The Chemical Age

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Notes and Comments

Scientific Instruments

MEASUREMENT is quite a modern development in science and is perhaps the one fact that caused the transition from alchemy and phlogiston theory to modern chemistry. The microscope, for example, was first used in the chemical laboratory by Marggraf in 1745. We do not know when the balance was introduced—probably it was of slow development, being refined progressively from the crude weighing machines of earlier days; we know, however, that it was first used in chemical work by Homberg in 1699. It is since that time that the chemical industry has developed and, indeed, that all modern technical achievements have been made possible. With increase in facilities for measurements, the rate of industrial progress becomes faster. In its way the science of measurement is as important and as intricate as any other branch of human activities. The tendency to-day is towards ever greater refinements in the art, and it is essential for all engaged in industries or professions wherein precise work is necessary to keep themselves fully posted in regard to new methods and new instruments.

In addition to the more obvious uses of scientific apparatus in the hands of the expert, there are two demands of industry which manufacturers are not neglecting. These arise from the need for keeping down costs of production and for scientific control of industrial processes. From the first of these has arisen the demand for instruments that can make precise measurements, automatically or with the minimum of skill, that would require intricate chemical or physical work if performed by human agency. In that way and by the use of these instruments a number of semi-skilled assistants can be employed to do work which would otherwise require training of a high order. From the second demand arises the need for instruments capable of yielding results sufficiently accurate for the purpose but of a robustness that allows them to be handled by workmen while engaged on the process work. Manufacturers of instruments are keenly alive to these needs and will be anxious, we doubt not, to learn of other directions in which their skill can be applied. Their inherent difficulty is that they do not themselves use the instruments they make and close collaboration between maker and user is even more necessary in the instrument trade than in many others. The difficulties are intensified in instruments which are to be used by the semi-skilled or uskilled; it is difficult to measure with other than a fool-proof instrument when one does not know the meaning of the results. There is the anecdote of the apprentice who asked his foreman what a "thou" was. The foreman explained that as increasing accuracy was demanded, so they worked in "eighths," "sixteenths," "thirty-seconds" and "sixty-fourths." When great accuracy was needed "thou's" were used. "How many 'thou's' are there in an inch?" asked the apprentice. "I don't know," said the foreman, "millions of them, I should think."

Mechanical Calculation

IT is announced that Mr. Robert McDougall has provided the University of Manchester, of which Institution he is deputy treasurer, with the first "differential analyser" to be erected outside America. The apparatus, which costs several thousands of pounds, is described as "a complicated and ingenious piece of mechanism for the assistance of mathematicians dealing with differential equations or rates of change of interacting variable functions." It deals, in short, with variables instead of with the fixed numerical quantities handled by the ordinary mechanical calculator, and gives numerical solutions of equations that have numerical coefficients. It is not an apparatus for the pure mathematician, but for the computator who descends from the higher flights of abstruse mathematics to the daily level of calculation, designed to give the answer in figures applicable to the human experience of three-dimensional space.

It is undoubtedly a wonderful machine, but we are not at all sure that technicians should not be pleased that its cost is so high as to be prohibitive to the majority of engineers and scientific workers. The slide rule is likewise a wonderful instrument—or at least an instrument of wonderful potentialities—but is liable to misuse. There is a great deal to be said for making every calculator work every calculation in figures from first principles. Those of us who at times have to make a number of repetition calculations generally, if mathematically inclined, end by reducing the labour of calculation to a shortened form in which a number of constants are linked together in one single number and in which the successive steps are masked by short cuts. Having used this formula for a few weeks, the origins of it becomes wrapped in obscurity and it becomes in time an instrument used blindly and without thought as to its true applicability under any given set of circumstances. In that way confusion of thought arises. The second stage is the use of mechanical mathematical methods by people who have never learnt the theory of the process and therefore do not know what they are doing. That is still worse, and is akin to the "chemist" who performs an analysis mechanically, like a cook working by the rules of a cookery book,

and without the least understanding of the chemical or physical changes he is bringing to pass. Mechanical aids to work lead inevitably to mechanical thinking. They may become a substitute for mental processes to a quite absurd degree. We recollect the chief draughtsman of an important concern who formed the habit of using the slide rule on every conceivable occasion. On one occasion it was necessary to state the area of a piece of iron 2 ft. square and our friend, having performed the calculation on the slide rule, gravely announced that the answer was " very nearly 4 sq. ft." In a mechanical age, let us retain the power to think and reason and to know the why and the wherefore. The need to do this prompts us to suggest that mechanical methods should be regarded with some suspicion, and that, whilst the numerous calculating machines now in use may make for accuracy in the unskilled and may result in less staff—if that be really the advantage it is supposed to be!—in the long run they may lower the standard of intelligence and the quickness of brain of those who use them.

The Beet Sugar Subsidy

BY a majority of two to one, the report of the United Kingdom Sugar Industry Inquiry Committee, issued on April 10, recommends that the beet sugar subsidy should be discontinued. The committee, consisting of Mr. Wilfrid Greene (chairman), Sir Kenneth Lee and Mr. Cyril Lloyd, was appointed twelve months ago by the Chancellor of the Exchequer and the Minister of Agriculture " to inquire into the condition of the sugar industry in the United Kingdom, including both home-grown beet sugar and imported sugar and covering production, refining and distribution and, having in mind the changes in the structure of the industry which would follow upon its reorganisation under the Agricultural Marketing Acts, to make recommendations for its future conduct and, in particular, as to the application of State aid in so far as this may be considered necessary." Mr. Greene and Sir Kenneth Lee state that they are unable to find justification for the expenditure of several million pounds each year on an industry which has no real prospects of becoming self-supporting. Mr. Lloyd takes the opposite view. The majority report, signed by Mr. Greene and Sir Kenneth Lee, reviews the world sugar situation and the position of the United Kingdom sugar industry, with particular reference to beet sugar. It examines the scope for reorganisation and suggests a detailed plan of organisation and assistance for consideration should it be decided to continue State support. This plan provides for control of the sugar industry by a permanent sugar commission and for the amalgamation of the beet sugar interests. The plan for reorganisation is more comprehensive than the draft Sugar Marketing Scheme put forward last year by the industry under the Agricultural Marketing Acts, and this scheme, therefore, becomes necessary; but the machinery of the plan includes, with certain modifications, the draft Sugar Beet Marketing Scheme put forward by the growers. It is recommended that if State aid is to be continued it should be in the form of an Exchequer subsidy, as at present.

The signatories explain why they cannot recommend the continuance of State support for the beet sugar industry beyond the maximum rate of duty preference grant to Colonial sugar. They recognise that in existing circumstances this would substantially mean the discontinuance of the beet sugar industry, and in that event they propose that existing sugar beet growers should be compensated by cash payments on a descending scale for three years, and that the protection now given to the refining industry should be reconsidered. Mr. Lloyd, in his minority report, gives his reasons for the view that the advantages accruing from the existence of the beet sugar industry justify the present and probable future cost of State aid. He recommends that State aid should, in the first place, be provided by the remission of the Excise duty. He agrees that the future conduct of the industry should be on the lines of the plan of reorganisation set out in the majority report, with certain specified alterations.

United States Exhibition

ACCORDING to advance indications the 1935 Exposition of Chemical Industries at Grand Central Palace, New York, from December 2 to 7, will be one of the largest in recent years. Some of the more pretentious exhibits are being designed and constructed over a period of eight to ten months in advance of the exposition week. Companies leasing the smaller exhibition spaces are making their contracts many months in advance in an effort to secure their particular preference of location with respect to floors, aisles, corners, and entrances. The registered attendance at the Exposition of Chemical Industries has been more than tripled during the past ten years, and this year's exhibitors are responding with enthusiasm to stage a series of exhibits so concise, comprehensive, and dramatically appealing as to be unusual business-getters. Unique in the world, the Exposition of Chemical Industries reaches a world market. At the last exposition, held in 1933, the attendance was from 983 cities and towns in 42 States of the United States and from 69 cities and towns in 27 foreign countries. The registered attendance was 34,269, representing an increase of 50 per cent. over the previous exposition. Admission is without charge and by registration or invitation only. No tickets are sold.

The exposition constitutes a pageant of the latest, most improved materials, equipment and methods. Stimulating the development of processes, the depression may even be considered the nourishment which has brought about the growth of many new products which heretofore could not be produced economically. From the chemical industries come basic necessities for practically all other industries. Directly dependent on chemical commodities are many of the prime necessities for human comfort and high standards of living. Covering the broad fields of raw materials, machinery, and finished products, the Exposition of Chemical Industries has a number of classifications designed to meet the specific interests of large groups of producers and purchasers. Among these are chemicals and chemical products, metals and alloys, laboratory equipment and supplies, instruments of precision, containers and packaging, materials handling equipment, brewing, distilling and bottling equipment, industrial chemical equipment and machinery. A number of exhibits will feature synthetic plastics and moulded products, also lacquers, varnishes and corrosion-resisting surface coatings of wide variety. Exhibits designed to explain natural resources and industrial opportunities for plant location, and a variety of educational exhibits will complete the great pageant of timely exhibits.

Progress at Mellon Institute, 1934-1935*

THE growth of the Mellon Institute during the past twenty-four years is a striking illustration of the rising esteem for research. One of the first organisations in the United States founded expressly for investigating the problems of the industries, the industrial fellowships of the Institute have now passed the one thousand mark and have served 3,600 companies, either as independent firms or as members of industrial associations. In ten instances fellowship inventions have created new industries and many new branches have been added to existing manufactures as a result of other research accomplishments.

The chemical industry as a whole has maintained its research organisations and has been gradually expanding during the past year. The Institute has been extending its own activities in the field of pure scientific research as well as in industrial work. In addition to its wide investigational programme, the Institute has since the beginning of the depression aided in the employment of scientists and engineers and it is becoming more difficult to fill the recent demands for specialists. It is also encouraging to note that an increasing number of opportunities are opening up for the younger technical graduates. As in the preceding years, the organisation has been helpful to scientific professions and to the industries by presenting facts respecting the utility of applied science, in addresses before business groups and in popular articles. In addition, a series of lectures on important subjects in industrial chemistry and chemical engineering is presented by specialists of the Institute. These discourses are open to the students of industrial chemistry and chemical engineering in the University of Pittsburgh, as well as to interested scientists and engineers in the Pittsburgh district.

Clearing House for Information

One of the functions of the Institute is to act as a clearing-house on specific scientific information for the public. Where it is possible, this is supplied direct and in other cases the inquirer is referred to the proper sources—specialists in various fields; research laboratories working along specific lines; commercial laboratories; and to pertinent books and periodicals.

In the fiscal year, March 1, 1934, to March 1, 1935, $596,937 was received by the Institute from industrial fellowship donors to defray the cost of scientific investigations being carried on for these companies and associations. The money appropriated by donors to the Institute during the past twenty-four years amounts to $10,029,544. Throughout the year, 62 industrial fellowships—17 multiple and 45 individual fellowships—were at work. These investigations required the services of 97 fellows and 48 assistants during all or part of the year. At the close of the year, 56 industrial fellowships—16 multiple and 40 individual fellowships—were in operation, and 87 fellows and 29 assistants held positions thereon. Twenty-eight fellowships have been working for five years or more, and of this number 14 have concluded 10 years of research, eight have been active for 15 years or more, and three fellowships are 20 years of age or older.

Seven fellowships began operation during 1934-35: Starch, stone, closure, dried yeast, demulcent, laboratory and thread. The Institute accepted a new fellowship on soya bean, which began operation on March 1. The following fellowships concluded their investigational programmes during the year: Cleaning, velvet, vanadium, sugar, phosphates and paper finishing.

Since 1927, the Carbon Black Fellowship sustained by the Columbian Carbon Co., New York, has been studying the physical, chemical and colloidal properties of carbon black pigments. It has also been concerned with the application of this fundamental work to the development of new carbon blacks, new uses for carbon blacks, and improvements of various products in which carbon blacks are at present used. The fellowship's basic investigation of the dispersion properties of carbon blacks has led to the development of a method for colloidally dispersing carbon black pigments in lacquer vehicles, this colloidal dispersion resulting in markedly improved properties for the black lacquer. The preparation of black lacquers by this method involves two operations. In the first, the carbon black is colloidally dispersed in a lacquer body of nitrocellulose plus some plasticiser, the product of this operation being a dry, brittle lacquer intermediate in which carbon black is dispersed to its ultimate fineness. The second consists of the solution of this dry product in suitable lacquer solvents and the formulation of this solution with stock lacquer components to give the final finished black lacquer. This dry lacquer intermediate is being manufactured by the Binney and Smith Co. and is offered to the trade under the name "Coblac."

In recent years, some States have specified the use of dark and light traffic lanes in new highway construction, the purpose being to cut down road glare and to afford more contrast between the lanes. The darkened concrete is obtained by colouring with black pigments, carbon black being found most satisfactory for this purpose. Fellowship studies showed that by the use of aqueous dispersions of carbon black maximum darkening of concrete could be obtained with minimum pigment content (2 per cent. carbon black). Furthermore, various physical tests on concrete containing 2 per cent. dispersed black showed in every instance improved strength, this improvement being as much as 25 per cent. in some cases. Undoubtedly, the colloidal black besides colouring the concrete improves, in some manner, the bond between the hydrated cement and aggregate, thereby increasing the strength of the concrete. It seems quite probable that these aqueous dispersions of carbon black will have a considerable use not only for darkening but also for increasing the strength of all compositions, such as concrete, mortars and artificial stone. Aqueous dispersions of carbon blacks for these purposes are being manufactured and sold under the name of "Hiblak."

* Abstract of the Twenty-Second Annual Report of the director, E. R. Weidlein, to the trustees of the institution.

Brief Summaries of Recent Research Developments

Advance in Enamel Procedure

The O. Hommel Co.'s fellowship on enamelling has given attention to several aspects of enamelling procedure. Recognising the practical necessity of employing cobalt in the ground coat, to ensure maximum adherence of the enamel to the steel and for the purpose of eliminating the usual ground coat, a procedure has been developed by which a special ground coat and the first cover coat are applied in one firing. As a consequence of the absence of the customary dark ground coat, one or two light cover coats are adequate for the desired finish and, in addition, one firing operation is eliminated. Thus, a simplification and a saving have been effected in operation and in materials and, at the same time, the quality of the product has been maintained. The problem of stabilising certain colours which have an inherent tendency to change in appearance during the firing operation has also been studied. As a result, several new frit compositions have been developed that minimise this colour change.

The multiple industrial fellowship of the American Refractories Institute has continued work on developing new test methods for evaluating progress in developmental work, as well as for the control of commercial products while being manufactured. One of the most important causes of failure of refractories in service is spalling. It was realised some years ago that the test methods then in use were not satisfactory, so the problem of designing a special test which would actually simulate service conditions was studied. This work has led to the development of what is known as the panel spalling test.

The principle of this test is to expose for treatment a section of a furnace wall rather than individual brick. The surface of the panel is heated for a 24-hour period under suitable conditions so as to reproduce the depth and degree of vitrification found in many types of industrial furnaces. The heat-treated panel is then given a series of severe thermal shocks by an alternate heating and cooling, the cooling being accomplished by means of an air blast. The test has been conducted on a large number and variety of commercial products, and the data correlated with the actual behaviour of these brands in service. The results were so

promising that the test has been accepted by the industry and is now part of the A.S.T.M. test methods. The rather extensive testing equipment necessary for the procedure has also been adopted. Suitable spalling procedures have been incorporated in three A.S.T.M. specifications covering refractories for malleable iron furnaces, stationary boilers and incinerators.

The accurate determination of alkalies in refractory materials high in alumina has long been a problem. The J. Lawrence Smith method is not entirely satisfactory, because the samples are not readily decomposed by the usual procedure. A systematic investigation was made of the procedure, devoting considerable attention to the time and temperature of the fusion. This work showed that it was necessary to control the temperatures accurately in order to obtain complete decomposition of the sample. Loss of alkali by volatilisation was overcome by cooling the top portion of the crucible. Another part of the study had to do with the decomposition of samples by means of a hydrofluoric acid method. After the initial hydrofluoric acid treatment, the R_2O_3 is precipitated in the usual manner, the calcium as oxalate, and the magnesium by 8-hydroxyquinoline. The alkalies are then weighed as sulphates and, by determining the sulphur trioxide, the alkali content as oxides can be calculated. The details of these methods are to be published.

Research on Sodium Hexametaphosphate

During the past two years, Dr. Bernard H. Gilmore, as the incumbent of the Calgonising Fellowship, has conducted an extended investigation of the rôle of sodium hexametaphosphate in sequestering calcium and magnesium ions as they affect detergent operations in which soap is used or formed. By removing these ions from solution without precipitation, the curdling effect of hard water upon soap is completely inhibited, and the soap used in washing operations is held in solution to exercise its full detergent effect. Published contributions from the fellowship to date have included reports on the use of sodium hexametaphosphate in laundering and in mechanical dishwashing, the cleaning of the foliage of evergreen shrubbery, its use as a veterinary wash for the removal of medication and for pet-washing in general, and a general theoretical discussion of the use of sodium hexametaphosphate as an adjuvant to soap in detergency operations. Dr. Gilmore has also investigated the methods for the determination of calcium soap on textile fibres, has pointed out a number of fallacies that have arisen out of the past use of faulty methods, and has recommended an analytical procedure by which trustworthy results may be obtained. This study promises to be of much assistance in the solution of difficulties in textile dyeing operations.

The multiple industrial fellowship sustained by the Texas Gulf Sulphur Co., Inc., New York, has continued its broad investigation of problems relating to the utilisation of sulphur. During the year it was announced that acid-resistant cements, made by combining sulphur with an aggregate, could be improved by the addition of certain olefine polysulphides. With the aid of these sulphides, sulphur cement can be made resistant to deterioration by fluctuating temperatures and can also be produced in varying degrees of plasticity. Such cements can be applied as bonding agents or as protective coatings in structures subjected to acids or corrosive solutions. The production of such modified sulphur cements has been undertaken by a commercial company. Among its other activities, the fellowship also rendered assistance to the donor in the preparation of a booklet dealing with the history, production and uses of sulphur, and containing tabulated scientific data of value in the application of this element.

Organic Synthesis

The Perkin Medal for 1935 was presented to Dr. George O. Curme, Jr., vice-president and director of research of the Carbide and Carbon Chemicals Corporation, on January 11, at a joint meeting of scientific societies under the auspices of the American Section of the Society of Chemical Industry. The Carbide and Carbon Chemicals Corporation was formed on a basis of Dr. Curme's research work in the Institute in the field of aliphatic chemistry. His achievements emphasise the value of carefully organised and fundamental research work. This research work is still being conducted at the Institute by the Carbide and Carbon Chemicals Corporation under the supervision of E. W. Reid, senior fellow. This fellowship has developed and improved methods for the production of glycol ethers, and several new products of this type were synthesised and their properties examined. Several new plasticisers of the ether-ester type were prepared and tested. The work on the development of new types of vinyl resins was continued. A group of polyethylene amine derivatives of ethylene diamine, particularly triethylene tetramine, was developed for use in the gas purification field for the removal and/or recovery of acid vapours, such as hydrogen sulphide or carbon dioxide. These products are now being made on a semi-commercial scale. The production of morpholine and certain derivatives, such as morpholine ethanol, methyl morpholine and phenyl morpholine, has been realised and will permit their commercial utilisation. New uses have been discovered for the ethylene and morpholine amines. These materials can be used in the purification of liquids, in the manufacture of polishes, in new types of medicinals, as textile and dye assistants, and as corrosion inhibitors.

The multiple industrial fellowship of the H. J. Heinz Co. developed two new strained foods during 1934. One is a strained cereal for use in the feeding of babies and in special diets. The other is strained apricots, prepared from fresh, undried fruit. A great deal of work was done on vitamin C with relation to its distribution in vegetable varieties, effect of harvesting and storage of the vegetable, and its destruction in various processes in the manufacture of food products.

Studies in the field of cinchona alkaloids have been continued with particular emphasis on following lines which might lead to compounds of value therapeutically in pneumonia. To date, fifty-nine different preparations have been tested for toxity, protection against lethal doses of pneumococci in animals and pneumococcocidal power, in vitro. Many biological and clinical data are being accumulated by Dr. W. W. G. Maclachlan and his associates, Drs. H H. Permar, John M. Johnston, Joseph R. Kenny and H. B. Burchell. One paper, "Some effects of Quinine Derivatives in Experimental Pneumococcus Studies," has been published. The chemical staff has been enlarged by the addition of Dr. B. L. Souther and Miss Mary Hosler during the year.

Revision of the United States Pharmacopœia

The Institute has taken an active part, during the past five years, in the preparation of the eleventh revision of the "United States Pharmacopœia." The new pharmacopœia will contain among its official titles standards for about two hundred substances classified as organic chemicals, of which approximately 10 per cent. are receiving pharmacopœial recognition for the first time. Changes in manufacturing procedures, newly-discovered scientific data and therapeutic needs, and the necessity in some cases for more rigid standardisation have made imperative the revision of many assays and tests for purity, and the development of new assay processes for the elimination of hitherto unrecognised inaccuracies.

Included in the studies that have been completed during the five-year period are: a critical study of the melting point of acetylsalicylic acid, the determination of aldehydes and peroxides in ether, the detection of gelatin in agar, a volumetric (iodometric) assay for organic nitrites and nitroglycerin, the detection of rosin and rosin oil in balsams, the differentiation between barbital and phenobarbital, a gravimetric method for the assay of camphor and its preparations made necessary by the admission of optically-inactive synthetic camphor, the detection of acetone in chloroform, the assay of chloroformic preparations, the detection of carnauba wax in beeswax, the assay of compound solution of cresol, two methods for the chemical evaluation of methylene blue, an investigation of the water of crystallisation of quinine sulphate, the evaluation of the adsorption properties of medicinal charcoal, the detection of antipyrine in amidopyrine, the revision of the pharmacopœial standards for soap, and a critical study of the methods for the chemical assay of thyroid preparations, while many other tests and assays have been carefully rechecked.

UNITED States production of sulphur changed little in 1934 in comparison with 1933. Production of sulphur increased slightly, from 1,406,063 long tons in 1933 to 1,421,473 tons in 1934. Shipments declined from 1,637,368 tons in 1933, valued at about $29,500,000, to 1,613,838 tons in 1934, valued at about $28,900,000. Production of sulphur was reported from California, Louisiana and Texas. Texas was again the leading sulphur-producing State, with an output in 1934 of 1,187,233 long tons, or 84 per cent. of the total for the country.

The Commercial Importance of Casein

A Product with Increasing Applications

THE wide publicity accorded to the plastics industry has given rise to a prevalent idea that casein is a protein of commercial value solely as a raw material for this new industry or as a basis of patent foodstuffs. It is much more than this, however, which has engendered laboratory and industrial research far in excess of most other comparable products, for casein to-day plays an important part in widespread chemical industries, especially in those concerned with water-proofing, adhesives, textile finishes, leather treatment, etc.

Up to the present those countries with large supplies of skim milk, such as Holland, France, Ireland, and Argentina have been the chief producers of casein. This state of affairs may be modified in the near future, for other materials such as soya beans, horse chestnuts, and other seeds are being utilised in Japan and China. "Caisenogen" is the correct name for the milk protein present in the form of its calcium salt and converted by reunion into technical casein. According to recent work by C. Porcher there are two types, *viz.*, casein precipitated by acids, and, secondly, "rennet casein," which is a double salt containing calcium paracaseinate and calcium phosphate. The mineral ash from the latter should not vary from the limits of 7.2 to 7.5 per cent. for a good quality material. A large number of technical forms are stated to contain absorbed acid owing to insufficient attention given to the fact that a slow precipitation from skim milk is essential. After deducting the amount of fatty acids, neutral fats, ash, and water content, from a given weight of technical casein, there remains but a small proportion of true casein substance; so that it must be emphasised that the practical value of any sample can not be determined by analysis.

Manufacturing Methods

Manufacturing methods are usually of three types, giving products known as rennet casein, self-soured casein, and muriatic casein. The first treats skim milk at 36° C. for 15 to 20 minutes, when rennet causes a curd formation which is heated with steam, thoroughly washed, and dried at a low temperature. This is the method often adopted when the product is to be used in the food industries. For higher yields and better texture of final product, the addition of 0.01 per cent. calcium chloride to the milk is included, and the drying is carried out below 63° C. The natural souring process occupies several hours and is really an acid precipitation method, since lactic acid is the coagulant; the warm residual liquor serves to start a second batch. A temperature of 38° C. is used, the soft curds are clumped by heating with steam jets, and the material washed, pressed, dried in tunnel driers, and ground. For muriatic casein either sulphuric acid or hydrochloric acid is used at a temperature below 65° C., the tough lumps being drained, steam-treated, kneaded, and dried; for washing is not possible in this case. The product is hard and not easily wetted, whereas the casein from the lactic acid method is the softest form. A modification is to use constant stirring and slow addition of acid, working with a pH solution controlled between 4.6 to 4.8, and the product is the "grain-curd" casein.

Modifications of the above methods have been patented for specific purposes. Where alkaline solutions of casein with low viscosity are desired it is claimed to be an advantage to cause an acid-precipitated casein to absorb phosphoric acid, hydrofluosilicic acid, or sodium acid sulphate. Without doubt the more acid added in preparation, the lower the ash content and viscosity of solutions, but a strongly acidic casein is difficult to handle in practice. For retaining fluidity of solutions in alkalies it is claimed that an addition of piperidine is effective. Efforts have been made on a practical scale to obtain albumin as by-product by precipitating casein with alum at 40° C., and removal of albumin from the filtrate by use of tannic acid. When casein is required for the paper-coating trade Gould and Whittier have shown that the weakening effect of the appreciable ash content on the adhesive strength of casein is chemical rather than mechanical; that it is the phosphorous and calcium proportion that matters, whilst the presence of potassium chloride is insignificant; and that a thorough washing is vital for producing casein of greatest strength.

New treatments prior to drying and grinding are appearing. One method is to dissolve acid caseins in ammonia solution and by spray-drying the liquid both water and excess ammonia are eliminated. When raw materials other than skim milk are used the whole process is modified; as, for example, in treating soya beans, horse chestnuts, etc., by heating with water under pressure at 135° C. in the presence of alkali carbonates, or hydroxides of lime and magnesia.

Passing to technical applications other than in casein plastics, the paper trade claims a major place at present. As a sizing material, a binder for fillers, and as a type of mordant for colour work, casein is much valued. Treated with lime and alum it is applied in paper for half-tone work, while for extra heavy duty the action of formaldehyde is utilised; as for example, in the paper packings for the cement industry, sandpapers, and waterproofed papers.

Introduction in Adhesives

Aircraft glue made from casein has such a reputation that it is unnecessary to refer to the introduction of casein in adhesives. By now a host of alternative specifications have appeared, the majority of those of value making use of "grain curd" casein as a base. The powdered product is incorporated with alkaline carbonates or borates, and the resulting glue may be used cold. For example, casein plus 25 per cent. of water, 3 or 4 per cent. sodium bicarbonate, are agitated with more water if necessary, a small proportion of a soluble fluoride being added to inhibit mould formation. Many glues are stated to be prepared from fat-free casein, since this gives an increase in strength although having no effect on water-proofing properties; while a further desideratum is the avoidance of any excess of inorganic salts. Casein-lime glues are very effective, being equal to animal glues in adhesive properties but superior as regards waterproofing. English examples are the Laitzo glues, while a French patent form uses 3 parts lime-water to one of casein; it is common, however, to include sodium silicate in the mixture, or dextrin, starch, or other materials to cause swelling and adsorption of water.

Oleo-casein emulsions are applied as water paint vehicles. The casein greatly increases the durability of the paint layers, fixing the pigment without the addition of further materials, the pigments used having to be free from any interaction with lime. A typical mix contains equal weights of casein and lime, eight times this weight of whiting or powdered chalk, and earth colours such as ochre, umber, vandyke brown, etc., are added. When special properties are required, sodium silicate may be included, or boric acid for sanitary paints, or even asbestos where fire-proof paints are made. Allied to these applications is the use of casein cements, such as the aeronautical specification containing 78 per cent. casein, 4.5 per cent. sodium carbonate, 4 per cent. sodium fluoride, 12.5 per cent. first-grade lime, and one per cent. sodium arsenate. Other types include from 15 to 30 per cent. sodium phosphate, together with sodium sulphite and silicate.

Insecticidal Sprays

A new possibility is the increased use of casein in insecticidal sprays. For it has been proved that out of a large variety of materials tried as spreading agents, the water-soluble proteins, and particularly casein, give the greatest spreading effect at the lowest concentration whatever the surface to be treated. Skim milk in the proportion of 2 to 3 quarts per 100 gallons may be used in place of a casein solution, slaked lime being essential in this case; whereas with casein the essential point is to work into a paste before adding it to the spray tank. Considerable quantities of casein are used in special food industries, the sodium salt which is soluble being used along with sodium glycerophosphates, etc. Vi-Casein, Sanatogen, Laitproto, and Plasmon goods include a sodium caseinate prepared from a purified casein dissolved in sodium carbonate. Pure casein is used in bacteriology in an ash-free form, and in medicine, to neutralise the effect of alkaloids. If there be added to the above such uses as in leather dressing both as filler and glazer, as filler in artificial leather goods, and as a stabiliser of emulsions, the importance of casein is realised.

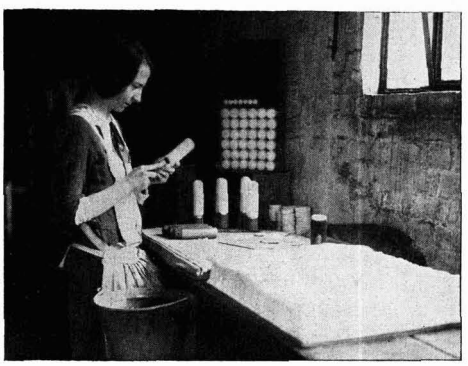
Filter Papers for Laboratory Use

By J. B. GREEN

It is a difficult thing to get the correct grade of filter paper for each particular job, and many chemists do not take the trouble to have a selection of papers and to choose a different paper when they change over to analyse some different material.

It is unnecessary to use an unsuitable filter paper because of the enormous varieties which are actually in stock in England. There are at least three first-class English makers and their filter papers are stocked by all dealers. Every chemist should have the price list of two or three good makers always ready at hand, and he should consult these before deciding on a paper. For quantitative analysis, "ashless" filter paper is generally used. There are only two English makes, but there is quite a difference in the price. There are four or five different sorts of "ashless" paper, from very thin, fast papers, with an extremely low ash, to a thicker, slower paper which will retain a finer precipitate and has slightly more ash. It is essential to keep these "ashless" papers in their original packet and not let them lie about on the bench. A piece of "ashless" paper can pick up vastly more ash in the way of specks of dust than the paper actually contains.

For qualitative work it is very essential to get the paper



Making Soxhlet Thimbles from wet pulp. These thimbles are used for testing the purity of milk.

suitable for the pressure which is being used, otherwise it will burst or cause a lot of delay; burst if too thin, and cause a lot of delay if it is too thick. In addition, the heat of the liquid makes a lot of difference. It is no good using a closely-woven paper unless the clarity of the filtrate is of great importance. Always use the fastest filter paper you can which will give a suitable filtrate. Where great accuracy is required it is always worth while paying the little extra and getting a hand-made paper, which will be extra strong and pure.

Where filter papers are required for extraordinary purposes, such as filtering smoke, poison gas, or fine grit out of atmosphere, it is almost impossible to get a suitable paper from stock. At the same time, English makers can make small quantities of special papers very satisfactorily. There are already a number of thimbles obtainable which are very useful for filtering air.

When using Soxhlet thimbles the thimble itself should not be handled, but the material to be washed should be wrapped lightly in a piece of filter paper and put in and out of the thimble with a pair of tweezers. If the thimble is handled carefully enough, and is a very loose fit in the tube, a good make of thimble should last for months in constant use.

The chemist sometimes complains that a certain make of paper is not pure. The cause of this is that he has been pleating, or folding, his paper on a bench and, as laboratory benches are frequently tainted with chemicals or waxes, this is a very dangerous practice. If you want to use pleated papers you should buy them direct from the dealers already pleated, because factory-pleated filter papers are folded under absolutely clean conditions.

When using large quantities of filter papers some chemists are tempted to use foreign-made paper on account of price, but actually the English papers are, in many cases, as cheap as the foreign and certainly far more pure and reliable.

Do not be prejudiced against a new colour. If you are used to a grey paper there is no reason why you could not get even better results with a white paper; and if you have been used to a plain paper do not imagine that a "creped"

Folding Agar Agar paper which is used for filtering Agar.

paper could not improve your process. Many chemists to-day are held back because they refuse even to try a new paper. In many cases it is more economical to buy a slightly more expensive paper than you are using at present, because they can save (a) considerable time in filtering, and (b) a lot of expense of eliminating the possibility of a burst paper and so having to start the experiment all over again.

Chemists using filter papers are heartily recommended to exchange notes and experiences with other chemists, because

Vatman dipping the mould into the vat.

it is surprising what a difference a suitable paper will make to the cost and efficiency of the chemist's work. When sending inquiries to the filter paper dealer or maker it is necessary to state the purpose for which the paper is required; the approximate heat of the liquid; whether speed or very clear filtrate is most important; and also to give the quantity and size required, with a sample of what is already being used. Dealers and makers of filter paper are ready always to help chemists in their difficulties.

Colour Constancy Measurement

By G. F. BEDFORD, A.R.C.S., B.Sc.

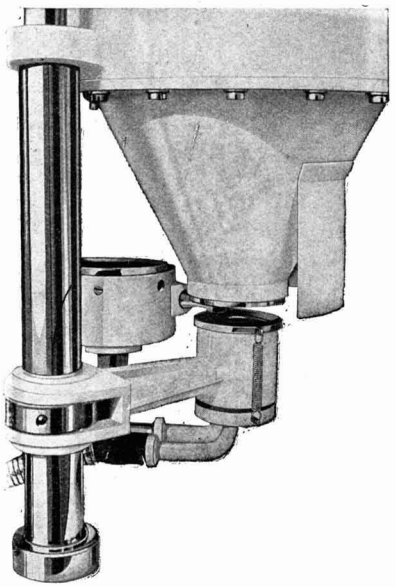
OWING to the varying intensities of daylight, it is impossible to state a definite period for which a material would have to be exposed before it could be classed as colour-constant, or fadeless, and even if an apparatus were used, employing a constant artificial light-source of approximately the same intensity as sunlight, it would necessitate an exposure of very long duration.

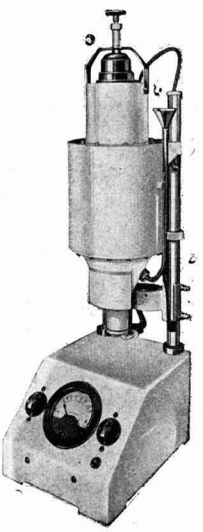
In order to determine the colour constancy of a material in a very short space of time, it is necessary to employ a source of light of very much higher intensity than sunlight, at the same time having the same characteristics and effects. When using such a light, the spectral composition should be similar to sunlight, and it is therefore necessary to have a continuous light-source, which emits only those light-rays found in the solar spectrum. This means that on the short-wave side of the spectrum it must be cut off at about 2,900 Angstrom units, which is well into the ultra-violet region. In the case of the long-wave side, it is not necessary to draw the line so sharply, because infra-red has hardly any colour-changing properties. Care must be taken that this radiation is not too powerful, otherwise the material to be examined would be heated so intensely that it would probably ignite. Besides the necessity of using a continuous spectrum composed of all wave-lengths from about 2,900-7,600 Angstrom units (approximately the visible limit of the red end of the spectrum), the distribution of the energy radiated by the light-source over these wave-lengths must correspond as nearly as possible to the distribution of sunlight.

It would be quite wrong, for example, to use a light-source which, as compared with sunlight, radiates a greater part of its energy in the wave-length region of 2,900-4,000 Angstrom units, especially since research has proved, contrary to popular opinion, that in some instances dependent on the colouring matter used the long-wave part of the spectrum causes a greater change in colour than the short wave. In some cases, materials change colour by red light only and the use of a light-source with an incorrect spectral distribution would lead to some materials behaving differently than when exposed to sunlight. The fallacy of the popular opinion mentioned above that especially the more remote ultra-violet rays of sunight have the greatest colour-changing effect, has sufficiently been proved by various researches. It is true that almost all colouring matter is effected by ultra-violet light, yet the ultra-violet rays from the solar spectrum that reach us are relatively weak. The colour-destroying action is mainly produced by the excessive visible rays.

It is quite a different matter, however, when dealing with materials which absorb ultra-violet light only, such as white and yellow, although a yellow material shows absorption in the violet as well. Examples of these are white or uncoloured cloths and colouring matter, white paper, etc. It is therefore desirable that the artificial source of light for testing colour-constancy shall also possess, like sunlight, rays of a wave-length up to about 2,900 Angstrom units.

The apparatus Philips Industrial (Philips Lamps, Ltd.) are introducing for testing colour-constancy complies with these demands. Besides its great operating speed and the fact that this apparatus, unlike sunlight, is ready for use at all times, it has the further advantage of being constant. In this manner it is possible, when examining materials as to their colour-constancy, to take measurements which can be reproduced accurately. This is of special importance, because the time during which tests can be made by sunlight is very limited owing to the fact that when the sun is rather low in the sky its intensity is correspondingly low and its colour-changing effects negligible. On the other hand, sunlight seldom has a constant effect for several days in succession, so that even with a cloudless sky a material exposed under otherwise the same conditions for the same period will not show for each day the same amount of colour variation. The great advantage of an artificial light-source having the same or practically the same distribution of energy as sunlight is thus immediately evident, for in this manner one is quite independent of the variable sun and consequently the artificial source can be introduced as a standard for testing colour-constancy.





Apparatus introduced by Philips Industrial (Philips Lamps, Ltd.) for testing colour constancy.

The apparatus for testing colour-constancy comprises a water-cooled cylinder containing a 750-watt lamp of a shape similar to that of a cinema lamp, with the lower part made of quartz glass. With the aid of a reflector in the cylinder, this lamp gives an intensity of illumination of about 5,000,000 lux (about 500,000 f.c.) on a copper table, also cooled by water, bearing the sample to be examined. The light intensity is approximately 50 times that of the sun on a fine summer day (June 21 noon). It may be taken as a general rule that if materials have been exposed to the light of this apparatus for one hour and do not show any alteration in colour they can safely be considered as colour-constant.

In addition to water-cooling, the apparatus is also equipped with a fan which ensures that the great amount of light does not cause excessive heat, even when testing very thick tissues. The apparatus is fed by a transformer with a rotary resistance by which the current is kept constant at 50 amps. The copper table can easily be turned away from under the apparatus for the purpose of examining the sample during irradiation, and, if desired, for replacing same by another. The enormous light intensity of the apparatus and the correct adjustment of this source of light to give approximately the same characteristics as sunlight make it possible to test, in a very short time, the colour-constancy of textile goods, paints, lacquers, inks and many other materials.

Laboratory Fittings

An All-in Furnishing Service

THE manufacture of laboratory furniture and fittings is an important section of the business of F. E. Becker and Co. (London), and W. and J. George, Ltd. (Birmingham), and their extensive experience in planning and furnishing is at the disposal of those about to start new laboratories, or in those cases where it is desired to bring old laboratories up to date. Special attention is given to the manufacture of laboratory gas and water fittings, which are of extra strong construction and tested to pressures far in excess of those likely to be encountered in normal use.

The name "Becker" is, of course, synonymous with balances and some of the first balances ever made in this country originated in their workshops. Perhaps the most popular balance ever manufactured by them is the new "Nivco" Analytical Balance. This is indeed a worthy example of high-class British craftsmanship; it is sensitive to 0.1 mg. when fully loaded (200 grams).

The "Nivco" Gas-Heated Muffle Furnace is of interest to chemists in small laboratories, where it will be found useful for ash determinations and general laboratory work, electrically-heated furnaces are also supplied. A large electrically-driven centrifuge, manufactured by this firm, is also illustrated; a range of such machines, down to the small hand-operated model, is available.

Colour Matching Problems

An Artificial Source of Daylight

WHEN Mr. F. E. Lamplough, the well-known glass technologist, first introduced his colour-matching lamp twelve years ago, the claim was made that it was the nearest possible approach to north sky light that could be produced from artificial sources of light. This appears to be a claim which has stood the test of time. For, while it is not claimed that the correction is yet absolutely and scientifically perfect, none better has been brought to our notice and the Lamplough lamp continues to be used with perfect confidence in a very wide variety of industries.

The light source employed is the ordinary gasfilled lamp and the correction is achieved by means of a double glass screen. The preparation of the screens is performed personally by the inventor, and in this way the standard of correction is kept within such narrow limits that additional lamps or any necessary replacements can be secured without any perceptible variation in optical characteristics. This is obviously a point of the greatest importance. To produce one or two units sufficiently corrected is probably not very difficult, but to produce hundreds is a considerable achievement and a very real service to every industry having a colour basis.

The deviations of the Lamplough Matching Lamp from strict equivalence to average daylight are small compared with the variations of daylight itself. It is not, therefore, surprising that a large proportion of the users of this lamp (which is supplied by Restlight, Ltd.) do their matching and observations by its light in preference to daylight all the year round. Periodical renewal of the electric bulb and reasonable cleanliness are all that is necessary to ensure a constant source of daylight "on tap." Though the lamp is primarily intended, and principally used, for the critical matching of colours, the fact that its light had so nearly the same colour compositions as daylight throughout the whole spectrum, considerably increases the scope of its usefulness. It can be employed in colour recognition or discrimination as distinct from the matching of two articles or pieces of material.

While it would perhaps be an exaggeration to say that no laboratory is complete without a source of artificial daylight, the possession of such a lamp undoubtedly makes one independent of the variations of natural daylight, as well as providing daylight by night. It is equally clear since complete confidence is necessary for the successful use of artificial daylight and also because important results may depend upon its accuracy, that only the very best obtainable is good enough for the laboratory.

A New Optical Pyrometer

Standard Lamp Temperature Achieved

THE Siemens Cross-Filament Optical Pyrometer, introduced by Elliott Brothers (London), Ltd., is a direct-reading instrument and is completely self-contained in a small portable case. The principle involved is that of maintaining the filament of an electric lamp at a definite known and constant temperature, and reducing the incoming radiation from the hot body whose temperature is to be measured, until the filament apparently disappears into the background. This reduction of the radiation is accomplished by the interposition of a wedge-shaped graduated absorption screen (calibrated in temperature degrees) between the standard lamp and the hot body.

A unique feature of the cross-filament pyrometer is the ingenious method of obtaining and maintaining the standard lamp temperature. Actually, the lamp has two filaments crossing each other, a ribbon and a wire flattened at the place of conjunction. These filaments are composed of two materials which have diverse temperature current characteristics. They are connected in series and supplied with current from an incorporated battery through an adjustable resistance. The two filaments are equally brilliant at one temperature only, and this temperature is quickly and easily obtained by adjusting the resistance until the two filaments merge into each oter. Two ranges are available, viz.: 800-1500° C. and 900-1800° C.

Ring Balance Meters

Some Refinements in Design

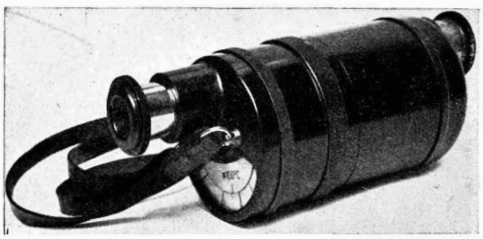
RING-BALANCE meters are supplied by Elliott Brothers (London), Ltd., for the measurement of flow, draught and pressure of gases, etc. These meters have been designed for the purpose of measuring the draught and pressures of low-pressure gases, air or water and also, when used in conjunction with orifice plates, the flow of such gases and fluids, etc. This method of measurement ensures the greatest accuracy with regard to even the smallest variations.

The ring balance consists of a drum, pivoted on knife edges, half-filled with liquid and provided with a counterbalance. The space above the surface of the liquid is divided into two, by means of a partition, and the pressures to be measured are conveyed to the two spaces by means of flexible tube connections. The drum is, therefore, in effect a U-tube, balanced on knife edges. When the two pressures differ, due to an alteration in draught, or flow through an orifice plate, the liquid is displaced, but the drum rotates until the counterbalance, in its new position, balances the displaced liquid. The angle through which the drum has revolved is then a measure of the pressure difference which caused the displacement. The accuracy is not affected by the quantity or specific gravity of the liquid used. The range of the instrument may be very easily altered by changing the counterbalance weight.

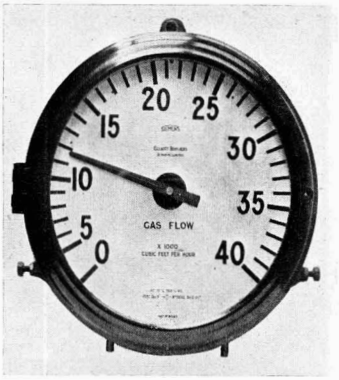
Ring-balance meters are very accurate for low pressure measurements. When used as flowmeters very little loss of head is occasioned; there are no moving parts in the pipeline; the whole apparatus is very robust; indicating or recording instruments are available, and can be supplied suitable for distant transmission of the readings if desired.

Among other equipment which Elliott Brothers (London), Ltd., have introduced for use in laboratories is a laboratory type thermo-couple potentiometer. This instrument is a

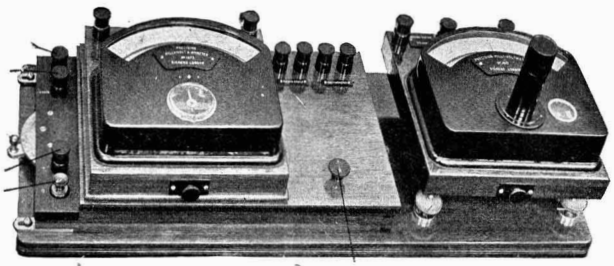
form of potentiometer designed for providing a convenient means of checking the accuracy of any thermo-couple type temperature indicator, whilst actually in service, connected to a thermo-couple. It consists of a very sensitive suspended coil galvanometer, a regulating resistance, a standard moving coil milliammeter, and an accurately adjusted potentiometer resistance. Both "null" and "deflection" methods may be used, and the apparatus is very suitable for use in laboratories and testing institutions where great accuracy is desired. The instrument is supplied complete with regulating resistance and 4-volt accumulator in a teak case with leather handle.



The Siemens Cross-Filament Optical Pyrometer.



Ring Balance Meter, Indicating Type.



Laboratory Type Thermocouple Potentiometer.

Recording Ring Balance Meter for the measurement of flow, draught and pressure of gases, etc.

Millisecond Meter Test Set for the accurate measurement of very short time intervals on a direct reading scale.

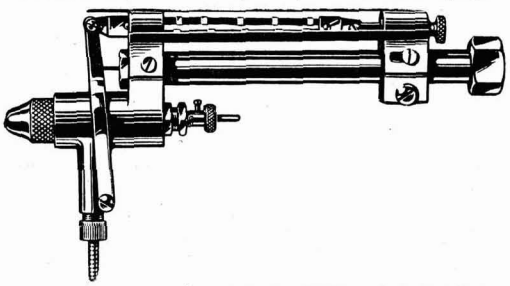
Laboratory Standard Wattmeter.

Control of Humidity

The Humatagraph Apparatus

THE Humatagraph spray, particularly designed for factory and warehouse purposes, is operated by compressed air at 40-50 lb. pressure, each spray being automatically controlled by strands of cone fibre to within + or − 2½ per cent. of any desired humidity. Air and water is conducted in pipes to the sprays mounted in the rooms to be humidified. A cistern with a float valve must be provided for each level, the valve keeping the water at such a level that it is sucked up by the spray from the open ends of the pipe.

The spray secures that the water particles are finely broken up, a deposit of unabsorbed water being avoided. Humidity conditions may be extremely local, and the Humatagraph



The Humatagraph Spray (C. L. Burdick Manufacturing Co.).

automatically-operated spray not only overcomes these difficulties but is able to provide extra humidity at any point where it may be required.

Another humidity apparatus is designed for homes and offices where rooms are too dry for health and comfort. It consists of a humidity chamber supplied with water and an arrangement of absorbent cotton fabric which picks up the water and gives it off to a current of air from an electric fan. The operation of the fan is controlled by an hygrostatic mercury switch to within + or −2 per cent. of any desired humidity and can be placed at any part of the room by extending the wire. Both types of apparatus are made by the C. L. Burdick Manufacturing Co.

Emulsification in the Laboratory

A Hand-operated Machine for Small Quantities

IN most laboratories the need to emulsify small quantities of mixture frequently arises and, through lack of suitable apparatus, cannot always be carried out in a really satisfactory manner. Any machine available, being intended for bulk production, is generally too large for the purpose and requires too much cleaning both before and after using.

The "Q.P." Laboratory Emulsifier, supplied by Ormerod Engineers, Ltd., has been designed specially to overcome these difficulties and to provide the chemist with an efficient means to carry out his experiments on emulsions. Quantities as small as 50 c.c. can be as efficiently emulsified as large quantities, and it only takes a few minutes for the operation. The process of emulsification is rapid and stable, and, being continuous, it is only necessary to keep on filling up the bowl of the machine to obtain a continuous flow of emulsion. The machine is hand operated, but an electrically-driven machine for bulk production will shortly be available. At a comfortable speed of 80-90 strokes per minute it takes three to four minutes to emulsify a pint of liquid. The mixture is pumped through a fine aperture, a vortex being formed by directing the resultant stream against a baffle. The globule size may be controlled by the speed of operation, and it will be apparent that this unique method of emulsification makes the machine particularly suitable for experiments on small test mixtures.

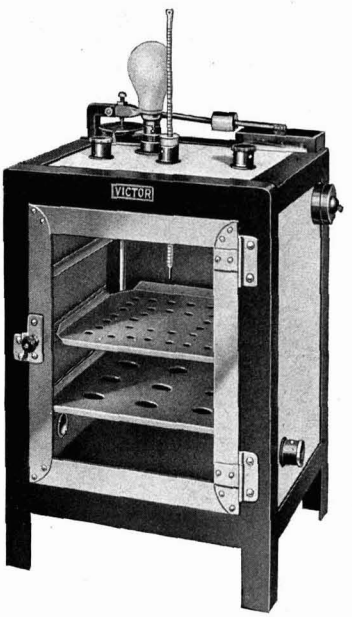
A very satisfactory feature of this machine is the ease with which it can be cleaned after use, as it is only necessary to pump hot soapy water or some other cleaning medium to cleanse the machine thoroughly. There are no pockets or corners in which the mixture can lodge, and the machine drains itself after cleaning.

Electrically Heated Ovens

New Features Offering Long Economical Life

A NEW series of strongly made electrically-heated ovens incorporating many new features and offering long economical life at moderate first-cost has been placed on the market by J. W. Towers and Co., Ltd. In these "Victor" ovens the heating elements are guaranteed for two years. The design of the oven is the result of numerous tests on experimental ovens, particular attention being given to robust construction, constancy and uniformity of temperature, safety, ventilation and efficiency.

The heating elements are of coiled Nichrome V wire, securely mounted on Sindanyo formers, and are easily replaceable. As they are designed to work at low temperatures, they will last for many years without renewal, and are



Victor Double Walled Electrically Heated Air Oven (J. W. Towers & Co., Ltd.).

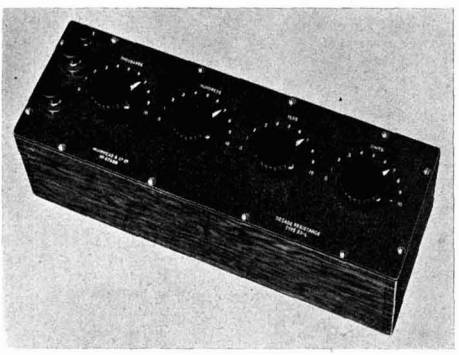
guaranteed for two years under normal conditions By using totally-enclosed elements (excepting in the single-wall ovens) advantages are gained in (*a*) protection from corrosion; (*b*) very uniform heating due to inner copper oven being surrounded by hot-air jacket; (*c*) avoidance of direct radiation of heat on to the samples, with consequent overheating; and (*d*) applicability for inflammable substances without risk of fire or explosion. The automatic thermostat is of very sensitive type, but is strongly constructed. It is operated by means of a bi-metallic rod and tube which runs from top to bottom of the oven, thus being actuated by the average temperature. The movement of the bi-metallic rod operates platinum contacts by means of a long lever arm outside the oven, and a shunt lamp is fitted to minimise sparking at the contacts. The thermostat is readily set by rotating a disc graduated every 10° C. All "Victor" electrically-heated ovens on attaining the required temperature have a consumption of approximately half the rated consumption. Earthing terminals are provided.

THREE BREWERIES IN BRAZIL produce liquid carbon dioxide for their own consumption and sale. Two of the plants are in Rio de Janeiro and the other is in Sao Paulo. No solid carbon dioxide is being manufactured, but it has been rumoured that the local representative of the German I.G. Farbenindustrie A.G. is considering the production possibilities.

Electrical Laboratory Equipment

Components for Construction of Special Apparatus

MANY instruments produced as laboratory equipment for the electrical industry are now finding increasing favour with chemists in dealing with problems capable of solution by electrical means. The more recent additions to the range of apparatus made by Muirhead and Co., Ltd., as described in Section 7 of their catalogue, includes decade resistances, attenuators, voltage dividers and potentiometers (all of which are suitable for use at frequencies throughout the audio



Decade Resistance Box.

range), and also a variety of high-grade components suitable for the construction of special equipment for investigation and demonstration work.

The Type 11 Variable Air Condenser is a particularly fine example of high-grade instrument work and provides a very stable capacity standard which can be accurately subdivided into ten thousand parts, while the use of quartz insulation

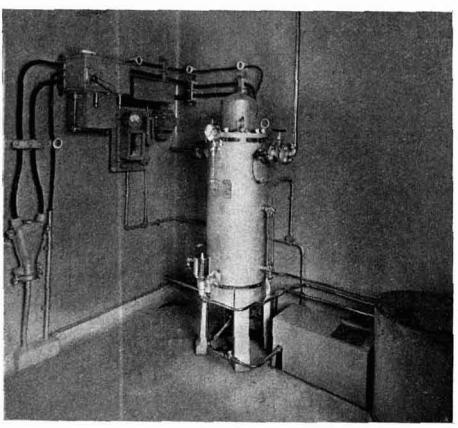
Variable Air Condenser.

reduces the electrical losses to a minimum. Several types are available with a maximum capacity of 150 to 1,500 mmfd. Adjustable and fixed mica condensers are also described. Oscillators include a portable radio frequency oscillator with provision for internal and external modulation and a heterodyne oscillator with a continuously variable frequency from 10 to 12,000 c.p.s. The latter is essentially a high-grade instrument with substantially level output voltage and freedom from harmonics. A source of constant frequency is provided by a valve maintained tuning fork, which is now obtainable in a portable form. For frequency checking and timing, several types of phonic motors and clocks are manufactured. Components include variable and fixed resistances, capacitances, low capacity key switches, rotary switches, dials and relays. Under a general heading may be mentioned universal bridges for measurements of resistance and inductance, a capacity-measuring set with discrimination to 0.03 mmfd., Schering bridges and oscillographs.

Laboratory Steam Supply

Advantages of an Electric Boiler

IN many laboratories steam is required intermittently for various work, and with the ordinary fuel-fired boiler it is obviously a matter of some difficulty to obtain it unless the requirements are sufficiently large to justify a standard steam boiler with flue, stoker, etc. This is a case where electric boilers are so suitable, not only because the boilers being very small and requiring no chimney and so on can be placed right up alongside the work, but also because steam can be obtained at pressure in a few minutes after switching on.



Bastian and Allen A.C. Steam Boiler.

The accompanying illustration shows a Bastian and Allen A.C. Steam Boiler, with pump and feed tank, which supplies steam for sterilising equipment. Normally, the boiler is empty of water, and all that has to be done when steam is wanted is to switch on the feed pump when water is pumped into the boiler. There are no elements of the usual type, but current actually passes through the water itself and begins to do so as soon as the water rises to the level of the electrodes inside the boiler. Steam is then rapidly generated and controls are provided so that the load or current at which the boiler is set remains constant and so keeps the steam evaporation constant, or, if the steam demand alters, the water automatically reduces the current and therefore the steam supply.

This boiler will maintain the pressure at any point up to 120 lb. per square inch, at which the control is set, unless the demand for steam is above the output of the boiler. They are supplied in a range of sizes up to an evaporation of 3,000 lb. per hour.

IMPORTS OF GLYCERINE into Italy in the first three-quarters of 1934 totalled 3,116 metric quintals valued at 581,874 lire, compared with 6,393 quintals valued at 1,011,044 lire in the corresponding period of 1933. During the 9-month period of 1934, shipments into Italy amounted to 2,917 quintals of crude glycerine (484,627 lire) and 199 quintals of refined (97,247 lire), while in the January-September period of 1933, imports of crude glycerine amounted to 6,261 quintals (945,439 lire) and 132 quintals of refined (65,605 lire).

Progress in Optical Apparatus

New Instruments of British Manufacture

IN the last year or so there have been several advances in the apparatus made by Adam Hilger, Ltd., both in the form of improvements to existing apparatus and in new instruments. As an instance of the former type of progress we would refer to the Hilger Quartz Spectrographs, types E315 and E316, in which the optical system has been revised in such a manner that even finer definition than formerly is now obtained. As a result, not only can finer detail in the spectra be resolved but the effective speed of the instruments has been increased, owing to the concentration of the spectral energy in the line itself. Certain mechanical improvements render easier the employment of the instrument.

An instrument which has proved its worth in a very short time, and which now appears in a greatly improved form constructed entirely of metal, is the Vitameter A. By means of this comparatively simple apparatus the spectrophotometric test which is now acknowledged to be a reliable measure of the vitamin A content of a substance can be applied visually and by comparatively untrained observers. This test, recognised by the League of Nations Commission on Vitamins, consists in the measurement of the absorption of the substance at the peak of the vitamin A absorption band (at 3,280 Å). In the laboratory it is carried out by precise spectrophotometric apparatus, such as the Hilger "Spekker" Spectrophotometer, but the Vitameter A gives results of ample accuracy for works control and similar purposes.

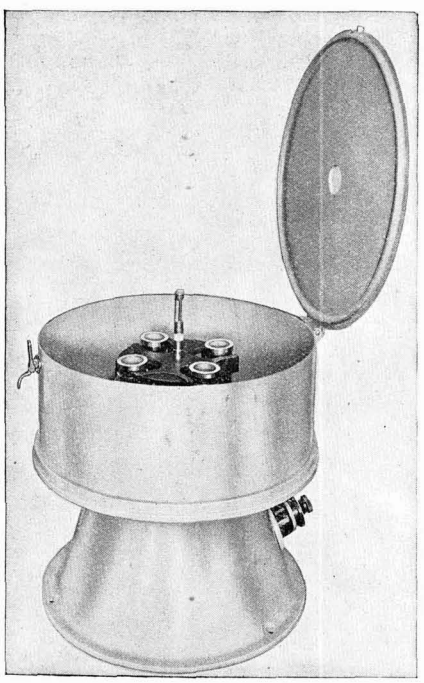
Among the new accessories for spectroscopy is a form of arc lamp in which a low voltage arc is maintained by a series of rapid approaches and retractions of one electrode with respect to the other. In this way the arc spectra of very fusible substances may be studied. It may be applied also to tests of objects of value whose marking is to be avoided.

A new Hilger instrument of special interest to the maker of chemical glassware and the glassblower is the Hilger glass thickness viewer. By simply placing a surface of a tube, bulb or other glass vessel against an aperture at one end of the appliance the thickness of the glass can be read from a scale at the other end.

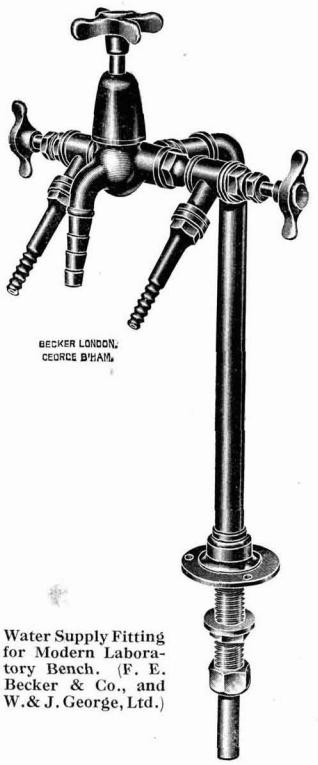
The comparison of two coloured surfaces when they are closely similar is often rendered difficult by the inability to view them against a dark background and in close juxtaposition. The Hilger Universal Color Comparator has been designed to allow the best possible conditions for colour matching to be obtained. The surfaces to be compared are placed on an open stage and viewed through an aperture in a viewing box. They are then seen to be separated by an almost imperceptible line and viewed against a perfectly black background so that comparison is rendered very easy and precise.

Dyes for Biological Work

DYES for biological purposes are supplied by The Vector Manufacturing Co., Ltd. These "Revector" dyes are prepared under standardised conditions. In order to ensure that every batch of dyestuff conforms to standard, it is tested spectrographically, as suggested by the United States Commission on the Standardisation of Biological Stains, before being sent out. In fixing such standards, due regard is paid to the degree of purity desirable in each dyestuff. As many dyestuffs are known under different synonyms, and confusion has been known to arise in biological literature when one dyestuff has been defined by the same name as another and perhaps better known product, the name of the dye, as given upon the label, is followed by the reference number under which the dye appears in the Colour Index of the Society of Dyers and Colourists, 1924-1928. By reference to this index users can acquaint themselves with the chemical nature and the characteristics of every synthetic dyestuff offered for sale.



Electrically-driven Centrifuge. (F. E. Becker & Co., and W. & J. George, Ltd.)



Water Supply Fitting for Modern Laboratory Bench. (F. E. Becker & Co., and W.& J. George, Ltd.)

Laboratory Fires

Methyl Bromide as a Fire-Fighting Medium

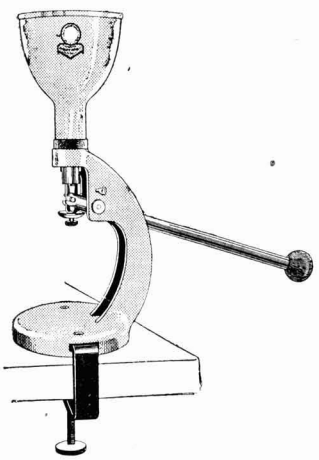
WHILE laboratories do not as a rule contain within their immediate precincts large quantities of any chemical, they do keep small quantities of highly inflammable substances. These small quantities are fully able to destroy the whole building if allowed to burn unchecked in the early stages after a mishap from, for example, an overturned beaker. It therefore becomes of great importance to discover the best and most economic method of first-aid treatment in these cases.

The National Fire Protection Co., Ltd., supply the "Essex" methyl bromide fire appliances, which are particularly suited to protect the risk of fire from highly volatile and inflammable chemicals. Methyl bromide is a curious substance, upon which little really authoritative research has been performed as to its obviously extraordinary fire-fighting ability. Although it will produce 1.6 times more gas than the same weight of carbon tetrachloride, some further reason must be sought to explain a fire extinguishing superiority of at least 6 over carbon tetrachloride. Methyl bromide (b.p. 4.5° C.) is normally used appreciably above its boiling point, and this will provide a cooling effect in addition to that of merely blanketing produced by the greater generation of gas. The important point here is the rate of generation, since methyl bromide will volatilise independently of any heat absorbed from the fire, whilst carbon tetrachloride will require considerable thermal energy for this purpose.

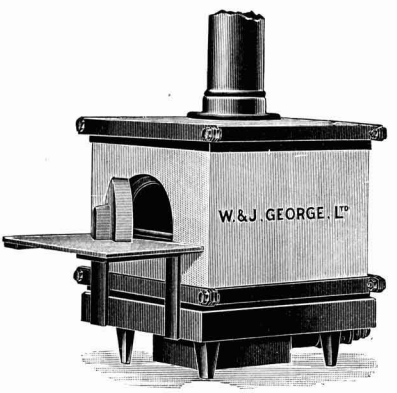
It is, however, extremely doubtful if either of these effects fully explain its superiority over other fire-fighting media. There remains a further property about which little is known at present. It is an accepted fact that certain halides possess an inhibitory effect on some reactions, of which combustion is one. It is further known that hydrobromic acid possesses this ability to a marked degree, in fact, greater than any other substance upon which research has been performed. In this latter case it has been shown that this effect is due to the bromine radicle. It therefore seems fair to assume that this inhibitory effect may be the complement which explains the remainder of the superiority of methyl bromide as a fire extinguisher.

Those who are unacquainted with methyl bromide may well ask what evidence there is for this stated efficiency. It may be sufficient to say that five European countries use it exclusively in all their aircraft on account of its extremely low weight-efficiency ratio. The Board of Trade allow an extinguisher containing only half a pint of methyl bromide to replace a two-gallon foam machine, and tests recently carried out in public show that methyl bromide is anything from six to ten times quicker in action than foam or carbon tetrachloride upon such substances as ether, acetone, etc.

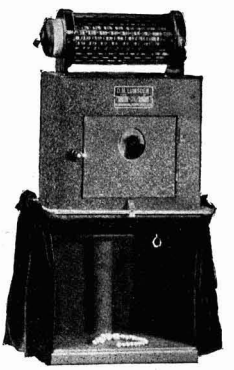
Regarding the question of toxicity, it may be said that according to Sir Thomas Legge, of the Home Office, a concentration of 4 parts of methyl bromide per 1,000 part of air is safe to breathe for 60 minutes, and an ordinary hand-type methyl bromide extinguisher is unlikely to produce a greater concentration than this in a small room.



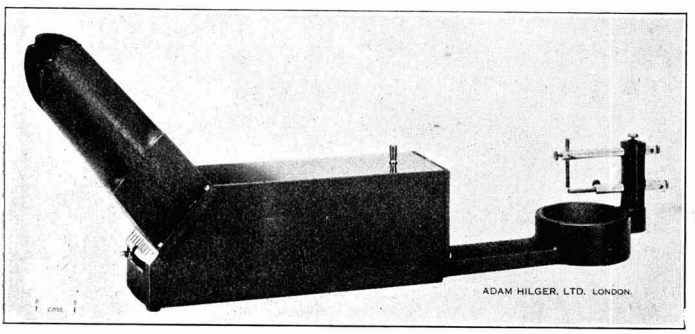
The "Q.P." Hand Operated Emulsifier (Ormerod Engineers, Ltd.).



The "Nivco" Gas Heated Muffle Furnace. (F. E. Becker & Co., and W. & J. George, Ltd.)



The Lumsden Analytic Cabinet for the observation of fluorescence under ultra-violet light. (D. M. Lumsden)



Vitameter A for the spectrophotometric testing of Vitamin A content. (Adam Hilger, Ltd.)

The Avometer Multi-Range Measuring Instrument. (Automatic Coil Winder and Electrica Equipment Co., Ltd.)

Spectrophotometry Developments

Two Noteworthy Instruments

THE industrial chemist sooner or later will come in contact with problems in which colour plays a most important part. It may be in connection with the dye industry, photographic plates and films, colour photography, vitamins, paints and varnishes, printing, and a multitude of other industries, and it should be understood that visible colour or that of the visible spectrum is really only a very small portion of the radiant energy emitted by an incandescent source. The greater part of such radiation cannot be detected or observed by the eye, and can only be investigated by special apparatus such as the photo-electric cell or by photography. Whatever

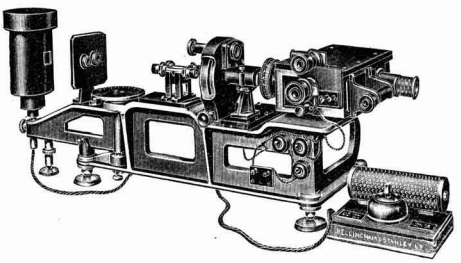


Fig. 1

work the chemist is engaged on he should be familiar with the instruments which are now available.

Instruments dealing with colour problems are usually arranged to measure the amount of light absorbed, transmitted or reflected in different parts of the spectrum. That is to say, the instrument consists of a spectrometer to disperse the light, and some form of photometer to measure the amount

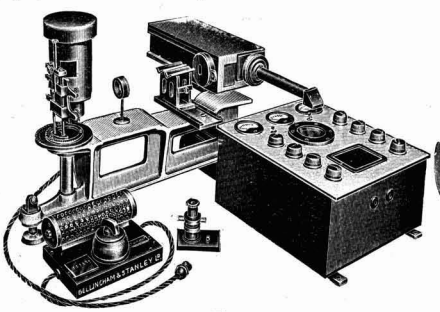


Fig. 2

of light passed. It is usual to employ some form of optical device whereby the light from the source is separated into two beams of equal intensity, separated by a convenient distance before entering the photometer. One of these beams may be diminished in intensity by some suitable means, such as crossed Nicol prisms. The other beam passes either through the substance to be examined or is reflected from its surface.

Fig. 1 shows a modern spectrophotometer working on these principles. The light source is on the extreme left, and after passing the two deflecting prisms in the metal screen passes through the solution tubes and into the photometer situated immediately in front of the spectrometer slit. The photometer carries a glass circle on which is the dividing, reading in either circular degrees or in densities. The glass circle, which controls the rotation of one of the Nicol prisms, is mounted on ball bearings and is turned by hand. A fine adjustment is also provided which is always in action.

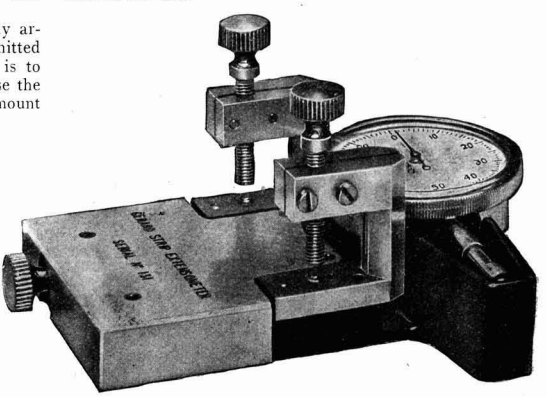
The field of view, as seen in the spectrometer eyepiece, is a vertical strip of approximately monochromatic light divided into two parts. The upper consists of the light passing through the tube of solution, the lower is the light passing through the variable crossed Nicols of the photometer. This may be changed in intensity by rotation of the photometer circle until an exact match is made of the light passing the solution. A spiral divided sleeve fitted on a micrometer screw seen on the right of the spectrometer, affords a means of changing the wavelength of light under observation, and measurements of absorption may be taken over the whole range of the visible spectrum. The eyepiece of the spectrometer may be moved out of position and a metal camera mounted in place, so that measurements can be continued into the ultra-violet.

Another form of this instrument is shown in Fig. 2, but in this case all measurements are obtained by a photo-cell and amplifier, which affords a means of obtaining the required measurements accurately and without the fatigue which always accompanies visual observations extended over a long period.

Mechanical Testing

Some Modern Methods

THE Hounsfield Tensometer is a portable, multi-purpose machine equipped for tensile, bending, notched bar, Brinell hardness, and strip tests, whilst, in addition, autographic records are made from which yield point, maximum stress and fracture can be read off without calculation, elongation and reduction in area per cent. being read off, also without calculation, from universal gauges, adjustable for any of the eight tensile test-pieces which the machine can pull. The Tensometer autographic records can show the effect of changes in heat treatment, also the greatest sensitiveness of notched bar records over tensile records. If a routine Brinell test shows an unexpectedly low result, this can be checked as soon as a tensile test-piece can be turned; again, if a tensile test has yielded an unexpected result it can be checked by a notched-bar test.



The Gerard Extensometer

The Gerard extensometer, illustrated here, is another product marketed by Tensometer, Ltd., and has been approved by the Mechanical Committee of the British Standards Institution. This instrument is simple to operate and can be manipulated efficiently by one person, as the dial is so arranged that its indications are clearly visible while the load is being applied. The whole apparatus has been specially designed for the quick and accurate determination of yield points and proof stresses; the instrument is clamped on to the test-piece with the locking bolt in position, when a small initial load is applied to the specimen. The locking bolt is then withdrawn and the dial set to zero. The Gerard extensometer can be used on test-pieces of the standard diameter, 0.564 in., and on sheet specimens ½ in. in width.

AKTB. FORENADE SUPERFOSFATFABRIKER, established in 1882, owns and operates superphosphate factories in Landskrona, Limhamn and Malmo, and also leases a factory at Gaddviken (near Stockholm) from Kooperativa Forbundet (the Co-operative Union). Aktb. Forenade Superfosfatfabriker produced 208,000 metric tons of superphosphates in 1934, as compared with 220,000 metric tons in 1933 and 191,000 in 1932. Plants were not operated at capacity during those years because of the large stock on hand in 1932.

Fluorescence Observation

The Lumsden Cabinet

A LARGE number of substances show a characteristic fluorescence when exposed to ultra-violet light, and by making use of this effect the composition of many materials can easily be determined. The observation of fluorescence is most conveniently carried out by means of the " Lumsden " Analytic Cabinet, which consists of a small quartz burner enclosed in a light tight chamber, having at the bottom a special glass filter. By absorbing most of the visible light and allowing only the invisible ultra-violet rays to pass through, to excite the fluorescence of the object to be examined, the effect is made very brilliant and distinct. In this cabinet a special dark glass filter is used which gives a maximum transmission between 3,300 and 3,900 A.U.

These lamps are most useful for routine testing an infinite number of substances, the test can be applied instantaneously, is visible, and does not necessitate the destruction of the samples.

By examination under ultra-violet light, wool can easily be distinguished from silk or cotton, vegetable from mineral oil, genuine from imitation precious stones and pearls. Fluorescence constitutes a sensitive test for the purity of many chemicals and materials used in industrial process. The presence of minute quantities of certain substances are easily demonstrated by the lamps, as, for instance, arsenic and 1 part of aesculin can be detected in 10,000 million parts of water.

The " Lumsden " analytic cabinet has the great advantage that it is easily detached from its stand, so that it can be suspended over the work bench, allowing a very large area to be covered by the rays. The dark glass filter can be removed and the direct radiation used for bleaching experiments. The lamps are very inexpensive to run, taking only 500 watts of current, and they are made for any supply between 100 and 250 volts, for both direct and alternating current.

Laboratory Glassware

Schott and Genossen's Fifty Years' Progress

THE completion of the first half century of their foundation has been recently celebrated by Schott and Genossen. In this period developments have taken place which have revolutionised the glass industries throughout the world. The Jena Works may be described as the parent factory of all resistance glasses and chemical apparatus, from which the remainder of the industry at home and in other lands, have great benefited. Dr. Otto Schott, one of the founders, has been largely responsible for the advancement made by these great works, by his own valuable technical investigations.

Probably the finest glass in the world is the well-known Jena Gerate 20 glass (apparatus glass 20) which owes its reputation to its thermal resistance, combined with reliability against attack by water, acids, and alkalies. Extremely hard tubing of Felsea and Durobax glasses have established themselves as ideal for Carius tubes. Owing to its toughness and low co-efficient of expansion, Supremax glass, with a melting point at about 800° C., has satisfied a need for a glass combining all these features.

The triumph of the glass industry has been achieved by the Jena Works with their glass filtering apparatus incorporating porous glass plates of known and graduated porosity, and the later achievement of making all glass Buchner funnels with slit sieves suitable for ordinary filter paper. The new analytical funnels combine the latest application of scientific design to rapid filtration. Of special interest to the analytical physicist are the Jena optical glasses, for the absorbtion and filtration of light rays, with sharply-defined absorbtion curves. Cuvettes, colorimeter tubes and Kerr cells, etc., with fused on parallel polished plates, are all of interest for analysis by optical methods. Thermometer tubing and tubing for electric and electro-chemical apparatus are the perfection of modern hand-made glassware and made to standards unattainable by others.

Every new discovery is tested to destruction for months by Schott's laboratories before being marketed. Every piece of glassware is optically tested for flaws or strain, by methods which are ruthlessly applied.

The Avometer

Multi-Range Measuring Instrument

THE Universal Avometer consists of a moulded panel, on the inside of which are mounted the whole of the switching apparatus, resistances, shunts, transformer, rectifier, etc., and the moving coil. On the panel itself are two rotating switch knobs, one for D.C. and the other for A.C., which automatically connect the shunts and resistances, so that only two terminals are required for connecting the Avometer for any tests. A standard replaceable fuse fits into the panel, and a push-button to alter the sensitivity of the instrument is fitted. The scale plate has three sets of markings and the dial is provided with an untarnishable mirror to prevent parallax errors. The back of the instrument holds a 1½-volt dry cell, used for resistance measurement, and means of compensating for its loss of voltage and change of resistance are provided. The movement consists of an aluminium former wound with copper wire, and supplemented with constanton to reduce temperature error. The coil is pivoted on hardened and highly-polished steel points, between conical sapphire jewels, and swings in a gap energised by a powerful well-aged cobalt steel magnet. Two phosphor-bronze hairsprings are fitted for conveying current to the moving coil and for the return of the pointer to zero. The resistances are pile wound on flat slabs, there being no possibility of a short circuit under high voltage.

With one exception, each successive range as indicated by the switch knobs is ten times the value of the previous one, and it is therefore possible to avoid the use of awkward multiplying constants. By pressing the button, which is only intended for use when measuring current and voltage, the normal full-scale deflection as shown by the switch knob is halved, and twice the normal length of pointer deflection is produced with a given input. On A.C. the instrument is accurate to first grade limits between 25 and 100 cycles, but it may be used up to 5,000 cycles without introducing more than 5 per cent. error. The Avometer is made by the Automatic Coil Winder and Electrical Equipment Co., Ltd.

Lawn Tennis Tournament

Entries Close Next Monday

LAWN tennis players throughout the chemical industry are reminded that next Monday, April 29, is the closing date for entries for the fifth annual CHEMICAL AGE Lawn Tennis Tournament. The tournament is open to all men engaged in the chemical industry either as principals of members of staffs throughout Great Britain, and will comprise singles and doubles, the latter being open to members of the same, or associated firms. THE CHEMICAL AGE Silver Challenge Cups, one for the singles and one for the doubles, will be awarded, to be held jointly for twelve months by the winners and the firms they represent, and there will also be, as in previous years, smaller trophies to be presented outright to the successful players and the runners-up.

Intending competitors should send in their entries at once to the Editor, THE CHEMICAL AGE, Bouverie House, 154 Fleet Street, London, E.C.4. Those who have not yet obtained entry forms should send their names, addresses, and the names of their firms.

Cleaning Research in Canada

Government Assistance

THE RESEARCH INSTITUTE OF LAUNDERERS AND CLEANERS has been formed as a result of efforts in the dry-cleaning and laundering industry towards a greater degree of co-operation between the cleaning trades and the textile-manufacturing industry. The Canadian Government is giving some assistance in this effort by providing that through the National Research Council the analytical and laboratory work will be directed, although the assistants and laboratory staff will be provided by the cleaning industry. The secretary of the National Research Council is also secretary of the Research Institute of Launderers and Dry Cleaners, both with headquarters at Ottawa.

British Association of Chemists

Liverpool Section Annual Dinner

THE annual meeting of the Liverpool Section of the British Association of Chemists was held on April 10 at the Exchange Hotel, Liverpool, when Professor E. C. C. Baly, president of the Association, was in the chair, supported by the Section chairman, Mr. L. Wild, and Mr. C. B. Woodley, general secretary.

Mr. A. BETTON, hon. secretary, reported an increase in membership to 163 full members and 24 students. A feature this year had been the arrangement of extra meetings at which members had made valuable contributions.

Dr. F. W. KAY, hon. treasurer, said that in spite of a debit balance the section had had a very successful year, both as regarded increased membership and on the social side.

Professor BALY said the Association was doing work of incalculable value to the profession. He pleaded for whole-hearted co-operation. He felt that if the Association were to attain the objects which the founders had in mind it would mean sacrifices of many kinds. He had a feeling that the Association was going to be a very big thing in a very short time. He believed that they were on the edge of very big possibilities. If those possibilities eventuated, he could assure them that the Association would come into its own. The membership was of the order of 2,000, whilst that of the Institute of Chemistry was 9,000. Yet together they only included a small proportion and did not represent the whole of the chemistry profession. He felt that they should advocate some policy which would benefit their profession as a whole, independent of whether they belonged to one association or another. Ever since he had been their president he had been convinced that the Association was going to rise to a position in the world of science which was its rightful position.

The following were elected officers for the 1935-36 session: Chairman, Mr. L. Wild; vice-chairmen, Messrs. J. W. Crabtree and C. A. Wylie; hon. secretary, Mr. E. Myer; hon. treasurer, Dr. F. W. Kay; committee, Messrs. A. Betton, D. T. Bruce, W. Johnston, T. L. Looker, W. Mansbridge, H. P. Minton, W. S. Reid, G. C. Riley, M. Rosebery, J. Sowler, R. J. Taylor and Dr. H. G. Bott.

Consideration was then given to the new unemployment benefit fund proposals, *viz.*: (a) That the period of benefit be extended beyond 26 weeks for a further 13 weeks, but at half the rate of benefit, where a member is still unemployed; (b) the possibility of granting a cash payment to the dependents of a member at death. This would be calculated on the unit basis and would increase with the time a unit has been held: Up to five years, six to ten years, eleven to fifteen years, over fifteen years (maximum). The rate may be slightly higher with each succeeding unit taken up, no count being taken of benefit drawn; (c) the possibility of making a cash payment to members reaching the age of 65—only those who have drawn no benefit during fifteen years to be eligible.

Mr. C. B. WOODLEY, in outlining the proposals, said that the ideas were not only their own, but some were from members themselves. The members of the committee had taken a long view and to his mind it should really become an investment fund. Trade was becoming more lively, and in the last few weeks they had had some good applications for men—one or two in the nature of £750 per year—and they had received a letter from one company to say they were pleased with the recommendation made to them. That resulted in members being taken off the fund and the fund benefited as a result.

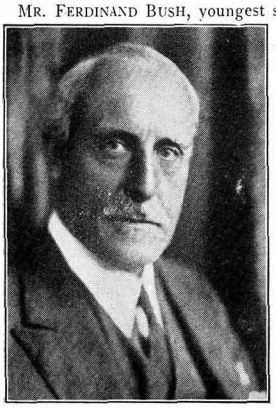
Society of Public Analysts

Forthcoming Papers

THE next meeting of the Society of Public Analysts will be held on Wednesday, May 1, at the Chemical Society's Rooms, Burlington House, Piccadilly, W.1, at 8 p.m., when the following papers will be read: "A Crystalline Putrefaction Product of Toxicological Significance," by G. Roche Lynch, M.B., F.I.C., and R. H. Slater, D.Sc., Ph.D., F.I.C.; "A Simple Form of Micro-Counter," by T. E. Wallis, B.Sc., F.I.C.; "A Colorimetric Method for the Quantitative Measurement of Rancidity," by Magnus A. Pyke, B.Sc.; "The Determination of Total Alkaloids in Cocoa," and "The Determination of Cocoa Matter in Flour Confectionery," by D. D. Moir, M.Sc., F.I.C., and E. Hinks, B.Sc., F.I.C.; "Colour Measurement of Oils and Other Liquids," by E. R. Bolton, F.I.C., M.I.Chem.E., and K. A. Williams, B.Sc., F.I.C.

THE twenty-fifth annual May Lecture of the Institute of Metals will be delivered by Professor W. L. Bragg, F.R.S., on Wednesday, May 8, at 8 p.m. The lecture, which will be entitled "Atomic Arrangements in Metals and Alloys," is to be given in the Hall of the Institute of Mechanical Engineers, Storey's Gate, Westminster, S.W.1. Free tickets of admission can be obtained from Mr. G. Shaw Scott, 36 Victoria Street, London, S.W.1.

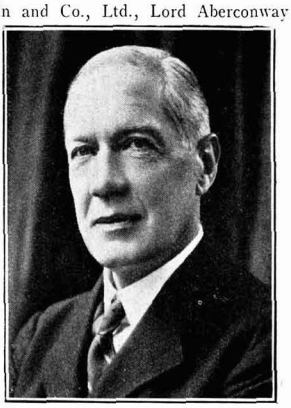
Obituary



Mr. Ferdinand Bush

MR. FERDINAND BUSH, youngest son of the late Mr. W. J. Bush, founder of the firm of W. J. Bush and Co., Ltd., whose death, at Bexhill-on-Sea, was reported last week, represented the company in Scotland from 1908 until 1916, when he returned to London upon his appointment as general manager. Six years later he was elected to the board, on which he continued to serve until the time of his death.

MR. H. STANLEY POCHIN, J.P., who died at his home at Croft House, Croft, Leicester, last week at the age of 58, was formerly managing director of H. D. Pochin and Co., Ltd., of Salford. Towards the end of 1933 the firm was absorbed by English Clays, Lovering, Pochin and Co., Ltd., Lord Aberconway being appointed chairman and Mr. Stanley Pochin becoming a director. He joined his brother, Mr. Frank H. Pochin, in connection with the Standard Engineering Co., Ltd., soon after the founding of that company, in 1894, and was joint managing director and afterwards sole managing director on the death of his brother in 1930. Since 1912, Mr. Stanley Pochin had been associated with the Croft Granite, Brick and Concrete Co., Ltd., and he was the moving spirit in Cornish Mine Supplies, Ltd., at St. Austell. Recently, he undertook the directorship of Cortonwood Collieries, Ltd., near Barnsley.



Mr. H. Stanley Pochin

Inventions in the Chemical Industry

Patent Specifications and Applications

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.

Sulphonic Acids

SULPHONIC acid derivatives having not less than 10 carbon atoms produced by treatment of aliphatic monohydric alcohols, such as are produced by reduction of fatty acids, with sulphonating agents, followed by treatment with a sulphite, are used in hair washes. In an example a sulphonic acid derivative is prepared by treating with concentrated sulphuric acid alcohol produced by reduction of lauric acid, separating the resulting sulphuric acid ester and heating a solution thereof with sodium sulphite to convert the sulphuric ester into a sulphonic acid. See specification No. 418,664 of E. Franz.

Stannous Chloride

IN extracting tin from ores by the use of a solid chloridising agent such as calcium chloride, the ore is first preheated and chloridisation then effected, say, at 700—800° C. with volatilisation of stannous chloride, in the presence of a reducing gas such as carbon monoxide or producer gas introduced as such to the reaction zone after the preheating step. The process may be carried out in a multiple hearth furnace, preheating of the ore being effected in the upper part of the furnace and admixture of chloride and treatment with reducing gas taking place on the lower hearths. Excess of the chloridising agent may be used. It is stated that hydrogen, water gas or coal gas are less effective as reducing agents than carbon monoxide. See specification No. 412,273 of L. A. Wood and British American Mines, Ltd.

Applications for Patents

(April 4 to 10 inclusive.)

STABLE CELLULOSE NITRATES, manufacture.—E. Berl. 10453.

HYDROCARBON LIQUIDS, refining.—Burmah Oil Co., Ltd. (Allan), and B. C. Allibone. 10891.

DYEING, ETC., TEXTILE MATERIALS.—E. I. du Pont de Nemours and Co. (United States, April 6, '34.) 10864.

QUINOLINE DERIVATIVES, manufacture.—L. S. E. Ellis. 10590.

CONVERSION OF CARBON DISULPHIDE to sulphur.—Gas Light and Coke Co. and R. H. Griffith. 10659.

BASIC CHROMIUM SULPHATE, manufacture.—J. R. Geigy A.-G. (Germany, April 9, '34.) 10484.

MONOAZO DYESTUFFS, manufacture.—J. R. Geigy, A.-G. (Germany, April 9, '34.) 10595.

INSOLUBLE DISAZO DYESTUFFS, manufacture.—J. R. Geigy A.-G. (Germany, April 9, '34.) 10596.

DISAZO DYESTUFFS, manufacture.—J. R. Geigy A.-G. (Germany, April 12, '34.) 10597.

SHAPED MATERIALS from highly polymeric compounds, manufacture.—W. W. Groves. 10972.

SOLUTIONS OF POLYACRYLIC ACID NITRILE, manufacture.—W. W. Groves. 10973.

KETO-DICARBOXYLIC ACIDS, ETC., manufacture.—W. W. Groves. 11120.

STABLE MIXTURES of chlorophyll-containing products, production.—P. R. Gruter. 10799.

READILY-SOLUBLE COMPLEX THEOPHYLLINE COMPOUNDS, making.—P. R. Gruter. 11143.

FORMALDEHYDE, ETC., OXIDATION PRODUCTS, making.—Gutehoffnungshütte Oberhausen A.-G. (Germany, April 7, '34.) 10842.

CONCENTRATED AQUEOUS SOLUTIONS of the follicular hormone, obtaining.—F. Hoffmann-La Roche and Co., A.-G. (Germany, May 17, '34.) 10962.

GLYCEROL MONO-LACTATE, manufacture.—Howards and Sons, Ltd., and R. H. Lock. 11123.

ACYLATED POLYALKYLENE POLYAMINES, preparation.—I. G. Farbenindustrie. (Germany, April 7, '34.) 10727.

HALOGENATED ETHERS, manufacture.—I. G. Farbenindustrie. (Germany, April 10, '34.) 10929 and 10930.

HIGHLY-CONCENTRATED NITRIC ACID, production.—Imperial Chemical Industries, Ltd., and G. P. Davies. 10641.

ACID-RESISTANT SILICON-IRON CASTING, production.—Isabellen-Hütte Ges. and F. Heusler. (July 5, '34.) 10857.

DYESTUFFS.—J. Y. Johnson. 10609.

ACID DYESTUFFS of the anthraquinone series, manufacture.—J. Y. Johnson. 10699.

CATALYTIC OXIDATION of unsaturated alcohols.—Naamlooze Vennootschap de Bataafsche Petroleum Maatschappij. (United States, April 18, '34.) 11167.

SYNTHETIC RESINS, production.—Naamlooze Vennootschap Industrieele Maatschappij v.h. Noury en van der Lande. (Holland, April 18, '34.) 11171.

CERAMIC-LIKE ARTICLES.—Naamlooze Vennootschap Maatschappij tot Beheer en Exploitatie van Octrooien. (France, April 11, '34.) 10820.

ZINC, distillation.—National Smelting Co., Ltd., and S. Robson. 10563.

HYDROCARBON PRODUCTS by destructive hydrogenation, production.—H. E. Potts (International Hydrogenation Patents Co.). 10556,10557.

INTERMEDIATES of stable diazoimino products, etc., manufacture.—M. A. T. Rogers. 11172.

DRY RUBBER, preparation.—Rubber-Latex-Poeder-Compagnie Naamlooze Vennootschap and M. J. Stam. 10800.

CONVERTING MILKY LIQUIDS, ETC., into finely-divided solid condition.—Rubber-Latex-Poeder-Compagnie. Naamlooze Vennootschap and M. J. Stam. 10801.

CONVERTING METALLIC ALUMINIUM with hydrogen chloride.—Ruhrchemie A.-G. (Germany, April 24, '34.) 10890.

ESTERS OF POLYCYCLIC ALCOHOLS, manufacture.—Schering-Kahlbaum A.-G. (Germany, April 7, '34.) 10877.

1 : 2-DIAMINOBENZENE, manufacture.—Soc. of Chemical Industry in Basle. (Switzerland, April 12, '34.) 10486.

INDIGOID DYESTUFFS, manufacture.—Soc. of Chemical Industry in Basle. (Switzerland, April 20, '34.) 11122.

COATING OF MAGNESIUM, ETC., with aluminium.—J. Stone and Co., Ltd., and G. R. Webster. 10844.

INCREASING YIELD in catalytic synthesis of aliphatic hydrocarbons.—Studien- und Verwertungsges. (Germany, April 25, '34.) 11038.

PURIFYING CRUDE HYDROCARBONS.—W. W. Triggs. 11002.

Complete Specifications open to Public Inspection

CONCENTRATED MILK CONSTITUENTS, production.—Kraft-Phenix Cheese Corporation. Oct. 6, 1933. 23803/34.

PHOTOGRAPHIC ANTI-HALATION LAYERS and filter layers, manufacture.—I. G. Farbenindustrie. Oct. 4, 1933. 25581/34.

MAGNESIA AND NITROGENOUS FERTILISERS from dolomite, manufacture and production.—Klöcker-Werke A.-G. Oct. 2, 1933. 26300/34.

CHLORINE DERIVATIVES of rubber.—Deutsche Gold- und Silber-Scheideanstalt vorm. Roessler. Oct. 5, 1933. 27556/34.

MAGNET STEELS containing nickel, aluminium, and chromium.—R. Bosch A.-G. Oct. 4, 1933. 27869/34.

QUINONES, manufacture and production.—I. G. Farbenindustrie. Oct. 7, 1933. 27920/34.

CELLULOSE DERIVATIVES, manufacture.—British Celanese, Ltd. Oct. 7, 1933. 28296/34.

CELLULOSE ESTERS, manufacture.—Soc. of Chemical Industry in Basle. Oct. 7, 1933. 28559/34.

RUBBER COMPOSITIONS and their manufacture.—E. I. du Pont de Nemours and Co. Oct. 7, 1933. 28616/34.

ARTIFICIAL TEXTILES by the viscose process, manufacture.—S. Sordelli. Oct. 6, 1933. 28769/34.

Specifications Accepted with date of Application

PHOSPHORIC ACID, manufacture.—Dorr Co., Inc. July 2, 1932. 426,392.

MOTHER-OF-PEARL EFFECTS in artificial plastic substances and paints and lacquers, production.—H. Hunsdiecker. (Sept. 1, 1933. 426,554.

CELLULOSE FIBRE particularly for improving the dyeing properties thereof, treatment.—Deutsche Hydrierwerke A.-G. Sept. 28, 1932. 426,482.

HYDROXYDIPHENYLENE COMPOUNDS and derivatives thereof, process for the manufacture.—I. G. Farbenindustrie. Oct. 5, 1932. (Cognate applications, 27172/33 and 27173/33.) 426,403.

WATER-INSOLUBLE AZO DYESTUFFS, process for the manufacture. I. G. Farbenindustrie. Oct. 5, 1932. 426,564.

VULCANISING RUBBER, process.—J. R. Ingram and Rubber Service Laboratories Co. Oct. 7, 1933. 426,649.

CHLORHYDRINS, process for the manufacture.—Naamlooze Vennootschap de Bataafsche Petroleum Maatschappij. Feb. 27, 1933. 426,519.

SULPURETTED HYDROGEN and the like in gases, method of and apparatus for detecting.—R. Norgate. May 23, 1934. 426,378.

SULPHUR by means of reduction of gases containing sulphur dioxide, process for producing.—A. R. Lindblad. June 12, 1934. 426,455.

SULPHUR by reducing sulphur dioxide, process for producing. A. R. Lindblad. June 12, 1934. 426,456.

Weekly Prices of British Chemical Products

Review of Current Market Conditions

THERE are no changes to report in market prices this week. Unless otherwise stated the prices below cover fair quantities net and naked at sellers' works. The Easter holidays have had a quietening effect on market conditions generally.

General Chemicals

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

ACID, ACETIC.—Tech. 80%, £36 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.—Commercial granulated, £25 10s. per ton; crystal, £26 10s.; powdered, £27 10s.; extra finely powdered, £29 10s. packed in 1-cwt. bags, carriage paid home to buyers' premises within the United Kingdom in 1-ton lots.

ACID, CHROMIC.—10½d. per lb., less 2½%, d/d U.K.

ACID, CITRIC.—11¾d. per lb. less 15%. MANCHESTER: 11¾d.

ACID, CRESYLIC.—97/99%, 1s. 8d. to 1s. 9d. per gal.; 98/100%, 2s. to 2s. 2d.

ACID, FORMIC.—LONDON: £40 to £45 per ton.

ACID, HYDROCHLORIC.—Spot, 4s. 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, SCOTLAND: 80°, £24 ex station full truck loads.

ACID, OXALIC.—LONDON: £47 17s. 6d. to £57 10s. per ton, according to packages and position. SCOTLAND: 98/100%, £48 to £50 ex store. MANCHESTER: £49 to £54 ex store.

ACID, SULPHURIC.—SCOTLAND: 144° quality, £3 12s. 6d.; 168°, £7; dearsenicated, 20s. per ton extra.

ACID, TARTARIC.—1s. per lb. less 5%, carriage paid for lots of 5 cwt. and upwards. MANCHESTER: 1s. 0¾d. per lb.

ALUM.—SCOTLAND: Lump potash, £8 10s. per ton ex store.

ALUMINA SULPHATE.—LONDON: £7 10s. to £8 per ton. SCOTLAND: £7 to £8 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, £30 per ton; powdered, £33, in 5-cwt. casks d/d buyers' premises U.K.

AMMONIUM CHLORIDE.—LONDON: Fine white crystals, £18 to £19. (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, £34 per ton, c.i.f. U.K. ports.

ANTIMONY SULPHIDE.—Golden, 6¾d. to 1s. 3d. per lb.; crimson, 1s. 5½d. to 1s. 7½d. per lb., according to quality.

ARSENIC.—LONDON: £16 10s. per ton c.i.f. main U.K. ports for imported material; Cornish nominal, £22 10s. f.o.r mines. SCOTLAND: White powdered, £23 ex wharf. MANCHESTER: White powdered Cornish, £22 10s., ex store.

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

BARIUM CHLORIDE.—£11 per ton. SCOTLAND: £10 10s.

BARYTES.—£6 10s. to £8 per ton.

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

BLEACHING POWDER.—Spot, 35/37%, £7 19s. per ton d/d station in casks, special terms for contract. SCOTLAND: £8 in 5/6 cwt. casks for contracts over 1934/1935.

BORAX, COMMERCIAL.—Granulated, £14 10s. per ton; crystal, £15 10s.; powdered, £16; finely powdered, £17; packed in 1-cwt. bags, carriage paid home to buyer's premises within the United Kingdom in 1-ton lots.

CADMIUM SULPHIDE.—3s. 2d. to 3s. 6d.

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.—3¾d. to 4¾d. per lb. LONDON: 4½d. to 5d.

CARBON TETRACHLORIDE.—SCOTLAND: £41 to £43 per ton, drums extra.

CHROMIUM OXIDE.—10¾d. per lb., according to quantity d/d U.K.; green, 1s. 2d. per lb.

CHROMETAN.—Crystals, 3½d. 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.—£3 19s. per cwt. less 21%. LONDON: £3 17s. per cwt. SCOTLAND: £4 2s. less 2½%.

DINITROTOLUENE.—66/68° C., 9d. per lb.

DIPHENYLGUANIDINE.—2s. 2d. per lb.

FORMALDEHYDE.—LONDON: £25 10s. per ton. SCOTLAND: 40%, £25 to £28 ex store.

IODINE.—Resublimed B.P., 6s. 3d. to 8s. 4d. per lb.

LAMPBLACK.—£45 to £48 per ton.

LEAD ACETATE.—LONDON: White, £34 10s. per ton; brown, £1 per ton less. SCOTLAND: White crystals, £33 to £35; brown, £1 per ton less. MANCHESTER: White, £35; brown, £33.

LEAD NITRATE.—£27 10s. per ton.

LEAD, RED.—SCOTLAND: £24 to £26 per ton less 2½%; d/d buyer's works.

LEAD, WHITE.—SCOTLAND: £39 per ton, carriage paid. LONDON: £36 10s.

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

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

METHYLATED SPIRIT.—61 O.P. industrial, 1s. 5d. to 2s. per gal.; pyridinised industrial, 1s. 7d. to 2s. 2d.; mineralised, 2s. 6d. to 3s. Spirit 64 O.P. is 1d. more in all cases and the range of prices is 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.—7¾d. to 8¼d. per lb. for delivery up to December 31.

POTASH, CAUSTIC.—LONDON: £42 per ton. MANCHESTER: £38 to £40.

POTASSIUM BICHROMATE.—Crystals and Granular, 5d. per lb. less 5% d/d U.K. Discount according to quantity. Ground, 5½d. LONDON: 5d. per lb. less 5%, with discounts for contracts. SCOTLAND: 5d. d/d U.K. or c.i.f. Irish Ports. MANCHESTER: 5d.

POTASSIUM CHLORATE.—LONDON: £37 to £40 per ton. SCOTLAND: 99¾/100%, powder, £37. MANCHESTER: £38.

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

POTASSIUM IODIDE.—B.P., 5s. 2d. per lb.

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

POTASSIUM PERMANGANATE.—LONDON: 10¼d. per lb. SCOTLAND: B.P. crystals, 9d. MANCHESTER: B.P., 10¾d.

POTASSIUM PRUSSIATE.—LONDON: Yellow, 8¼d. to 8¾d. per lb. SCOTLAND: Yellow spot, 8¼d. ex store. MANCHESTER: Yellow, 8¼d.

SALAMMONIAC.—First lump spot, £41 17s. 6d. per ton d/d in barrels.

SODA ASH.—58% spot, £5 12s. 6d. per ton f.o.r in bags.

SODA, CAUSTIC.—Solid 76/77° spot, £13 17s. 6d. per ton d/d station. SCOTLAND: Powdered 98/99%, £17 10s. in drums, £18 5s. in casks, Solid 76/77°, £14 12s. 6d. 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 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: £22. SCOTLAND: £20.

SODIUM BICARBONATE.—Refined spot, £10 10s. per ton d/d station in bags. SCOTLAND: Refined recrystallised £10 15s. 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 lot less 5% for spot lots and 4d. per lb. with discounts for contract quantities. MANCHESTER: 4d. per lb. basis. SCOTLAND: 4d. delivered buyer's premises with concession for contracts.

SODIUM BISULPHITE POWDER.—60/62%, £18 10s. per ton d/d 1-cwt. iron drums for home trade.

SODIUM CARBONATE, MONOHYDRATE.—£15 per ton d/d in minimum ton lots in 2 cwt. free bags. 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 10s. per ton.

SODIUM CHROMATE.—4d. 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, £14 10s. ex station, 4-ton lots. MANCHESTER: Commercial, £10 5s.; photographic, £14 10s.

SODIUM META SILICATE.—£14 per ton, d/d U.K. in cwt. bags.

SODIUM IODIDE.—B.P., 6s. per lb.

SODIUM NITRITE.—LONDON. Spot, £18 to £20 per ton d/d station in drums.
SODIUM PERBORATE.—10%, 9¼d. per lb. d/d in 1-cwt. drums. LONDON: 10d. per lb.
SODIUM PHOSPHATE.—£13 per ton.
SODIUM PRUSSIATE.—LONDON: 5d. to 5½d. per lb. SCOTLAND: 5d. to 5½d. ex store. MANCHESTER: 5d. to 5½d.
SULPHUR.—£9 15s. to £10 per ton. SCOTLAND: £8 to £9.
SODIUM SILICATE.—140° Tw. Spot £8 per ton. SCOTLAND: £8 10s.
SODIUM SULPHATE (GLAUBER SALTS).—£4 2s. 6d. per ton d/d SCOTLAND: English material £3 15s.
SODIUM SULPHATE (SALT CAKE).—Unground spot, £3 12s. 6d. 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 7s. 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 2s. 6d.
SODIUM SULPHITE.—Pea crystals spot, £13 10s. per ton d/d station in kegs. Commercial spot, £8 15s. d/d station in bags.
SULPHATE OF COPPER.—MANCHESTER: £14 15s. per ton f.o.b.
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. 5d. to 4s. 7d. per lb.
ZINC CHLORIDE.—SCOTLAND: British material, 98%, £18 10s. per ton f.o.b. U.K. ports.
ZINC SULPHATE.—LONDON: £12 per ton. SCOTLAND: £10 10s.
ZINC SULPHIDE.—11d. to 1s. per lb.

Intermediates and Dyes

ACID, BENZOIC, 1914 B.P. (ex Toluol).—1s. 9½d. per lb.
ACID, GAMMA.—Spot, 4s. per lb. 100% d/d buyer's works.
ACID, H.—Spot, 2s. 4½d. per lb. 100% d/d buyer's works.
ACID NAPHTHIONIC.—1s. 8d. per lb.
ACID, NEVILLE AND WINTHER.—Spot, 3s. per lb. 100%.
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.
BENZIDINE HCL.—2s. 5d. per lb.
p CRESOL 34-5° C.—2s. per lb. in ton lots.
m-CRESOL 98/100%.—2s. 3d. per lb. in ton lots.
DICHLORANILINE.—1s. 11½d. to 2s. 3d. per lb.
DIMETHYLANILINE.—Spot, 1s. 6d. per lb., package extra.
DINITROBENZENE.—8d. per lb.
DINITRCTOLUENE.—48/50° C., 9d. per lb.; 66/68° C., 01½d.
DINITROCHLORBENZENE, SOLID.—£72 per ton.
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.
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.—3ss. 11d. 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. to 5d. per lb.: 5-cwt. lots, drums extra.
NITRONAPHTHALENE.—9d. per lb.; P.G., 1s. 0½d. per lb.
SODIUM NAPHTHIONATE.—Spot, 1s. 9d. per lb.
o-TOLUIDINE.—9½d. to 11d. per lb.
p-TOLUIDINE.—1s. 11d. per lb.

Wood Distillation Products

ACETATE OF LIME.—Brown, £8 10s. to £9. Grey, £12 to £14. Liquor, brown, 30° Tw., 8d. per gal. MANCHESTER: Brown, £11; grey, £13 10s.
ACETIC ACID, TECHNICAL, 40%.—£17 to £18 per ton.
CHARCOAL.—£5 to £10 per ton.
WOOD CREOSOTE.—Unrefined, 3d. to 1s. 6d. per gal.
WOOD NAPHTHA, MISCIBLE.—2s. 6d. to 3s. 6d. per gal.; solvent, 3s. 3d. to 4s. 3d. per gal.
WOOD TAR.—£2 to £4 per ton.

Coal Tar Products

ACID, CARBOLIC.—Crystals, 7¾d. to 8½d. per lb.; crude, 60's, 1s. 1½d. to 2s. 2½d. per gal. MANCHESTER: Crystals, 7¾d. to 8d. per lb.; crude, 2s. 1d. per gal. SCOTLAND: 60's 2s. 6d. to 2s. 7d.
ACID, CRESYLIC.—90/100%, 1s. 8d. to 2s. 3d. per gal.; pale 98%, 1s. 6d. to 1s. 7d.; according to specification. LONDON: 98/100%, 1s. 4d.; dark, 95/97%, 1s. SCOTLAND: Pale, 99/100%, 1s. 3d. to 1s. 4d.; dark, 97/99%, 1s. to 1s. 1d.; high boiling acid, 2s. 6d. to 3s.
BENZOL.—At works, crude, 8½d. to 9d. per gal.; standard motor, 1s. 2d. to 1s. 2½d.; 90%, 1s. 3d. to 1s. 3½d.; pure, 1s. 6½d. to 1s. 7d. LONDON: Motor, 1s. 2½d. SCOTLAND: Motor, 1s. 6½d.
CREOSOTE.—B.S.I. Specification standard, 5½d. to 5⅝d. per gal. f.o.r. Home, 3¾d. d/d. LONDON: 4½d. f.o.r. North; 5d. London. MANCHESTER: 4¾d. to 5½d. SCOTLAND: Specification oils, 4d.; washed oil, 4½d. to 4⅝d.; light, 4½d.; heavy, 4½d. to 4⅝d.
NAPHTHA.—Solvent, 90/160%, 1s. 6d. to 1s. 7d. per gal.; 95/160%, 1s. 6d.; 99%, 11d. to 1s. 1d. LONDON: Solvent, 1s. 2½d. to 1s. 3½d.; heavy, 11d. to 1s. 0½d. f.o.r. SCOTLAND: 90/160%, 1s. 3d. to 1s. 3½d.; 90/190%, 11d. to 1s. 2d.
NAPHTHALENE.—Purified crystals, £10 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, 70s. to 75s.
PITCH.—Medium soft, 40s. per ton. LONDON: 45s. per ton, f.o.b. East Coast port.
PYRIDINE.—90/140, 6s. to 8s. 6d. per gal.; 90/180, 2s. 3d.
TOLUOL.—90%, 1s. 11d. to 2s. per gal.; pure, 2s. 2d.
XYLOL.—Commercial, 1s. 11d. to 2s. per gal.; pure, 2s. 1d. to 2s. 2d.

Nitrogen Fertilisers

SULPHATE OF AMMONIA.—£7 5s. per ton; for neutral quality basis 20.6% nitrogen delivered in 6-ton lots to farmer's nearest station.
CYANAMIDE.—£7 5s. per ton delivered in 4-ton lots to farmer's nearest station.
NITRATE OF SODA.—£7 12s. 6d. per ton for delivery to June, 1935, in 6-ton lots, carriage paid to farmer's nearest station for material basis 15.5% or 16% nitrogen.
NITRO-CHALK.—£7 5s. per ton to June, 1935, in 6-ton lots carriage paid for material basis 15.5% nitrogen.
CONCENTRATED COMPLETE FERTILISERS.—£10 5s. to £10 17s. 6d. per ton according to percentage of constituents, for delivery up to June, 1935, in 6-ton lots carriage paid.
NITROGEN PHOSPHATE FERTILISERS.—£10 5s. to £13 15s. per ton.

Latest Oil Prices

LONDON, April 24.—LINSEED OIL was steady. Spot, £23 (small quantities); May, £20 7s 6d.; June-Aug., £20 15s.; Sept.-Dec., £21 7s. 6d., naked. SOYA BEAN OIL was quiet. Oriental (bulk), April-May shipment, £22 15s. a ton. RAPE OIL was inactive. Crude extracted, £32; technical refined, £33 10s., naked, ex wharf. COTTON OIL was steady. Egyptian crude, £24 10s.; refined common edible, £28 10s.; and deodorised, £30 10s. a ton, naked, ex mill (small lots £1 10s. extra). TURPENTINE was firmer. American, spot, 50s. 6d. a cwt.
HULL.—LINSEED OIL.—Spot, quoted £21 2s. 6d. per ton; April, £20 12s. 6d.; May-Aug., £21; Sept.-Dec., £21 7s. 6d. COTTON OIL.—Egyptian, crude, spot, £25; edible, refined, spot, £27 10s.; technical, spot, £27 10s.; deodorised, £29 10s., naked. PALM KERNEL OIL.—Crude, f.m.q., spot, £19 10s., naked. GROUNDNUT OIL.—Extracted, spot, £32; deodorised, £35. RAPE OIL.—Extracted, spot, £31; refined, £32 10s. SOYA OIL.—Extracted, spot, £26 10s.; deodorised, £29 10s. per ton. CASTOR OIL.—Pharmaceutical, 40s. 6d. per cwt.; first, 35s. 6d.; seconds, 32s. 6d. COD OIL, f.o.r. or f.a.s., 25s. per cwt. TURPENTINE.—American, spot, 52s. per cwt.

Forthcoming Events

LONDON

May 1, 2, 3.—Iron and Steel Institute. Annual meeting. Symposium on the Welding of Iron and Steel. Annual dinner, May 2, Connaught Rooms, Great Queen Street, London. 7 p.m.

May 1.—Society of Public Analysts. 8 p.m. Burlington House, Piccadilly, London.

May 1.—Society of Chemical Industry (Plastics Group). Annual general meeting. 7.30 p.m. Federation of British Industries, 21 Tothill Street, London.

May 2.—Chemical Society. Ordinary scientific meeting. 8 p.m. Burlington House, Piccadilly, London.

BIRMINGHAM

Apr. 30.—Electrodepositors' Technical Society. "Power Supply for Electroplating with Particular Reference to Rectification." A. Smart and A. L. Williams. 7.30 p.m. James Watt Memorial Institute, Gt. Charles Street, Birmingham.

May 2.—Midland Metallurgical Societies. "The Newer Alloy Steels used in Automobile Work." S. A. Main. 7 p.m. James Watt Memorial Institute, Great Charles Street, Birmingham.

HULL

Apr. 30.—Hull Chemical and Engineering Society. Annual general meeting. 7.45 p.m. Municipal Technical College, Park Street, Hull.

SWANSEA

May 4.—Swansea Technical College Metallurgical Society. Annual meeting. 6.45 p.m. Technical College, Swansea.

Beet Sugar Industry

Employment of Alien Chemists

A SUGGESTION that the Council of the Institute of Chemistry should inquire into employment of aliens in the United Kingdom beet sugar industry, upon which the report of the Greene committee of inquiry was issued on April 10, was made on April 11 at the annual meeting of the Liverpool and North-Western Section of the Institute. The matter was raised by Mr. E. Gabriel Jones, Deputy City Analyst, who said that the discussion of the report would give the Institute Council an opportunity of inquiring into the allegations that the chief chemists and other executive officers in many of the beet sugar factories were aliens. If this was found to be correct the Council should make a vigorous protest. "There must surely be enough British chemists to fill these positions. I believe the processes were originally run by Dutch chemists, and they were perhaps necessary at first to show us how it was done. The industry has now been running long enough for our own chemists to be employed." A resolution was approved asking the Council to make the inquiry.

Trade Conditions in Finland

A Decline in Imported Chemicals in 1934

A DECLINE in the value of imported chemicals is reported in a memorandum on overseas trade conditions in Finland in 1934 issued by the Department of Overseas Trade. The decline is reported to be entirely due to a reduction in purchases of sulphur for the sulphite cellulose industry from 68,500 tons in 1933 to 61,900 tons in 1934. Many of the sulphite cellulose mills have now set up plants for the production of sulphur from ore supplied by the Outokumpu copper mine. Imports of sulphate of alumina for the paper industry increased from 6,800 tons in 1933 to 7,100 tons in 1934 and the value from Fmks.7.5 million to Fmks.9.8 million.

Improved industrial conditions are clearly reflected in the expansion of the import trade in metals, which in value reached a figure last year only slightly less than the 1929 level. Pig iron imports in 1934 were 52,000 compared with 18,000 tons in 1933, while sheet iron imports rose from 21,000 tons in 1933 to 33,000 in 1934, the import trade in pipes increasing from 7,000 to 11,400 tons.

From Week to Week

IMPERIAL CHEMICAL INDUSTRIES, LTD., have given £5,000 to King George's Jubilee Trust.

MR. WILLIAM CHARLES BRINSON, of Rock Ferry, Birkenhead, Cheshire, a former director of Evans, Sons, Lescher, and Webb. Ltd., of Liverpool, left £10,609.

A GUNPOWDER FACTORY was blown up at Decines, Isere, on April 20. An engineer's body was found eighty yards away, that of a woman employee fifty yards away, and there was apparently one other casualty. Three buildings were wrecked.

EDINBURGH UNIVERSITY CHEMICAL SOCIETY celebrated its diamond jubilee on April 20, being under the impression that it was founded only 60 years ago. In the course of the celebrations Professor James Kendall informed those assembled that the original foundation of the society went back to 1785.

THE EXPORT AND RE-EXPORT from France of aluminium in various forms is temporarily prohibited, by a decree published on April 19, in the "Journal Officiel." The decree pursues the Government's policy of conserving the country's defensive resources.

A PROGRESS REPORT has been issued by the Duffield Iron Corporation, stating that the commercial-size unit of plant was completed on April 20, and that drying fires are being applied in preparation for the plant's operation next month. Mr. Duffield is satisfied that the operation of this full-size unit of plant will establish the claims originally set forth for the economic production of iron and steel.

THE COUPONS DUE ON MAY 1 of the Potash Syndicate of Germany 25-Year Sinking Fund Loan 7 per cent. bonds, series "A" and "B," may be presented at the counting house of J. Henry Schroder and Co., 145 Leadenhall Street, London. Should holders claim in London the dollar value of the coupons, this will be converted into sterling at the buying rate for sight exchange on the day of presentation, except that the rate ruling on April 26, 1935, will be applied to all coupons presented prior to that date.

THE NUMBER OF PLANTATIONS of Indian rubber in the last year in India was 4,637, covering an area of 253,427 acres. This is a slight decline as compared with the previous year. The total production of raw rubber during the year was 12,915,000 lb. The exports of rubber by sea during the year amounted to 17,200,000 lb. as compared with 7,000,000 lb. in the previous year. Of the exports, the United Kingdom purchased 20 per cent., Straits Settlements 45 per cent., Ceylon 21 per cent., and Germany 2 per cent. Of the total trade, Burma accounted for 60 per cent., Madras 34 per cent., and Travancore 6 per cent.

SULPHUR is produced in Canada from pyrites and in the form of sulphuric acid from waste smelter gases. Production in these forms totalled 51,537 tons, of which 5,501 tons were contained in pyrites and 45,805 tons in sulphuric acid. No pyrites is being directly mined as such at the present time, but pyrites concentrates which are separated from copper sulphides at Eustis and the Aldermac mines, Quebec, and at the Britannia mine, British Columbia, are sold to Canadian and foreign consumers. Part of the concentrate from the Britannia mine is exported to the Tacoma smelter for use as a fluxing material. Sulphoric acid is made from waste smelter gases at the Trail and Copper Cliff smelters. Elemental sulphur is also being recovered from smelter gases at Trail.

AN ORDER HAS BEEN PRONOUNCED by the Court of Sessions confirming the reduction of capital of the Scottish Central Glass Works, Ltd., Kelliebank, Alloa, from £200,000 to £100,000.

THE LONDON OFFICE of Rhodes, Brydon and Youatt, Ltd., Stockport, is now at 28 Victoria Street, Westminster, S.W.1 The telephone number is still Victoria 5948.

THE FRANKLIN MEDAL has been awarded to Albert Einstein and Sir Ambrose Fleming for their work in the fields of relativity and wireless research respectively. It is announced that $1,000 (£200) will be paid to each of the scientists from the Franklin Medal Fund created by Mr. Samuel Insull.

AT THE ANNUAL MEETING of the Tharsis Sulphur and Copper Co., Ltd., the chairman, Mr. W. P. Rutherford, announced that the directors had decided to embark, in a small way, on the extraction of gold and silver by the cyanide process from gossan. The directors have decided to proceed with the erection of one unit of plant.

TWO MEN WERE OVERCOME shortly after entering a kiln at the fireclay works of Steele Brothers and Sons, Edinburgh, on April 17, and subsequently died. The manager, making his usual round of inspection, found the men, who had entered the kiln to fix electric lamps in preparation for night work. The cause of the tragedy has not been ascertained.

AN IMPORTANT STEP in the study of cancer was announced on April 22 by Dr. L. F. Fieser, of Harvard University Research Laboratory, in an address to the Organic Chemistry Division of the American Chemical Society. He declared that he and his associates had succeeded in producing polynuclear hydrocarbons by disintegration of chemical compounds normally found in the body, which have the power of producing cancer in animals.

THE ORDINARY GENERAL MEETING of the Rubber Growers' Association (Incorporated) was held on April 16 at the offices, Fenchurch Street, London. Mr. James Fairbairn, chairman of council, said that one of the most important committees was the Technical Research and Development of New Uses Committee, presided over by Sir Herbert Wright.

AN AGREEMENT has been reached in principle between the Franco-German Potash Syndicate and the Spanish producers. Spanish producers will receive an export quota of about 14-16 per cent. in the syndicate, which will then comprise practically all producers in Europe. About half of the Spanish quota, or almost 8 per cent. of the total exports of the syndicate, will accrue to the leading Spanish producer, the Union Espanola de Explosivos, and the main part of the balance to the Potasas Ibericas S.A., the second largest producer in Spain.

CANADA'S ASBESTOS PRODUCTION during December totalled 10,616 tons, as against 20,240 tons in November, and 17,653 tons in December, 1933. Exports of asbestos in December totalled 15,031 tons, as compared with 18,504 tons in November. Production during last year declined slightly from 158,367 tons, valued at $5,211,177, to 155,980 tons ($4,936,326). A change in the system of mining during 1933, by one of the large operators, from the open pit to the block-caving method has resulted in a substantial saving in mining costs. Considerable research work on asbestos has been carried on at the National Research Laboratories, Ottawa, and the specifications for a standard testing machine, as developed by the National Research Council, has been accepted by the asbestos producers.

Company News

Alexander Duckham and Co.—The report for 1934 shows a gross profit of £152,697, against £129,453 in 1933. The directors recommend a final dividend of 8 per cent., making 12 per cent. for the year.

Magadi Soda Co.—A trading profit of £2,881 is shown for 1934. This compares with a comparable profit of £20,942 in 1933, so that after charges, fees, expenses, and interest, and crediting £5,522 from provision for contingencies, the net loss is £13,068, against £1,434 a year ago.

Shawinigan Water & Power Co.—The statement of earnings and expenses for the quarter ended March 31 shows a gross revenue of $3,118,975 against $2,916,779 last quarter. Operating expenses amounted to $1,372,814, fixed charges $1,023,475, leaving a surplus, before allowing for depreciation and tax, of $722,686.

Goodlass Wall and Lead Industries.—A dividend of 6 per cent., less tax, is announced on the ordinary shares for 1934. This is an increase of 1 per cent. on last year's dividend. The 1932 dividend was 3 per cent., while 2 per cent. was paid for the previous thirteen months.

Newton, Chambers and Co.—After making allowances for depreciation and providing £35,000 for accrued liability in respect of old accident cases, there is a profit of £85,754 for 1934 (against £43,289), making with the amount brought in £148,892. A final dividend of 10 per cent. is declared, making 12½ per cent., against 7½ per cent.; £25,000 is placed to capital sinking fund special reserve, leaving to carry forward £64,515.

Dunlop Rubber Co.—For the year 1934 a profit of £1,687,700, is reported, compared with £1,512,866 a year ago. The sum of £578,415 is brought forward, giving an available total of £2,266,102. The transfer to tax reserve is raised from £403,956 to £550,060, and the ordinary dividend repeated at 8 per cent., less tax. A further sum of £250,000 is placed to dividend equalisation reserve, £100,000 to contingencies reserve, and the carry-forward is raised to £588,652.

Reckitt and Sons.—An increase in profits is reported from £1,143,302 in 1933 to £1,161,934 in 1934. In addition, the accounts show a credit of £74,370, representing appreciation of investments, against £27,365 a year ago. A transfer of £100,000 is made to general reserve, and £74,370 is placed to investment reserve. The ordinary dividend and bonus again total 22½ per cent., and, after allowing £115,000 as bonus to employés, a surplus of £149,792, against £147,440, is carried forward.

Babcock and Wilcox.—The balance of profit available for appropriation for 1934 is shown at £424,762, compared with £242,179 for 1933. The contribution to staff funds is raised from £16,916, to £19,819, and after preference dividend requirements and the ordinary dividend of 8 per cent., the sum of £25,000 is transferred to the dividend equalisation fund, from which respective transfers of £125,000 and £50,000 were made to revenue in 1932 and 1933. The carry-forward is up from £23,388 to £44,406.

Rio Tinto Co.—The report for 1934 states that profits total £484,732, compared with £530,070 for 1933. The former figure is struck after charging £101,632 of the estimated cost of labour surplus to production requirements, and the report records a reduction in this burden, the comparative 1933 charge being £143,143. The 1934 charge, however, is shown less £27,958 as transfer from tax provision. Expenses, taxes, fees, etc., absorb £281,139, against £253,776. Debenture charges take £148,479. Of this amount, a sum of £69,007 refers to "amount of debenture redemption applied to writing down plant and other assets, less £12,404 transfer of ships' reserve account no longer required. The preference dividend requires £81,250, and the carry-forward is reduced from £402,858 to £376,722. No ordinary payment has been made since 1930.

New Companies Registered

Edward Hack, Ltd., 69 Farringdon Road, London.—Registered March 30. Nominal capital £10,000. Chemists, druggists, chemical manufacturers and dealers. Directors: Edward Hack, Dorothy Hack.

Allied Colloids (Bradford), Ltd.—Registered March 29. Nominal capital £1,000. Manufacturers of and dealers in chemicals, gases, drugs, medicines, oils, colours, dyes. A subscriber: Edgar A. Swift, The Gables, New Close Road, Shipley, Yorks.

John Wylde, Ltd.—Registered April 6. Nominal capital £10,000. Druggists, druggists' sundriesmen, chemists, oil and colour men. A subscriber: Norman Baker, Portland House, Basinghall Street, London.

Marvea Products, Ltd., 103 Cannon Street, London.—Registered April 10. Nominal capital £2,000. Chemists, druggists, dye manufacturers and dealers in drugs. Directors: Archibald W. G. Scaife and Norman W. Scaife.

Alfred Johnson and Son, Ltd.—Registered April 23. Nominal capital £100. Manufacturers of and dealers in earthenware, pottery and ceramic ware, clay, coke manufacturers, chemists, electrical and mechanical engineers. A subscriber: Ernest J. Burrows, 29 Lyndhurst Road, London.

Liverpool Electro Plating Co., Ltd., 14 North John Street, Liverpool.—Registered March 30. Nominal capital £1,500. Electro, nickel and chromium platers, bronzers, oxidisers. Directors: Edward I. Dugmore, Harrold D. Parry, Chas. T. Perry.

Corby Basic Slag, Ltd.—Registered April 5. Nominal capital £25,000. Manufacturers, producers, treaters, grinders and crushers of, and dealers in basic slag; manufacturers of and dealers in sulphate of ammonia, super-phosphates. A subscriber: Joseph H. G. Humphries, "Woodside," 18 Oakhill Road, Ashtead, Surrey.

Caledonian Drug Co., Ltd., 125 New Bond Street, London.—Registered April 1. Nominal capital £5,000. Manufacturers of and dealers in chemicals, drugs, medicines, bio-chemicals, bacteriological preparations and products, toilet requisites and preparations, perfumes. Directors: Adam Clark, Harry Berry.

Sponcel, Ltd., Woldham Road, Bromley, Kent.—Registered March 30. Nominal capital £5,000. Manufacturers of viscose and cellulose; manufacturing chemists and druggists. Directors: John L. Buchanan, Roger Pears, Jean Defaucamberge, Sir Thomas Taylor.

Instrument Engineering Company, Ltd.—Registered March 30. Nominal capital £4,000. Erectors and installers of instruments in boiler houses, blast furnaces, mines, engineering and chemical works. Directors: Arthur Sweet, 66 Victoria Street, S.W.1; Arthur G. Angell, Roy C. W. Bryant.

J. H. Wiseman and Company, Ltd., Suffolk House, 5 Laurence Pountney Hill, London.—Registered March 28. Nominal capital £1,000. To acquire the business of J. H. Wiseman and Co., chemical and general merchants and agents, importers and exporters of and dealers in all chemical and general products. Director: Joseph H. Wiseman.

Gravfil Machines, Ltd., 34 New North Street, Holborn, W.C.—Registered April 15. Nominal capital £1,000. To acquire the business of a bottling production and chemical engineer carried on by Clifford B. Harley, at 34 and 35 New North Street, Holborn. Metal-founders, pattern makers. Directors: Clifford B. Harley, Mrs. Doris M. Harley.

Unifloc Reagents, Ltd., 10 Adelaide Street, Swansea.—Registered March 29. Nominal capital £4,000. To manufacture, sell, buy and deal in all kinds of chemicals and chemical products, and any reagents, flocculators, materials, solutions and substances used in purifying, filtering, thickening and recovery processes and treatment of effluents and sewage. Directors: G. E. Aeron-Thomas, Noel G. Thomas.

Commercial Solvents (Great Britain), Ltd.—Registered April 15. Nominal capital £200,000. Manufacturers and importers of and dealers in organic solvents of all kinds, including butyl alcohol, acetone, amyl alcohol, ethyl alcohol and propyl alcohol, organic esters of all kinds, including amyl acetate, butyl acetate, propylacetate, ethyl acetate, butyl butyrate and butyl propriovate, organic or inorganic chemicals; distillers, extractors. A subscriber: F. Wasserman, 27 Melrose Avenue, London.

W. & J. Glossop, Ltd.—Registered April 18. Nominal capital £120,000. Tar distillers, tar spraying contractors, tar grouting contractors, tar macadam manufacturers, concrete glazed tile manufacturers; proprietors and manufacturers of super tar, vitar, vitarmac, fluidphalte (liquid bitumen) bitumulsion phaltum and preservel; manufacturers of automatic gauges and coal tar machines; agents for the Powrcleer apparatus. Directors: Henry Stephenson, York House, Roedean Crescent, Roehampton, S.W.15; Arthur Rideal, Ralph W. Willsdon, Frank P. Willsdon.

Books Received

Official Publications

Bulletin of the Imperial Institute. Vol. XXXII. No. 4. 1934. London: John Murray. Pp. 144. 3s. 6d.

Economic Conditions in British Malaya to December 20th, 1934. By A. Hartland. London: H.M. Stationery Office. Pp. 66. 2s. 3d.

The Investigation of Atmospheric Pollution. Report on Observations in the Year ended March 31, 1934. London: H.M. Stationery Office. Pp. 108. 5s.

Chromium Steels. By Richard Henry Greaves. London: H.M. Stationery Office. Pp. 319. 7s. 6d.

Chemical Trade Inquiries

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).

France.—An agent established at St. Amand-les-Eaux (Nord) wishes to obtain the representation, on a commission basis, of United Kingdom manufacturers of colours for ceramic industry, transfers for porcelain, etc., chemical products and pharmaceutical specialities. (Ref. No. 376.)