University College). Mr. A. G. Francis, an external student, was awarded a D.Sc. in Chemistry.

THIS YEAR'S MEETING of the British Association will be held at Leicester from September 6 to 13 under the presidency of Sir Frederick Gowland Hopkins. The presidents of the various sections will be: Mathematical and Physical Sciences: Sir G. T. Walker; Chemistry Professor, R. Robinson; Geology: Professor W. G. Fearnsides; Geography: Lord Meston; Economic science and statistics: Professor J. H. Jones; Engineering: Mr. R. W. Allen; Anthropology: Lord Raglan; Physiology: Professor E. D. Adrian; Psychology: Professor E. Aveling; Zoology: Dr. J. Gray; Botany: Professor F. E. Lloyd; Educational science: Mr. J. L. Holland; Agriculture: Dr. A. Lauder. In his presidential address on the evening of September 6, Sir Frederick Hopkins will deal with the chemical aspects of life.

THE IMPORT DUTIES ADVISORY COMMITTEE has under consideration applications for an increase in the import duty on lactose, fruit pectin, aluminium sulphate, aluminium hydrate, ammonia alum, potash alum and soda alum; for the adjustment of the duties on brown artificially fused aluminium oxide and natural emery garnet and corundum in grain; for the addition to the free list of white artificially fused aluminium oxide whether in the lump or in grain; brown artificially fused aluminium oxide, and natural garnet and corundum in the lump only. Representations should be addressed in writing to the Secretary, Import Duties Advisory Committee, Caxton House (West Block), Tothill Street, Westminster, London, S.W.1, not later than June 6, in the case of aluminium sulphate, aluminium hydrate, ammonia alum, potash alum and soda alum, and not later than June 19 in the case of the other commodities enumerated above.

A REPORT just presented to the Department of Lands and Fisheries and the Department of Finance of the Irish Free State records that the value of the kelp crop in that country during last year was £30,000. The value of the carrageen gathered amounted to £5,000. 4,300 tons of kelp for the manufacture of iodine, and 270 tons of carrageen were gathered on the Irish coasts during the past twelve months and it was found that the kelp contained .07 of iodine per ton. The price paid to gatherers for kelp averaged £7 17s. 4d. per ton, the fall in value being attributed to a slump in the price of iodine on the work market due to the alleged dumping activities of a South American combine. Consideration is now being given to a scheme for the establishment of a factory for the making of potash from kelp and a cattle food from carrageen.

THE DEATH HAS TAKEN PLACE at Edinburgh of Mr. William Robertson, who formerly carried on a sheep dip manufacturing business at Oban, Argyshire. The business was amalgamated with an English firm in 1923 when Mr. Robertson retired.

THE PRINCE OF WALES spent a busy day in the St. Austell district on May 24, beginning with an inspection of a china clay works of which he is landlord. In visiting the North Goonbarrow china clay works, the Prince was shown "mica drags," which remove coarse particles from the clay in suspension in water, and the settling pools where most of the water is removed, and he went inside a drying kiln.

THE DEATH OCCURRED at the age of 77 at Handsworth, Birmingham, on May 21, of Mr. Joseph Plant, chairman of Manifoldia, Limited, of West Bromwich, and managing director of Hudson's Soap manufacturers, which was taken over some time ago by Lever Brothers.

THE SIXTH INTERNATIONAL CONGRESS for Scientific Management will be held in London in 1935. A council has been formed, consisting of representatives of about forty organisations, and Sir George Beharrell, managing director of Dunlops, Limited, has been appointed chairman of the Congress.

WORK HAS BEEN STARTED on a large new factory at Dagenham, by May and Baker, Ltd., manufacturers of chemical products, including drugs, desy and scents. At present the firm has two factories, at Battersea and Wandsworth. Both are being transferred to Dagenham so as to bring them under one roof. When finished, in about a year's time, the factory will probably employ a staff of five hundred. Ample room has been left for future development.

A NEW LOW RECORD TEMPERATURE has been achieved in the Kamerlingh Onnes Laboratory by Professor de Haas, of Leyden University, and Professor Kramer and Dr. Wersma, of Utrecht. The new cold record, which stands at 0.27 degrees on the Kelvin or absolute temperature scale, was reached by bringing cerium fluoride into a strong magnetic field and suddenly lowering its energy. Absolute zero on the Kelvin scale is equivalent to minus 273 degrees centigrade approximately.

AN ANGLO-GERMAN TRADE ASSOCIATION has been formed in London. It possesses an advisory council and an advisory committee which comprise experts from all representative trades and industries. Among the members of the advisory council are Sir John Sandeman Allen, M.P., Mr. Alan E. Chorlton, M.P., Sir Philip Dawson, M.P., Major General Sir Newton J. Moore, Major R. Beaumont Thomas, M.P., and Sir William Wayland, M.P. Particulars may be obtained from the chairman, Mr. Stanley W. Hymans, 3 Gordon Square, London, W.C.1.

THE PROSPECTUS of the German Chemical Plant Exhibition, Achema VII has just been issued. This exhibition will be held in Cologne during the week May 18 to 27, 1934. The annual general meeting of the German Chemical Society and other scientific and technical societies will be held in Cologne at the same time. The preparations which have been made from the point of view of technical organisation in the interests of all those taking part in this exhibition are fully set forth in the prospectus. Those interested may obtain a copy of the prospectus, which is copiously illustrated, free of charge on application to the "Dechema" Deutsche Gesellschaft fur chemisches Apparatewesen E. V., Achema-Ge-schaftsstelle, Seelze bei Hannover.

SIR ARTHUR J. C. HUDDLESTON, late Economic Adviser to the Sudan Government, was appointed director of the Royal Technical College of Glasgow at a meeting of the governors on May 23. The vacancy is being caused by the retirement of Dr. H. F. Stockdale at the end of the session. The governors also appointed Mr. W. M. Cumming to be Young Professor of Technical Chemistry, in succession to the late Professor Thomas Gray. Educated at the Universities of Glasgow and Leeds, and also trained as a teacher, Dr. Cumming graduated in 1915 and took his B.Sc. in 1924. For five years he held appointments with British Fairy Dyes, and in 1920 became Senior Lecturer in Organic Chemistry at the College.

A HUNDRED AND EIGHTY REPRESENTATIVES of Lancashire local authorities, chairmen of highways committees, gas engineers, and surveyors on Wednesday made a tour of inspection of the works of the Lancashire Tar Distillers, Ltd., Varley Street, Miles Platting, at the invitation of the Lancashire District Board of the British Tar Association. The chairman of the board, Colonel W. M. Carr and Mr. R. C. Clarry, M.P., president of the British Road Tar Association, accompanied the visitors. Mr. Clarry said that it was in order to meet the situation of foreign tar production competition, that the British Road Tar Association had been formed. It was not a price ring, but a central organisation to co-ordinate the producers and to give them a central meeting place.

ADVERTISERS please note that the latest hour at which we can accept advertisements for insertion in these columns each week is 10 o'clock on Thursday morning.

APPOINTMENTS WANTED

(Prepaid—Twenty-seven words 1s. 6d.; every additional nine words 6d.) Replies can be received "Box , Office of this Journal," in which case our address is included in cost of advertisement, and charged as nine words.

BOYS of good character, well-trained and eager to work, will be gladly recommended by the Warden of the John Benn Hostel, Bower Street, E.1.