The Chemical Age

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Notes and Comments

Overseas Chemical Trade in 1934

THE overseas trade returns issued by the Board of Trade this week enable a comparison to be made between the chemical trade figures for 1934 and those for the two previous years. While they reveal an encouraging increase in the total exports of chemicals, drugs, dyes and colours, they show a much greater increase in imports. Total exports in 1934 were £19,565,890, compared with £18,567,696 in 1933 (an increase of £998,194, or 5.3 per cent.) and £18,539,350 in 1932 (an increase of £1,026,540, or 5.6 per cent.) Imports in 1934 totalled £11,276,142, compared with £9,923,496 in 1933 (an increase of £1,352,646 or 13.6 per cent.) and £9,680,451 in 1932 (an increase of £1,595,691 or 16.4 per cent.). Re-exports amounted to £820,280 in 1934, against £1,172,400 in 1933 (a decrease of £352,120) and £555,467 in 1932 (an increase of £264,813).

Taking exports and imports together and omitting re-exports, it will be seen that, in the year just ended, imports had grown to a figure representing 57.6 per cent. of the total exports. In 1933 the percentage was 53.4, and in 1932 it was only 52.2. There is, of course, no indication of the total home production or the home consumption of chemical products, but the returns are worthy of careful attention from the point of view of the success or failure of the existing tariff system, both at home and in those countries to which chemicals are exported, and from the standpoint of the efficiency of, or the room for improvement in, the overseas selling organisation of the British chemical trade.

Training the Worker

HOWEVER extensive may be the mechanisation of industry, success or failure must in the long view depend on the human element. By the introduction of machinery, industry the world over has removed the need for strength and craftsmanship. A completely mechanised works could be run by any beings that have the strength to push a button; electric relays could do the rest. The skilled craftsmanship of the past, when everything was made by hand, has given way to mass production by the machine by which equally beautiful and equally useful things are turned out by the hundred in the same space of time and with the same labour as was formerly required for a single article. All that we miss in the process is individuality. The new order throws into greater prominence the mental characteristics of workers and staff alike. The training of the higher members of the staff has been discussed times without number, but the mental qualifications of the workmen have not received their due meed of attention. The workman is facing a new problem, that of the replacement of his brawn by his brain, and it is less easy to acquire brain than muscle. To solve the problem must be a national care, and the raising of the school-leaving age and the system of continuation classes are a step in that direction. Educationists have discussed this in many aspects, but the industrialists who have to use the half-finished material supplied to them by the educationists must have the ultimate say in the value of what is being done. There can be no doubt that the principle of the continuation class in which the student learns while engaged in practical work has the great value that the learner sees the practical application of his knowledge whilst he is acquiring it. Much of the inertia of the school-boy arises from the inability to see what good all his "swotting" is doing him. It has been suggested that the critical point in development of the human race is after the age of 15, so that the raising of the school age would not have the same influence upon mental capacity as would continued study after that age.

The Continuation Class System

INDUSTRIALISTS who have charge of large concern find that a day continuation class during working hours is of inestimable value to their young employees below the age of 20. The entry of boys and and girls into industry should be delayed until the age of 16 at least; it is better that youth should be more fully developed before being thrown into the hurly-burly of industry and that young people should not be exposed at too early an age to the somewhat rough influences of the works. Those who are to occupy the higher posts do not enter the works generally until over the age of 20; 16 is not too old for the lower grades, and besides it is cheaper for the State to maintain a boy or girl *in statu pupillaris*, than to maintain the same individual in later years, grown up and with a family. Raising of the school age is an important contribution to the unemployment problem; continuation classes will assist industry to become more efficient.

The employer should encourage the continuation class idea by every means within his power; in no industry is this more important than in the chemical industry, for it is here that the skill and intelligence of the individual employee is needed pre-eminently. All works of any size should run their own continuation classes in which the learner may specialise in the knowledge required for the particular branch of industry in which he finds himself. In this there appears to be a difficulty, however, for many firms, and particularly

those engaged in engineering, take apprentices because that grade of labour is cheap and is good enough for the work it is called upon to do when learning, and when the apprentice becomes 21 only a few can be retained, the remainder being allowed to depart to other concerns. Why train men for someone else? This seems to be a short-sighted view. It costs little more to train 20 youths than to train five; the pick of the bunch may be retained, and the growing generation will be the best workers. This question of further education of every grade of labour must be the constant thought of every industrialist and of the head of every chemical works. The difficulties are not insuperable and the solution of them would be to the advantage of the chemical industry as a whole.

Perkin Medal Award

THE Perkin Medal of the Society of Chemical Industry, a distinguished honour among chemists, was presented on January 11 to Dr. George O. Curme, Jr., of the Carbide and Carbon Chemicals Corporation. The occasion was a joint meeting of the Society of Chemical Industry, the American Chemical Society, the Electrochemical Society and the Societe de Chimie Industrielle, held at the Chemists' Club, New York. Dr. Marston T. Bogert, of Columbia University, a past-president, making the presentation. The award of the medal was made several months ago by a committee representing five national chemical societies. This medal is awarded annually for valuable work in applied chemistry, and Dr. Curme was chosen for his work on the development of commercial processes for synthesis of aliphatic organic compounds such as alcohol, acetone and ethylene glycol. In his medal address, Dr. Curme described his researches on organic synthesis, and showed the relationship of the work done by himself and his associates to the broad movement of industrial synthetic organic chemistry, in which Sir William Perkin played an important part in the early days. Synthetic organic chemistry is now a practical part of industry on a large and ever-increasing scale, and has won its place by special achievement. This is illustrated by the valuable tools supplied to the motor car industries in perfection of to-day's car, and also by the contributions to aviation, the film industry, medicine and national defence. He indicated new advances possible in the textile field and pointed out the lack of progress in the construction industries.

Dr. Curme was born in Mount Vernon, Iowa, in 1888. He graduated from Northwestern University in 1909, spent one year at Harvard University in graduate study, and received the degree of Doctor of Philosophy at the University of Chicago in 1913. He then spent a year as a graduate student at the University of Berlin under Emil Fischer. In 1914 he accepted a Fellowship at the Mellon Institute of Industrial Research at Pittsburgh, Pa., to investigate synthesis of acetylene and olefine gases and their chemical derivatives. This work was continued on an expanding scale until 1920, when the project was transferred to a semi-plant scale near Charleston. In 1920 the Carbide and Carbon Chemicals Corporation was organised to exploit the results of the earlier research and to continue the commercial development of organic synthesis. Dr. Curme received the title of chief chemist of this company in 1920, vice-president and director of research in 1929. During his period of service with the company, successful processes have been developed and put into commercial operation for synthetic production of ethylene glycol, acetone, ethyl alcohol, methyl alcohol, butyl alcohol, acetic anhydride, glycol ethers, triethanolamine and related products. This work has, in effect, created a new division of industrial chemistry based on the synthesis of aliphatic chemicals, which has become an important factor in American industry.

Grain Size

EVERYONE has had the difficult task of interpreting the screen analysis of a powder or aggregate of particles of larger size. The chemist submits the given material to screening upon a number of sieves and reports, for example, that upon screen 2 in. mesh *a* per cent. is retained; that between $1\frac{1}{2}$ in. and 2 in. mesh there is present *b* per cent. and so on down all the gradations to the very finest powder. Of a second substance he reports the same set of figures, but with different values for *a*, *b*, *c*, etc. The chemist is satisfied that he has done his work. But the unfortunate works engineer may be left nearly as much in the dark as if he had never received the figures. He may receive two sets of figure such as are given below:—

	Sample A.	Sample B.
0-$\frac{1}{8}$ in.	5 per cent.	10 per cent.
$\frac{1}{8}$-$\frac{1}{4}$ in.	30 ,, ,,	10 ,, ,,
$\frac{1}{4}$-$\frac{1}{2}$ in.	15 ,, ,,	30 ,, ,,
$\frac{1}{2}$-1 in.	25 ,, ,,	20 ,, ,,
1-1$\frac{1}{2}$ in.	10 ,, ,,	20 ,, ,,
above 1$\frac{1}{2}$ in.	15 ,, ,,	10 ,, ,,

What is the size relationship between these two sizes of materials and which is the larger and by how much? The important question may be one of surface area; unless the particles are regular geometric figures it is impossible even to guess the total area, but if the size of the two samples could be expressed in some correct numerical manner, at least the relative surface areas of the two materials could be deduced. The only methods that seem to have been suggested for doing this, so far as our search through literature has gone, are those of Eisenberg and Blumel, both of whom have applied their solution to coals. Broadly, both methods involve drawing a curve with the sieve aperture as abscissa and the cumulative amount of the fraction retained on each mesh as the ordinate. The area under the curve is considerered as giving a measure of the size of the sample as a whole. Greenfield, through his co-workers, Dummett and Stancey, in " The Gas World " Cooking Section for November and December, 1934, refers to a modification of this method in which the same curve is plotted and upon this graph is drawn a straight line starting on the X-axis at the point denoting maximum particle size, and sloping upwards to cut the Y-axis; the line is so drawn that the area under this line is equal to the area under the curve. If the point where the curve cuts the Y-axis be divided into 100 parts, the intersection of the straight line with the Y-axis gives the size of the sample as a numerical index. This index is a constant method of expression so long as the maximum size of the grains in the sample is constant and the method is thus only applicable to powders and aggregates governed by this condition. It seems doubtful whether there does not exist some more exact mathematical method of evaluating the grain size of the complex mixture in terms of a single numerical figure, and the adoption of some such system would lighten the task of those who interpret screen analyses.

The Application of Spectroscopy to Chemical Problems

Its Past Achievements and Future Possibilities

THE method of spectrum analysis inaugurated in 1860 by Bunsen and Kirchhoff began with the discovery of rubidium and caesium, said Dr. R. A. Morton in a lecture to the Liverpool Section of the Institute of Chemistry on January 10. Other workers followed with thallium, indium, germanium and gallium, and spectroscopy played an important part in elucidating the chemistry of the rare earths and the inert gases.

Much careful work on the line spectra of the elements provided an accurate descriptive basis for a method of qualitative analysis of singular beauty and utility. At the same time it provided a body of data possessing unsurpassed precision and great complexity. Physicists and mathematicians have found a happy hunting ground in the data of spectroscopy, and in the last two generations have achieved a theoretical synthesis amazing alike for its elegance and its fundamental significance. Thus, it has been said that the periodic classification in its entirety could have been deduced from the interpretation of spectra even if no other evidence were available.

Detection of Impurities in Metals

The technique of qualitative analysis has now progressed to the point that the spectrographic method has no rival for the detection of many impurities present in traces in metals. Indeed, the experience of the British Non-Ferrous Metals Research Association (D. M. Smith, "Metallurgical Analysis by the Spectrograph," 1933) has "led to the conviction that spectrographic methods of assay are well worthy of far more extensive use in metallurgical chemical laboratories." Once a mastery of qualitative analysis has been gained, the difficulties in the way of quantitative analysis are not as a rule very formidable.

It is necessary first of all to realise the advantages and disadvantages of the various types of excitation for the light source and of photographic plates differing in spectral sensitivity. D.C. arcs are suitable for the less fusible metals and for powders like plant ashes, etc. High-tension condensed sparks are suitable for metals and for some solutions; the material is not used up and the distribution of impurities in heterogeneous specimens can be explored. The high frequency spark using a Tesla coil presents many advantages in the examination of biological specimens. Ramage has introduced a successful modification of the flame method of excitation; the specimen is rolled into a spill of ashless filter paper which is introduced into an oxy-acetylene or oxy-coal gas flame.

Line Intensities

Quantitative analysis depends essentially on the determination of line intensities, either by absolute photometry or in relation to the intensities of known lines due to major constituents of the specimen under test. De Gramont's "raies ultimes," *i.e.*, the few lines which persist in the spectrum and are the last to disappear as the amount of the element present decreases to the lower limit of spectrographic detection, are known for most metals, and in conjunction with the method of "homologous pairs of lines" provide the best approach to quantitative spectrum analysis. The degree of blackening of a "raie ultime" is compared with the blackening of a spectrum line of the primary substance (or major constituent) situated in close proximity on the plate and against a similar background. Thus, for the assay of copper, it is necessary first to obtain the spectrum of the pure metal and secondly it is convenient also to record that of an alloy containing 1 per cent. of tin (auxiliary alloy).

Bismuth is determined by its "raie ultime" 3067.7 Å, the intensity being compared with that of two of the weaker lines in the copper spectrum. With 0.001 per cent. Bi the 3067.7 line is barely visible, with 0.005 per cent. it becomes equal in intensity to the 3140.3 line of copper, whilst with 0.02 per cent. the 3067.7 line reaches equality with the 3108.6 line of copper. A fairly accurate estimate of bismuth content over the range 0.001-0.05 per cent. is thus readily possible using only the one bismuth line. Two lines of lead, 2614.2 and 2833.1 are readily detectable. For quantitative analysis, use is made of the auxiliary tin alloy. For 0.01 per cent. of lead the 2833.1 line is equally intense with the 2913.5 line of tin, and for 0.1 per cent. with the 2850.6 line. At 0.03 per cent., the 2813.6 tin line and the 2833.1 Pb line are equally intense, whilst the 2614.2 line of lead and the 2661.2 tin line are equal at 0.3 per cent. Pb.

Sufficient has been said to illustrate the principle of the homologous line pair method. It is obvious that work in this field requires access to good tables and to the literature in which line pairs have been calibrated against analytical data or specially prepared alloys. Various methods for increasing the accuracy of comparisons are available, perhaps the best being the logarithmic sector wedge method (cf. "Z. angew. Chem.," 1928, *41*, 1218 and "Trans. Optical Soc.," 1930, *31*, 169). In this method the greater the intensity of a line the longer its trace on the photographic plate.

Spectrum analysis is not inherently difficult, but it does require considerable experience. This fact, coupled with the cost of a full range of spectrographs, has militated against very wide use of the method. Recent developments, particularly in regard to metallurgical, clinical and pathological problems, have greatly increased the need for wider application, and the case is strengthened by the increasing utility of the same spectrographs in assays of organic substances by absorption spectra.

Absorption Spectra

The absorption spectra shown by simple molecules are important, since molecular spectra provide methods for determining structure, interatomic distances from moments of inertia and vibrational spectra, valency angles and force constants. Photochemistry, as instanced by Norrish's recent work on acetone, can be strikingly advanced by careful work on fluorescence spectra and absorption spectra in various regions. Absorption spectra also provide extremely good assays for some organic solvents, *e.g.*, carbon disulphide in chloroform or carbon tetrachloride; similarly benzene in alcohols or paraffins can be determined accurately, whilst naphthalene and anthracene can be estimated in many mixtures.

The Raman effect consists of a molecular scattering involving inelastic collisions between molecules and light quanta. The internal energy of the molecule may be increased or decreased as a result of the impact and the size (frequency) of the scattered quantum correspondingly decreased or increased. Experimentally, this results in new lines in the spectrum of the scattered light, differing in frequency from the exciting light by various constant quantities. The displacement of the exciting line represents a mode of vibration characteristic of the scattered molecule. The Raman effect is a highly additive property, but second order constitutive effects are proving very fruitful in the interpretation of organic structures. A simple application of the mechanics of springs has, in the hands of Kohlrausch, provided much information on the strength of linkages.

Organic chemistry has frequently been advanced by semi-empirical work on the absorption spectra of dissolved substances. Particular examples include the implications of the theory of chromophoric groups as applied both to substances absorbing in the ultra-violet and to dyestuffs, and to cases of doubtful constitution such as occur in keto-enol tautomerism. In this connection tribute should be paid to the great value of the technical advances in spectro-photometry which have been made since the war and have transformed the whole subject.

Perhaps the most interesting recent advances lie in the application of absorption spectro-photometry to biochemical problems. The discovery that foodstuffs may acquire anti-

rachitic potency on exposure to ultra-violet rays was followed up by the recognition that the property resided in the sterol fractions. It was then found, spectroscopically, that cholesterol contained a minute trace (1/5,000) of ergosterol, this substance being the photochemical precursor of vitamin D, now known as calciferol. This substance is manufactured on a considerable scale, and the operation involves spectrophotometric control of the initial and final products. The extraction of pure vitamin A from rich halibut liver oils has also been facilitated by spectroscopic data, both for vitamin A and carotene (provitamin A). Not only is the absorption spectrum a criterion for the pure vitamin, but also it affords the best method for assaying liver oils and has last year been adopted by the League of Nations Committee on Biological Standards. In addition, the well known antimony trichloride colour test for carotenoids and for vitamin A is best studied by means of visual spectro-photometry.

Vitamin B_1 has recently been isolated and its absorption spectrum has played an important part in establishing the purity of the best crystalline specimens, but few investigations can have been so quickly successful as the recent work on vitamin B_2, or lactoflavin. Warburg and Christian succeeded in isolating a respiratory enzyme (1933) which has since turned out to consist of a protein-like fragment linked up to a water soluble pigment identical with vitamin B_2. Egg albumen contains traces of pigment ovoflavin (0.18 g. isolated by Kuhn *et al* from 10,000 eggs), whilst whey contains a similar pigment, lactoflavin (1 gr. from 5,400 litres of whey). The absorption spectra for the various purified flavins are almost identical as are those of the degradation products at similar stages. Various relatively simple operations resulted in the recognition of the *iso*alloxazine ring system in the flavins and, in addition, a simple sugar residue was indicated. The flavins exhibit very high vitamin B_2 activity and synthetic work on *iso*alloxazines has culminated in a very neat synthesis of vitamin B_2 by Kuhn and his colleagues. In this work it is noteworthy that the recourse to absorption spectra is becoming part of the normal approach of organic chemists to the study of many natural products. Thus, the Birmingham school also used absorption spectra in the brilliant work on the structure of ascorbic acid (vitamin C).

There appears to be a close connection between the constitutions of oestrogenic, carcinogenic and the phenanthrenic substances of the bile acids and sterols. In this work spectroscopic criteria of identity or non-identity are playing a useful, if subsidiary, part. Attention has also been devoted to the spectra of such hormones as thyroxin, insulin adrenaline, oestrin, etc., but this work is only in its infancy. Numerous applications of absorption spectra to the detection and estimation of alkaloids are also recorded in the literature.

Spectroscopy thus links up with many different branches of chemistry. It provides that most physical of physical chemists, the mathematico-inorganic-wave-mechanician, with the raw data out of which he is developing a new and (almost alarmingly) significant body of knowledge. It also provides the less fecondite physical chemistry with the data for a highly detailed picture of the structure of simple molecules and it gives to organic chemistry a tool, which, if used with that blend of careful opportunism and speculative flair which is the peculiar gift of the great structure experts, makes it another useful, if empirical, weapon in the study of complicated molecules. It gives to the practical analyst possibilities which are only partially explored, and, on the other hand, it has helped to make inorganic chemistry a logical as well as a merely descriptive science.

Spectroscopy, however, is not a philosopher's stone or an Aladdin's lamp. Very frequently, it is less useful than X-ray crystallography, electrical dipole moments and, in its own field, the study of optical rotations. New ideas, like the parachor, new techniques like molecular beams all have their contribution to make. The modern tendency towards the free use of physical methods cuts across the old frontiers separating physical-inorganic, organic and biological chemistry. Territorial delimitation is obsolete and the rehabilitation of the word chemist—without qualifying adjectives—is much to be desired. Directed team work with spectroscopy playing its part among other adjuncts to chemical research has already justified itself.

Personal Notes

PROFESSOR JAMES GORDON GRAY, Cargill Professor of Applied Physics in the University of Glasgow, left £6,408.

MR. R. L. M. KIRKWOOD and MR. A. S. ELLYATT have been appointed to the board of directors of Tate and Lyle, Ltd.

MR. CHARLES ALEXANDER MACKINLAY, of James and John G. Scott, paint and colour manufacturers, left personal estate valued at £33,110.

MR. ARTHUR WILLIAM LANGDALE, senior partner of Langdale Brothers, chemical manure manufacturers, of Newcastle-on-Tyne, has died at the age of 81.

SIR ANDREW DUNCAN, recently appointed independent chairman of the British Iron and Steel Federation, will visit all the main Scottish steel and iron districts before tackling the organisation problems which await him.

DR. ROBERT MARTIN CAVEN, professor of Inorganic and Analytical Chemistry at the Royal Technical College, Glasgow, since 1920, who died on July 15, left estate to the value of £5,671, with net personalty of £5,411.

SIR GEORGE BEHARRELL, D.S.O., has reported that the general arrangements for the sixth International Congress for Scientific Management, which takes place from July 15 to 20, are now settled. About two hundred papers dealing with many phases of industrial organisation and control are expected.

MR. ARTHUR GILLIAT, who had been prominently associated with the chemical trade for over 60 years, died at his home at Roundhay, Leeds, on Tuesday, at the age of 79. He joined the firm of E. G. Jepson and Co., of Leeds, in 1872, of which he became a partner and for whom he travelled widely. He was keenly interested in the activities of the British Chemical and Dyestuffs Traders' Association, of which his son, Mr. H. Gilliat, is the present chairman. At one time Mr. Arthur Gilliat was Vice-Consul in the Leeds area for the Netherlands. He was well known as one of the early pioneers of cycling in Leeds. He leaves a widow, two sons and three daughters.

MR. DUNCAN MCGLASHAN, manufacturing chemist, formerly of 11 Corrennie Gardens and Cramond Bridge, Edinburgh, left estate valued at £38,961.

LADY DEWAR, widow of Sir James Dewar, who for 46 years was Fullerian Professor of Chemistry at the Royal Institution, died at her London home on January 7.

SIR ALFRED EWING, a former president of the British Association, and late principal and vice-chancellor of the University of Edinburgh, who died on January 7, was buried at King's College, Cambridge, on January 10.

New British Chemical Standards

Ferro Alloys

As a result of a request for standard analysed samples of ferro alloys the headquarters of British Chemical Standards announces the issue of the first three of a new series, *viz.*: Ferro tungsten (80.7 per cent. tungsten), ferro molybdenum (72.1 per cent. molybdenum), ferro titanium (22.8 per cent. titanium). These alloys are in each case of the low carbon variety and have been analysed by a ferro alloy manufacturer, independent chemist and Sheffield works chemists. They will meet a long-felt want by chemists associated with manufacturers and buyers of alloys for special steel making. The standard samples are issued in bottles containing 25 and 50 grms. of each alloy at a price which it is estimated will eventually cover the cost.

A valuable feature is the certificate of analysis which accompanies each bottle and records not only the individual tests and the standard figures, but also an outline of the methods of analysis employed. This information is of particular value in the case of the ferro tungsten. The samples may be obtained direct from the headquarters, 3 Wilson Street, Middlesbrough, or from any of the usual laboratory furnishers.

Paint and Varnish Problems in Aeronautics

THE selection of cellulose finishes, oil paints and organic coatings for protecting the metal surface of aircraft against corrosion, involves two general methods of approach, said Dr. E. W. J. Mardles, of the Royal Aircraft Establishment, Farnborough, when reading a paper at a meeting of the Oil and Colour Chemists Association, in London, on December 13. In the first place there is the search for an "ideal" universal paint and the drawing up of a specification for it, and, secondly, the art of using to the best advantage the wide range of high-quality products supplied by the paint manufacturer. Needless to say, the "ideal" paint had not yet been found although many present-day paints give remarkably good results. A protective coating suitable for the metal wings of an aeroplane is not necessarily suitable for seaplane hulls and floats, or for propeller blades.

Difficulties of Obtaining Good Adhesion

One of the major difficulties with aeroplane paints and varnishes is the obtaining of satisfactory adhesion of the film on some metal surfaces, especially when the film is immersed in sea water or after a short period of weathering. Owing to this lack of adhesion, corrosion is permitted very quickly to set up; paint films can often be scraped off cadmium plating with the thumb nail, although on steel and aluminium the films are hard and tough and quite satisfactory. Cellulose finishes have often been regarded with disfavour, solely because of the adhesion difficulty, and this difficulty becomes acute when the protective coatings are applied under adverse conditions of humidity and temperature, as when aircraft is reconditioned at marine stations in the tropics. When immersed in sea water the adhesion of films on plated steels, copper, anodised aluminium and stainless steel shows a greater fall of adhesion than on plain steel or aluminium. The synthetic resin enamels also show a rapid decline in adhesive qualities, especially on stainless steel.

A wide range of protective coatings has been examined at the Royal Aircraft Establishment on different specimens of cadmium-plated steel, and, of the various kinds of preparations tried, it was found that the linseed oil varnishes and paints (such as Air Ministry undercoating grey oil paint) afforded the best adhesion and protection to cadmium- and zinc-plated steels, especially when finished with a cellulose or synthetic resin enamel. When specimens of cadmium-plate coated with a variety of synthetic resin enamels and other protective coatings were exposed on the roof to weather, or immersed in sea water or submitted to the salt water spray test, the best results were invariably obtained when a linseed oil undercoating paint was used.

It has been found essential to employ oil paint undercoats to secure proper adhesion of the cellulose finish to anodised aluminium and other metal surfaces. Cellulose undercoats are unsuccessful and the better adhesion afforded on most metal surfaces by the long oil varnish paints has been found to make them suitable for undercoating purposes to the synthetic resin paints and enamels, especially for seaplane work.

Anti-Rust Preparations

As regards anti-rust preparations it has been found that a solution of wool wax, 33 per cent., in a mixture of equal volumes of white spirit and solvent naphtha, is very serviceable for stores work and for spraying into engine interiors for the purpose of preventing corrosion during transit or storage. With the use of "leaded" fuels the presence of minute amounts of hydrobromic acid left in the cylinder is apt to promote corrosion of the cylinder lining during the period of rest, and to counteract this tendency experiments have been carried out with several anti-rust preparations. Mixtures of castor oil or lard oil, with triethanolamine, recommended for engine interiors after the use of "leaded" fuels, have been examined and compared with ordinary wool fat preparations. These preparations have been found to be effective and easily usable by spray or swilling, and the engine can be started again without removing the grease. Owing to difficulties when the temperature falls below 5° C., during winter, it is necessary to warm the preparations before application and in the case of wool fat various additions have been added for the purpose of hardening the film and to counteract any acidity.

Pigment additions to the wax solutions, such as zinc oxide, ultramarine and zinc chromate, for the purpose of tinting or adding a basic substance to correct acidity have been found useful in certain cases. Rubber latex has also been tried out as a temporary rust preventer, the rubber film forming an envelope around the object, but no distinct advantage is gained over the grease preparations which are readily applied and easily removed.

A Search for the Ideal Protection Against Corrosion

Marine Fouling Problems

To prevent or reduce marine fouling on seaplane hulls and floats in tropical waters, a considerable amount of work has been done during the past ten years. The Air Ministry identification white cellulose dope, V.W.3, prepared with zinc oxide in a nitrocellulose base, and the aluminium nitrocellulose dope, V.84, with a small amount of added gums, have both been found to be useful in tropical waters and afforded as much or more protection against sea fouling as some of the proprietary algicides tried. No improvement was found when poisons, such as mercuric oxide, cuprous oxide, copper oleate, etc., were incorporated with the dopes or when the zinc oxide of the V.W.3 was partially replaced with white lead, zinc dust or arsenious oxide. The best results with algicides were obtained with copper arsenite preparations, which were painted over the usual standard cellulose finish or oil enamel. These copper arsenite paints, however, have a temporary character and need rubbing down and replenishing from time to time.

Points from the Discussion

Mr. R. BHATTACHARYA drew attention to the importance of shellac, and pointed out that shellac was being treated by a special process to give a resin which was not only water-resistant but was very hard, and yet flexible. It gave very good adhesion to metals (especially copper), it was resistant to water, the scratch hardness of the unbaked film was well over 1 kg., and the scratch hardness of the baked film was over 5 kg.

Dr. MARDLES said that shellac varnishes and paints were used in aeronautics; the joints and packing of the fuel system were usually made of shellac. Shellac was also used for lining the tanks, because it was one of the resins which resisted the action of fuels containing benzene. Then there were the uses of the shellac varnishes and paints for coating the interiors of oxygen cylinders (because the resin was so inert), and for water tanks. The clear varnishes were not favoured for aeronautical purposes because the weather seemed to disintegrate the film, adhesion suffered, and chipping and flaking occurred; pigmented preparations were usually called for.

Rust-Preventing Properties of Wool Fat

Mr. G. BOLTON SMITH confirmed that lanolin, or wool fat, possessed undoubted rust-preventing properties. With regard to the hardening of such a film, he suggested that good results could be obtained by using more or less equal proportions of wool wax, paraffin wax and coumar, having regard particularly to resistance to acids and alkalies; the coumar present in such a compound acted more or less as a hardener. If the material were used for dipping, brushing or spraying, the three materials could be let down with turpentine substi-

tute and other such things, leaving a " puddingy " sort of mass, but one which brushed and dipped fairly easily and gave quite a good flow.

Mr. T. HEDLEY BARRY suggested that perhaps the breakdown of many of the synthetic types of finish was due, not merely to poor adhesion between the undercoat and the metal, but to poor adhesion and the difference in relative expansion between the priming coat and the top coat. Some time ago he had had occasion to examine a very bad example of paint failure, where a so-called synthetic paint had been applied over woodwork, half of which was primed with ordinary grade lead primer and the other half with a white primer of poor composition. On the part where the lead primer was used the paint had held completely, but in the other case both the primer and the top coat had come away; the top coat seemed to have gripped the primer so hard that nothing could separate them. He had formed the opinion that the initial trouble was due to the use of inferior priming, and that an ordinary oil paint would have held on that fairly well.

Emphasising the importance of the proper preparation of surfaces to be painted, Mr. Barry said that in his recent experience of exposure tests at least 20 samples were of no use because the iron was not properly cleaned.

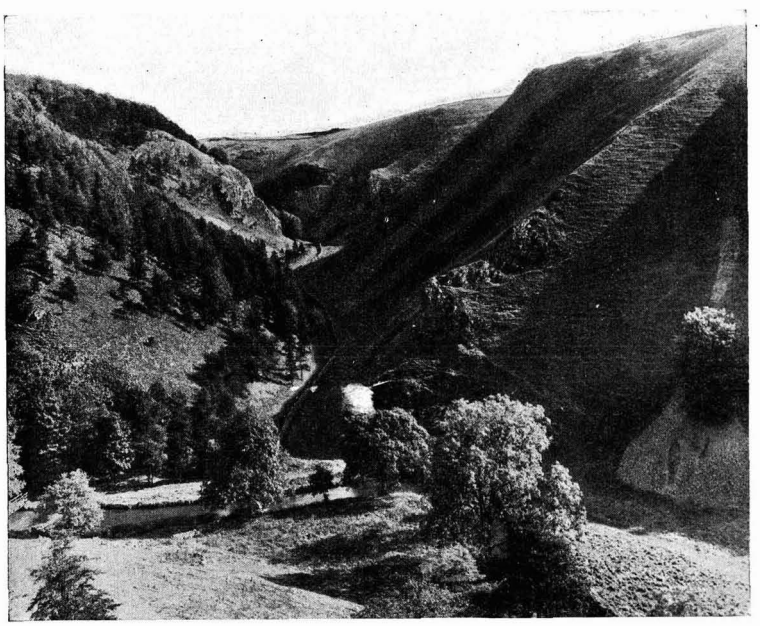
Dr. G. F. NEW said the paper revealed that Dr. Mardles had worked for years under very great difficulties. He experimented with materials that could be bought over the counter; he tried them and picked out the best, and built up a specification on its performance. It would appear to be preferable, however, to put his problems to the works laboratories and research organisations of the trade, so that they could get together and solve his problems, probably by means of some entirely new materials.

Imperial Chemical Industries' Gift to the Nation

Thirty Acres of Beautiful Dovedale

WE are indebted to the Editor of the " I.C.I. Magazine " for the loan of the accompanying illustration of Dovedale, the beautiful slopes of the Derbyshire valley which form part of the land recently presented by Imperial Chemical Industries, Ltd., to the National Trust for permanent preservation as an open park. The gift comprises the southern wall of the valley and a strip of the plateau, going eastward as far as Netty Knowle, which is the tumulus in which Bateman in 1852 found a remarkable sword. The view from this tumulus is exceptionally fine. The gift contains thirty acres of land to reflect the concentrated beauty of the valley and the open sky above with all the changing colours of a dove's wing.

The report placed before the committee regarding Dovedale says that " the area is within easy reach of one-quarter of the country's population, and is rich in historical, literary, botanical and geological associations. Although comparatively small, the selection of the area as a national park is justified. Access and control are the primary needs; if these ends can be secured by means of a regional planning scheme, it might be sufficient, but, in the case of the two river gorges,



The District in Upper Dovedale, Derbyshire, which has been given to the National Trust by Imperial Chemical Industries, Ltd. The Gift is the portion of the Valley on the right of the Wall and some of the Plateau above.

which was part of the company's estate and approaches within about 200 yards the northerly point of Mr. Robert McDougall's gift of Fishpond Plantation.

The gorge is now a dry valley, but at one time it was without doubt an important tributary of the Dove. All along this stretch of the famous river to Lode Mill and Hurts Wood there are weirs which add variety to a landscape rich in colour. Charles Cotton, who is well known to all good anglers, was born close by at Beresford Dale in 1630 and built his little " Fishing Temple " in 1674; he called this stream the " Silver Dove," and the water always appears acquisition is desirable." The nearest railway stations to the latest property of the National Trust in Dovedale are Hartington and Alsop-en-le-Dale on the L.M.S. Buxton-Ashbourne line. The gift is important in that it is the first gift of land to the National Trust to come direct from an industrial undertaking. Imperial Chemical Industries, Ltd., which has works at Alsop-en-le-Dale, is thus the benefactor doubly of the nation and of its own neighbourhood. The friends of the Trust in welcoming the gift hope it will prompt others to bring the country nearer to the acquisition of Dovedale as a national park.

A Miscellany of New Instruments and Apparatus

Annual Exhibition Arranged by The Physical Society

MANY appliances of new design or for a new purpose were shown at the 28th annual exhibition of scientific instruments and apparatus, organised by the Physical Society and held at the Imperial College of Science and Technology, South Kensington, London, January 1-3. There were about 110 exhibitors.

The Fagelston continuous gas indicator (super sensitive model) shown by Griffin and Tatlock, Ltd., was the latest development of this instrument, specially designed for use where extreme sensitivity over a short range is desired. This type of instrument has been found particularly useful for the measurement of small vapour concentrations in air or other gases, for example, a concentration of petrol in air as low as 1 part in 20,000 may be measured. Benzene in coal gas and humidity of coal gas are further interesting applications.

Griffin and Tatlock, Ltd., were also showing a re-designed form of Sand's electrolytic apparatus for routine analysis and research work, applicable to electrolytic, potentiometric and conductometric analysis. The use of resistance glass and lead seals has made it possible to modify the original all-platinum electrodes, and thus very substantially to reduce the amount of platinum required. The new electrodes are exhibited for the first time in conjunction with the alcohol and ether bottles used for their rapid drying. A further exhibit was a flow meter having a variable orifice working at a constant pressure difference. The instrument had a range extending from 0.1 to 125 c.c. per sec., and will accurately measure low rates of flow.

A new microchemical balance was shown by L. Oertling, Ltd. This balance had a protected beam and the upper part of the polished mahogany case was fitted with a double front slide and an aluminium shelf, so as to reduce to a minimum the effect of air currents and alteration in temperature due to the opening of the front slide (or lower side doors) during weighing operations. The balance had a 3 in. beam to carry 10 gm. in each pan and was sensitive to 0.01 mg. The pan supports were fitted with small agate cones in order to reduce point of contact.

The B.T.L. aperiodic projection balance, shown by Baird and Tatlock (London), Ltd., is suitable for all cases where speed is essential and accuracy must be simultaneously realised. The balance itself has a capacity of 200 gm., and is finished in a combination of black, chromium and stainless steel, which is at once attractive in appearance and extremely resistant to corrosive influences. The air-damping device is effective and reliable, and the projection device affords a brilliant image of the microscale on a screen.

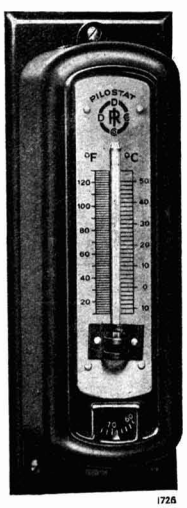
Three new features were shown by A Gallenkamp and Co., Ltd. The rotary oil-sealed vacuum pump is a new single-stage pump having a capacity of 25 litres free air per minute, and giving a final vacuum of 0.03 mm. or better. The outlet side will deliver air under pressure up to 12 lb. per sq. in. It is very silent in operation and absolutely reliable. The modified McLeod vacuum gauge covers a range of pressure from 500 mm. down to 0.0001 mm. by means of four separate scales, all of which are direct reading. Connection is done by means of interchangeable spherical glass joint obviating the use of rubber tubing or sealing on. The torsion viscometer is a versatile instrument for the rapid and accurate determination of viscosity over a very wide range. It can be used for cream, ice cream, paints, oils, greases, glues, jellies and many other substances.

The chief item of interest shown by the Thermal Syndicate, Ltd., was a self-starting mercury discharge burner which can be used in any position, and so provide a particularly convenient source of ultra-violet radiation.

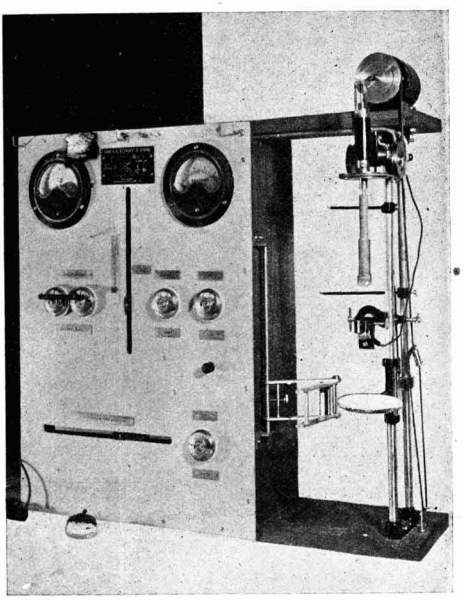
At the stand occupied by Bellingham and Stanley, Ltd., there was a new design in quartz spectrographs to photograph the spectrum between wave-lengths 10,000 A. and 2,100 A. on plates 12 in. × 3 in. Several important improvements have been embodied in this instrument, particularly in the dark-slide mounting. It is fitted with the new type of symmetrically opening slit, and by means of an optical device the illumination of the slit can be controlled up to the time of exposure. The spectrum between wave-lengths 8,000 A. and 2,100 A. is 26 cm. in length. A second feature of interest was a spectrophotometer for research and industrial purposes. The photometer unit is provided with a glass circle which carries the dividing, and readings can therefore be taken using transmitted light through the circle.

Negretti and Zambra were showing a new design of "roll chart" temperature and pressure recorders, utilising a "continuous" chart lasting 50 days, and incorporating mercury-in-steel systems for temperature records and bourdon tube or diaphragm movements for pressure or vacuum measurements. This recorder is arranged to provide a single record, or, where required, two records simultaneously. Both of these may be of temperature or pressure, or, if desired, one may be of temperature and one of pressure. In addition to recording, one or two pointers indicate the temperature or pressure on a scale mounted above the roll chart.

The recorder controller, another new exhibit by Negretti and Zambra, can be supplied with single or double systems

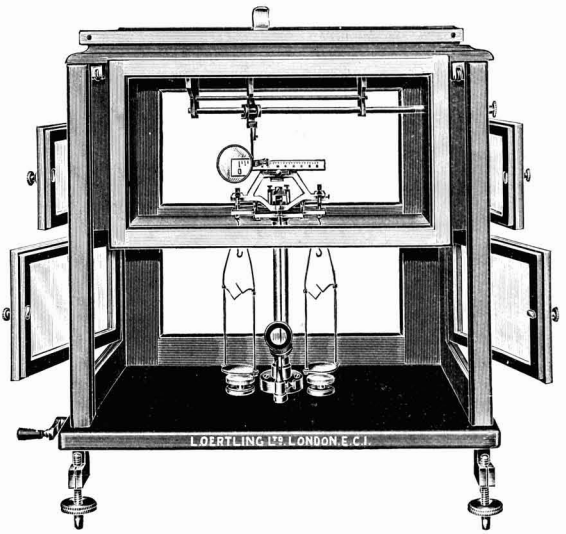


"Pilostat" Thermostatic Room Switch. Drayton Regulator and Instrument Co., Ltd.

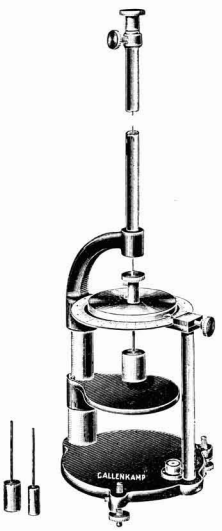


Sand's Electrolytic Apparatus for Routine Analysis. Griffin and Tatlock, Ltd.

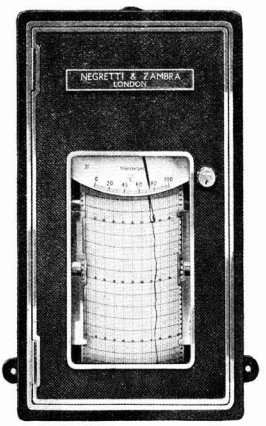
Combined Thermo-couple and Resistance Pyrometer. Negretti and Zambra.



Microchemical Balance. L. Oertling, Ltd.

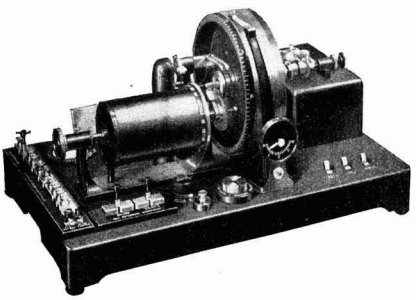


Torsion Viscometer.
A. Gallenkamp and Co., Ltd.

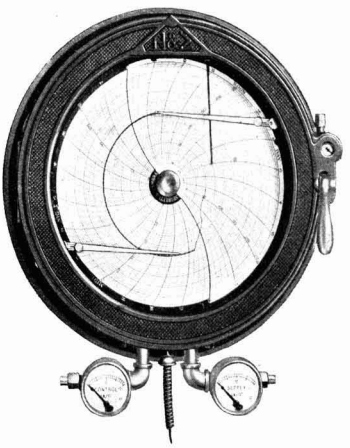


"Roll Chart" Temperature and Pressure Recorder.
Negretti and Zambra.

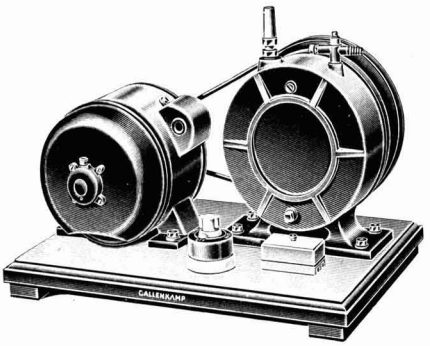
Recording Ring Balance Meter.
Elliott Bros. (London), Ltd.



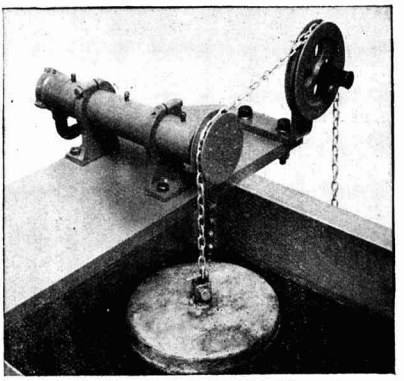
The Ionograph (Analysograph).
W. Edwards and Co.



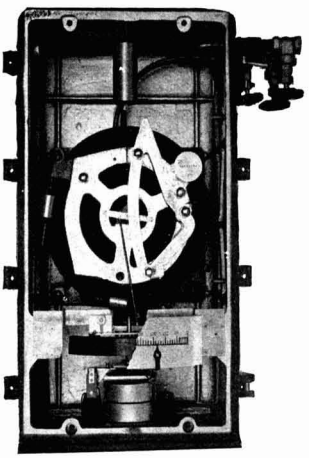
Combined Recorder Controller.
Negretti and Zambra.



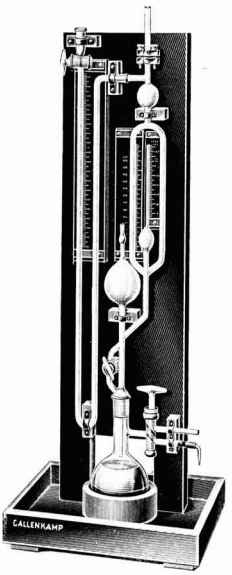
"Technico" Rotary Oil Sealed Vacuum Pump. A. Gallenkamp and Co., Ltd.



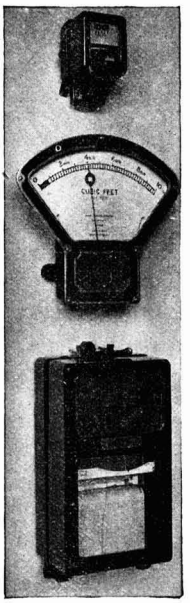
"C. and S." Transmitter for Water Level Indication. Evershed and Vignoles, Ltd.



Evershed-Midworth Flow Transmitter. Evershed and Vignoles, Ltd.



Modified McLeod Vacuum Gauge. A. Gallenkamp and Co., Ltd.



Evershed - Midworth Flow Transmission Panel. Evershed and Vignoles Ltd.

Indicating Ring Balance Meter. Elliott Bros. (London), Ltd.

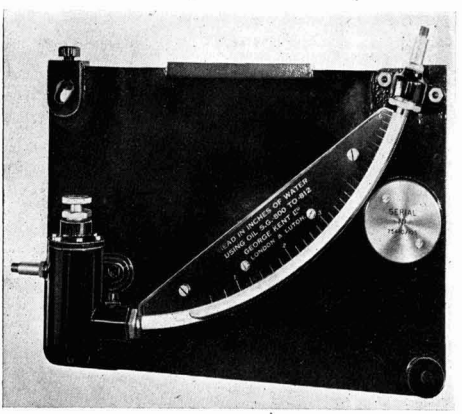
Illuminated Moving Scale Indicator. Cambridge Instrument Co., Ltd.

for either temperature or pressure or for one of each. Standard air operated control valves, lever motors, etc., may be used with this instrument. Chart ranges and speeds are available to cover all normal industrial requirements. One purpose in the design was to ensure that any influence of the controlling mechanism on the recording pen should produce little error.

A new combined thermocouple and resistance pyrometer, also by Negretti and Zambra, has been designed for use where there is a wide variation between suitable temperature ranges for different points in a multipoint installation. The indicator is provided with a scale having two ranges, one for high temperature up to the usual limits for thermocouple work, and the other for lower ranges, where the elements used are of the resistance type. A two-way "range" switch either connects the indicator to a thermocouple point selected by a rotary switch, or inserts it in a bridge circuit, when it indicates the temperature of a selected resistance bulb element. Any number of thermocouple and resistance element points can be provided according to the requirements of individual installations.

Ratio Flow Indicator

A ratio flow indicator for steam and air with mercury-in-steel flue gas thermometer, was shown by the Drayton Regulator and Instrument Co., Ltd. Two ring-balance type flow indicators are mounted edgewise, one balance ring being connected to an orifice plate in the steam flow line and the other to an orifice plate in the air flow line. The flow indicating scales are arranged side by side, so that when the correct ratio of flow is being maintained the indicating pointers are at the same level, thus, any discrepancy from



Manometer with replaceable Curved Tube: George Kent, Ltd.

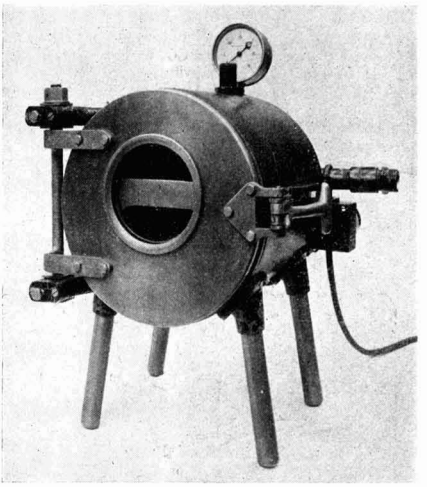
the correct flow ratio is immediately apparent. The edgewise mercury-in-steel flue gas thermometer which is mounted adjacent to the ratio flow indicator on the same panel is housed in a casing to match.

The Drayton "Pilostat" thermostatic room switch was exhibited in its finished form. The particular feature of the switch is its ability to handle 25 amperes, A.C. or D.C., at any voltage up to 250 volts, at the same time controlling with a differential of $\pm\frac{1}{2}^{\circ}$ F. The switch comprises a sensitive thermostatic capsule operating a light magnetically biassed metal contact which controls the electrical supply to the coil of a vertical mercury switch of sufficient capacity to handle the main load direct. The pilot switch and the relay switch are mounted as one unit on bakelite base, in a compact metal case, the thermostat being fitted with a moving-dial type calibrated setting device.

George Kent, Ltd., exhibited a manometer with a replaceable curved tube. This manometer is of the curved tube type with the special advantage that a broken glass tube can be replaced without necessitating any recalibration of the instrument. The spacing of the scale is approximately equal with the exception of a few divisions adjacent to zero. The manometer is temperature corrected so that variations of location will not affect the zero of a manometer once installed.

Two items of interest were shown by the Tintometer, Ltd. The first was a cylindrical vulcanite cell providing an exact length of a column of liquid between the two glass discs for colorimetric determinations; the advantage of this type of cell is that it does not spill readily and can easily be cleaned. The second item was a capillary folder providing a thin layer of liquid between two surfaces of glass for colorimetric determination.

A new catalytic hydrogenation apparatus, for pressure reactions with hydrogen and other gases and for work needing agitation, was shown by W. Edwards and Co. A rocking frame carries the reaction vessels clamped with a screw grip which automatically connects a flexible metal tube leading



Electrically-heated Vacuum Oven, W. Edwards and Co.

to a forged steel gas storage tank. Four high-pressure valves and a pressure gauge give control over the gas flow. The apparatus, including motor and rheostat, is mounted on a massive iron base. All moving parts have long accurately fitted bearings with provision for taking up wear. As a result the apparatus works quite silently. It may be readily adapted for high pressures by replacing the normal glass bottle with a forged steel bottle.

A new type of vacuum oven, also shown by W. Edwards and Co., has been developed to provide a means of rapid low-temperature evaporation. The electrically heated drying surface is maintained at any desired temperature up to 100° C. by automatic regulation, thus avoiding freezing of the material being treated. Large windows are placed at each end of the oven so that the material can be observed during the process. A self-adjusting door ensures an airtight seal and is instantly opened or closed by one simple movement.

A New Method for Analysis

The ionograph (analysograph), another exhibit by W. Edwards and Co., provides a new method for the analysis of substances. A solution of the material to be analysed is placed in a small electrolytic cell with a mercury anode. The cathode consists of a vessel with a fine capillary orifice from which mercury drops at short intervals. By means of a potentiometer a voltage that rises slowly from zero to either 2 or 4 volts is applied to the cell. As soon as the reduction potential reaches a critical value corresponding to various ions in the solution, a change in the current occurs that varies in value with the concentration of ions. This current is registered by means of a galvanometer that traces a curve on the sheet of paper moved in synchronism with the potentiometer contact, thus providing a scale of ordinates. From the curves thus automatically plotted the nature of the ions may be determined by the position of the peaks, and the amount present by the height of each peak.

E. Leitz (London) were showing an innovation which makes it possible to investigate the surface structure of metal

specimens during the process of heating up to 1,000° C. The apparatus consists of a vacuum chamber and water-cooling arrangement with a quartz window and may be placed directly on the inverted type of metallographic microscope. Where formerly it was necessary to re-polish and re-etch a metal specimen after heating it up to certain temperatures in order to observe changes occurring in its structure, this can be done now actually during the process of heating, a thermo-couple registering by means of a galvanometer the correct temperature.

Illuminated moving scale indicators of a new design were shown by the Cambridge Instrument Co., Ltd. These indicators have been modified so that the effective scale length is now either 24 or 36 in. They are designed for wall mounting or for flush mounting on a panel. These galvanometers may be calibrated for electrical or other quantities, such as temperature, pressure, percentage CO, CO_2, etc. A fluxmeter is exhibited. This has a sensitivity of 3,000 maxwell-turns per division and has been designed specially for routine testing of magnets. A remote controlled zeroising device is fitted so that the operator can read all deflections from a fixed zero. Pointer drift is absent and readings are taken with facility and rapidity.

Ring Balance Meters

Elliott Bros (London), Ltd., were showing indicating and recording ring balance meters for draught, pressure and flow. These meters are designed to measure 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. When used as flow meters, very little loss of head is occasioned.

The latest forms of indicating and recording controllers were shown by the Foster Instrument Co. in conjunction with motorised and magnetic valves suitable for all types of heating medium.

Water Level Indication

The Evershed C. and S. no-contact system of distant indication, shown by Evershed and Vignoles, Ltd., is specially designed for water level indication, the indicator being of the circular type with a scale 36 in. long. The method of transmission in this system is unique, inasmuch as there are no electrical contacts in the transmitter or other part of the circuit, the variation in the current which provides the indication being obtained by varying the inductance in the circuit. The system is therefore specially suitable for situations where the conditions are severe, as in sewage disposal schemes, or in exposed positions. The system is operated from a single-phase A.C. circuit, the accuracy of the reading being independent of variations in frequency and in the voltage of supply.

Distant indication, recording and integration of flow was the feature of another exhibit by Evershed and Vignoles, Ltd. In this Evershed-Midworth system the current transmitted is varied in proportion to the originating quantity, so that the indication and integration of this current is equivalent to integrating the flow which is being transmitted. One panel includes the originating movement with control ammeter, and an Evershed-Midworth transmitter with rectifier equipment for taking the supply from an A.C. circuit. The receiving panel includes an Evershed recording instrument with a 6 in. continuous roll chart, an indicating instrument in the form of a 12½ in. sector type ammeter scaled in terms of flow, to correspond with the originating movement, and a milliampere-hour meter.

Letter to the Editor

Sir Harry McGowan and the British Industries Fair

SIR,—Before I leave for a business visit to South Africa, may I say a word with reference to the forthcoming British Industries Fair. Great Britain's comparative prosperity among the manufacturer nations is accepted on all hands to-day as a fact of Nature, like the rising of the sun. But if our privileged position is to be maintained and strengthened, we cannot too often be reminded that prosperity, in common with most other benefits worth securing, is the result of planning and constant work.

Such a reminder arrives appropriately in these early weeks of a new year with the announcement of the nations sending most buyers to the British Industries Fair, which opens in London next month. They coincide almost exactly with the list of countries which increased their imports of British goods during the first nine months of 1934. We sent more goods to Holland, Denmark, Italy, Belgium, Sweden, Norway and Switzerland, all of them countries from which large numbers of buyers will arrive in London in February, and in Birmingham when the engineering and hardware section opens in May. Our Fair, in short, is a fine example of results to be gained for British manufacturers, and their workpeople, by intelligent planning and steady work from year to year, and the Fair is, in my opinion, worthy of the support of all those connected with the industry and commerce of the country. We can with profit study the method of its achievement and refrain from taking prosperity for granted.—Yours faithfully, H. MCGOWAN, Chairman.

Imperial Chemical Industries, Ltd.

Royal Society of Arts

Its Foundation and Progress

AN abridged story of the Royal Society of Arts has just been published for the Society by John Murray (price 3s. 6d.). It includes an appreciation by E. V. Lucas, and an account of the object of the Society, which is the fostering of art, industry, and science in all branches.

The " Society for the Encouragement of Arts, Manufactures, and Commerce in Great Britain " was founded in 1734 by William Shipley at Rawthmell's Coffee House, Covent Garden. At that time there existed in England only two other learned societies—the Royal Society, which dealt with pure science, and the Society of Antiquaries. By 1822 the membership had grown to such numbers that meetings were being held at Drury Lane Theatre. In 1770 the Society advertised for new permanent premises and by 1774 had moved into the house which was built by the Brothers Adam in Adelphi, which it has occupied till the present day.

As early as 1758 prizes were being given for agricultural improvements, while from its foundation the Society has interested itself in connection with the health and safety of workers in dangerous trades; before 1800 rewards were offered for leadless glazes and for respirators or smoke-helmets. The range of the Society's interest is shown by chapters on agriculture and forestry, and the colonies and India. The book concludes with a list of Albert Medal recipients.

The South American Revival

THE stage is set for a further increase in British exports to South America during 1935. Evidence of a definite South American revival is summarised in a brochure issued this week by " Industria Britanica " (one of the brightest of our Bouverie House contemporaries). As a journal issued to promote trade with these markets it admittedly has an axe to grind in reproducing authoritative statements on the improvement of trade opportunities in Brazil, Colombia, Chile, Peru, Cuba, Mexico, Paraguay, Uruguay and Venezuela. " Industria Britanica " gives a complete expert service to manufacturers, comprising the translation of " copy " and correspondence, an influential circulation built up from personal contacts made by Mr. John Benn during his travels in South America on behalf of the journal, the issue of monthly market notes, the obtaining of special reports from local representatives and finding agents for firms in markets where they are not already represented.

Notes and Reports from the Societies

Institute of Metals

Scottish Section : Corrosion Problems

SOME aspects of the corrosion of zinc, copper and bronze were discussed by Professor C. O. Bannister, in a paper read before the Scottish Section of the Institute of Metals at Glasgow, on January 14.

In the case of zinc, Dr. Vernon's work on the atmospheric corrosion of the metal was referred to, especially with regard to the formation of porous non-protective films on the metal. Under favourable conditions of exposure a quite different type of film is formed which is compact and adheres firmly to the metal, actually protecting it from the excessive attack which would be expected from Dr. Vernon's results in the open-air experiments. Several examples of sheet zinc used for roofing purposes have given service of over 40 years. On the other hand, under unfavourable conditions, troubles from corrosion may quickly arise and an example was given of a roof covering of zinc which failed after fifteen months' service, whereas the previous zinc covering had a life of 40 years. The zinc used was found to be satisfactory but an analysis of the corrosion product showed the presence of 35 per cent. ferric oxide which must have been derived from an extraneous source. This source was found to be domestic smoke, and, in confirmation of this, samples of soot from domestic chimneys were examined and found to contain from 1.4 to 2.8 per cent. iron. The iron in soot was found to be in a magnetic state, either as metal or as magnetic oxide, and it was found that by magnetic concentration of soot, the attracted portions may show as much as 36 per cent. iron. It is thus possible, under suitable conditions, for a considerable amount of iron to be brought into contact with the zinc, form couples and cause serious corrosion of the latter metal.

The fact that the zinc roofing in question showed serious signs of corrosion after only fifteen months in position, whereas the previous roofing had lasted for 40 years, is ascribed to the greater contamination of the atmosphere there as compared with 40 years ago, attack commencing violently before any protective film was formed, assisted by the formation of rust on the surface, which rust retains moisture and keeps corrosion products damp for a longer time.

Corrosion of Copper

In the case of the corrosion of copper, certain aspects of its corrosion by differential aeration were considered. Dr. Ulich Evans's apparatus was described and it was shown that in the bases of zinc, lead, cadmium or iron, the aerated electrode became the cathode, the metal going into solution at the unaerated electrode or anode. With metallic copper, however, there have been difficulties for, when the experiment is carried out in the manner described, a reversal of current is generally found to take place, the aerated electrode becoming the anode and losing more metal than the unaerated electrode. This has been shown to be due not to aeration but to the stirring of the electrolyte caused by bubbles of air. The effect of this stirring is to reduce the concentration of copper ions over the surface of the electrode and this shifts the potential in the negative direction.

In the case of metals, such as zinc or iron, the E.M.F. produced by differential aeration is large and any effect due to differences in ionic concentration at the two electrodes is very unlikely to reverse the current, but in the case of copper the E.M.F. set up by differential aeration is, even under favourable conditions, very small and if a considerable differential exists between the ionic concentration at the two electrodes, the "aeration current" may vanish and may be replaced by a current in the opposite direction. The relationship between the currents set up by differences of copper ion concentration and of oxygen concentration is neatly shown by an experiment described by Bengough and May in 1924. By arranging one copper electrode in stagnant solution while over the other oxygen saturated solution could pass, it was shown that with a slow flow this electrode functioned as cathode but as the rate of flow increased it became anodic. Experiments were described in which a very slow flow of air was passed over one electrode which remained cathode and, by using alternately slow streams of oxygen and nitrogen the electrode could be made cathodic and anodic in turn.

Society of Chemical Industry

Birmingham and Midland Section

THE next meeting of the Birmingham and Midland Section of the Society of Chemical Industry will be held in the Latin Theatre, University Buildings, Edmund Street, on Monday, January 21, at 6.45 p.m., when a paper will be read by Mr. N. D. Sylvester, M.Sc., A.I.C., of J. Lyons and Co., Ltd., on "Metals in the Food Industry." This will be followed by a paper on "The Reduction of the Acidity of Chamber Plant Exit Gases by an Intermediate Water Wash," by Mr. N. J. Price, B.A., A.I.C., and Mr. A. Dooley, B.Sc.

Joint Meeting of Plastics Group and Nottingham Section

OWING to unforeseen circumstances Dr. A. R. Lee will be unable to present his paper on "Adhesion" on January 24, and the chairman of the Plastics Group (Dr. L. A. Jordan) has arranged to take his place. The meeting will be held in University College, Shakespeare Street, Nottingham, at 7.30 p.m., when Dr. Jordan will read a paper on "Modern Views on Polymerisation." This paper will deal with the processes involved in the heat treatment of drying oils and in the manufacture of all kinds of synthetic resins which are at some stage concerned with polymerisation changes. Modern views on these changes permit of a mechanistic interpretation which is proving very satisfactory in developing the relationship between constitution and properties of such materials.

Institution of the Rubber Industry

Leicester Section : Chemical Technology of Rubber

RECENT developments in the application of chemical processes to rubber, and the application of rubber to chemical processes, were discussed by Dr. D. F. Twiss in a paper read before the Leicester Section of the Institution of the Rubber Industry on January 9.

In regard to vulcanisation, said Dr. Twiss, it is remarkable how slight has been the advance since the days of Charles Goodyear and Thomas Hancock. Apart from the occasional use of selenium as an alternative to sulphur, perhaps the most important modifications have been the vulcanisation of coagulated latex froth to form a new type of cellular rubber and the production of microporous ebonite by vulcanisation of a wet coagulum. The problem of reodorants and deodorants for rubber, which to-day is receiving much attention, is hardly modern and was indicated in more than one very early patent, *e.g.*, by Henry Johnson in 1797.

Much attention has been given in recent years to chemical treatment for hardening the surface of rubber articles and removing surface drag. For this purpose the halogen elements and some of their compounds, and also sulphuric acid, have been found very effective. It is of interest that Charles Goodyear used nitric acid for a similar purpose prior to 1837, but results of real technical value are now being obtained for the first time. Rubber manufacture by latex processes constitutes a modern development which, at any rate in the electro-deposition of latex rubber, has no early counterpart.

The application of chemical processes to rubber has been effected for the production of materials of new physical characteristics. The manufacture of chlorinated rubber is to-day making rapid advances and the material promises to be useful in more than one direction. New products have also been obtained from rubber by oxidation under various conditions. Perhaps the most striking development in this direction is the production of new thermoplastic products from rubber. Some of these show considerable promise for moulding purposes, whilst others exhibit remarkable powers in effecting the strong attachment of rubber to metal and have opened up new vistas in the production of rubber-protected metal as a constructional material for chemical work.

The possibilities of rubber as a raw material for chemical manufacturing purposes are very considerable and will doubtless receive steadily increasing attention and eventually become of great importance. Not only rubber itself but also

the hydrocarbons obtainable from it by destructive distillation with or without concurrent hydrogenation must be brought into consideration. These volatile products may even eventually have to be considered, not only for the preparation of numerous valuable chemical substances but also for the production of carbon black, which, in its importance for the rubber industry, is subordinate only to sulphur and rubber itself. Indeed, taking a long view, instead of considering petroleum as a possible source of synthetic rubber it will in time be necessary to regard such creative processes as the plantation production of rubber as a source of hydrocarbon oils for lubrication and fuel purposes, such as are at present a practical monopoly of the oil wells.

It is remarkable how many pioneer workers in the rubber industry, nearly a century ago, indicated the existence of chemical problems which only to-day are receiving the attention they deserve. There can be no doubt that a highly important phase of the rubber industry in the future will be a more intensive development of its chemical technology.

Chemical Engineering Group

The Chemical Aspect of Timber Research

THE chemical aspect of timber research was the subject of a paper read by Mr. W. G. Campbell, B.Sc., at a meeting of the Chemical Engineering Group, held in the rooms of the Chemical Society, Burlington House, London, on December 14.

Mr. Campbell began by saying that he did not intend to deal with the romances attendant on the efforts of the chemical engineer in connection with wood distillation, pulp and paper, and cellulose products generally, but rather to present to the practical man a few of the fundamental considerations about wood. Regarding the first cell wall component and the lignification of the membrane, there seemed to be no general agreement, but recent work had been successful in presenting us with a much clearer picture of the fine structure of wood cell walls than had hitherto been available. From analytical data obtained from the sap collected from living trees, it had been concluded that cellulose and lignin were built up from sucrose, the former from the glucose portion of the molecule and the latter from the fructose portion.

Probably the greatest amount of the destruction of wood which took place in nature was brought about by organic decay. The chief causal agents here were fungi, insects and marine borers, while research was constantly being directed towards the elucidation of the mechanism of these forms of decay, so that the methods of preservation so largely in use to-day might be improved. With regard to the ultimate chemical effect of fungi on wood, it would appear that the principal enzymic reactions involved were hydrolysis and oxidation.

Speaking of corrosion of metals by wood, Mr. Campbell stated that two outstanding examples were oak and western red cedar, which had a corrosive action on iron nails and bolts. Exposure to moisture and air probably accelerated this process, which was initiated by acids present among the minor constituents of the woods concerned. In oak there was good reason to believe that the acid concerned was acetic acid, but so far as it was known, the acid present in western red cedar had not been identified. In oak, the situation was further complicated by the fact that the iron salts formed during the corrosive process reacted with the tannin to form a salt or salts which stained the wood a bluish black. One other interesting example of the corrosion of a metal by a wood was that which took place when sheet lead was kept in contact with oak. In time, the lead became pitted and transformed into a white powder which was, in fact, basic lead carbonate. The acetic acid given off by the wood was sufficient, under suitable atmospheric conditions, to initiate a process which must be in all respects similar to the stack process of manufacturing white lead. To overcome this difficulty, it was considered advisable to char the surface of oak wood to which sheet lead was to be applied.

A certain amount of detailed work had recently been done on wood heated at temperatures above 100° C. and under 200° C. under various conditions, a series of experiments had also been carried out which threw some light on the mechanism of the decomposition. It had been shown that the presence of water vapour accelerated the reaction, and at temperatures as low as 109° C. the effects could be detected by analysis after a few hours. In its early stages the reaction was a hydrolysis, the effect of which was most marked on the hemicelluloses of the cell wall. This was reflected in reduced mechanical strength.

The effect of chemicals on wood was often mis-stated, it being found that certain chemicals could not, with advantage, be stored in wooden containers, and that the number of species of wood from which satisfactory containers can be made was limited. As Loveless pointed out, the main value of wood in chemical plant construction lay in its resistance to acid liquors, such as sulphuric and hydrochloric acids and their acid salts, which was directly attributable to the fact that the lignin and α-cellulose of wood were very resistant to acids.

In summing up, Mr. Campbell said that it was more than ordinarily unusual to find a wood that was imbued with all the advantageous characteristics of the examples cited, and that was why it was difficult to find substitutes for those few species which long experience had shown to be the best woods to use in chemical plants.

Institute of Fuel

Removal of Smoke from Flue Gases

THE removal of smoke and acid constituents from flue gases by a non-effluent water process was described by Dr. J. L. Pearson, G. Nonhebel and P. H. N. Ulande in a paper read before the Institute of Fuel on January 17. Air pollution, as disclosed by the reports of the Department of Scientific and Industrial Research and the 1932 committee appointed by the Electricity Commissioners, was discussed, the serious position arising from the superimposition of a power station on a large town being stressed.

Describing the scrubbing section of the Howden I.C.I. non-effluent water system for flue gas cleaning, the authors pointed out that for the first time in flue gas cleaning an efficient scrubber had been employed and that no liquor need be put to drain, large supplies of water not being needed and river pollution being completely avoided. This grid packed scrubber may also be used for the removal of fine dust from any gas permitting a wet process to be used. The pilot plant is simple, mechanically, consisting only of tanks, slurry pumps and pipes. Using the central system, three men on shift can operate the whole of the plant, and the complete cleaning process costs: In initial outlay (a) £1 4s. per kW installed for a unit system, (b) £1 1s. per kW installed for a central system. In running charges (a) 0.015od. per kWh for a unit system, (b) 0.0134d. per kWh for a central system.

Discussion on Fuel Costs

AN informal meeting of the Institute of Fuel, arranged for Friday, January 25, at 6.30 p.m., will be held in one of the club rooms at British Industries House, Oxford Street (Marble Arch), London, when a discussion will be opened on the subject of "The Cost of Production, Transport and Distribution per therm of Various Fuels, relative to the prices paid by Users." Mr. Steven Lacey (The Gas Light and Coke Co.) will deal with gas and coke, Mr. C. Dalley (British Controlled Oilfields) will discuss oil prices, and Mr. J. Stanleigh Turner (The Moira Colliery Co.) will speak about coal. The chair will be taken by Sir Philip Dawson, M.P., vice-president of the Institute.

Chemical Workers' Wages

Ballot on Proposal for Strike Action

DELEGATES from 40 drug and fine chemical establishments, representing over 6,000 workers, decided at a conference of shop stewards held at Toynbee Hall on January 13 to instruct the National Executive Council of the Chemical Workers' Union to take a ballot on a proposal for immediate strike action. If the result is in favour of a strike the council will tender seven days' notice to the employers.

The conference had been called to consider the refusal of the employers to entertain the workers' application for a minimum wage of 80s. a week for adult employees, with corresponding increases for other grades, and the operation of a 40-hour week.

British Overseas Chemical Trade in December

Imports and Exports Increase

The Board of Trade returns for the month ended December 31, 1934, show that exports of chemicals drugs, dyes and colours were valued at £1,513,881, as compared with £1,471,951 for December, 1933, an increase of £41,930. Imports were valued at £881,492, as compared with £836,922; re-exports were £45,029.

Imports

	Quantities. month ended December 31, 1933.	1934.	Value. month ended December 31, 1933. £	1934. £
Acids—				
Acetic .. .. cwt.	17,922	15,405	30,271	25,921
Boric (boracic) ,,	4,975	6,686	4,976	6,545
Citric .. .. ,,	1,539	1,978	4,684	6,172
Tartaric .. ,,	1,660	1,275	6,858	5,421
All other sorts value	—	—	8,967	16,833
Calcium carbide .. cwt.	115,975	101,087	67,209	57,639
Potassium compounds—				
Caustic and lyes cwt.	7,488	8,697	10,326	7,976
Chloride (muriate) ,,	28,980	34,970	11,917	11,381
Kainite and other mineral potassium fertiliser salts .. cwt.	69,455	117,424	12,628	16,292
Nitrate (saltpetre) ,,	11,215	29,758	9,932	10,943
Sulphate .. ,,	12,070	42,679	5,793	15,143
All other compounds ,,	9,448	11,119	15,825	19,037
Sodium compounds—				
Carbonate, including crystals, ash and bicarbonate .. cwt.	13,588	5,491	4,122	1,885
Chromate and bichromate .. .. cwt.	5,015	2,329	6,750	3,305
Cyanide .. .. ,,	3,000	2,800	7,149	6,522
Nitrate .. .. ,,	1,742	2,027	522	563
All other compounds ,,	12,156	22,699	10,165	17,165
Other chemical manufactures .. .. value	—	—	241,756	228,882
Drugs, medicines, etc.—				
Quinine and quinine salts oz.	58,416	127,234	4,707	9,528
Medicinal oils .. cwt.	1,809	2,630	3,881	8,747
Ointments and liniments cwt.	19	6	334	348
Proprietary medicines value	—	—	35,902	45,960
All other sorts .. ,,	—	—	34,880	32,133
Raw or simply prepared value	—	—	47,161	33,765
Finished dyestuffs (coal tar) .. .. cwt.	2,886	3,560	76,170	90,728
Extracts for tanning—				
Chestnut .. cwt.	25,564	25,878	18,290	17,778
Quebracho .. ,,	27,464	45,455	17,415	24,380
All other sorts .. ,,	31,318	28,392	24,797	17,942
All other dyes and dyestuffs, etc. .. cwt.	3,681	4,543	11,764	12,737
Painters' colours and materials—				
White lead, basic carbonate .. .. cwt.	6,448	6,012	7,714	6,698
Lithopone .. ,,	14,236	15,489	9,380	10,228
Ochres and earth colours cwt.	28,020	40,231	10,836	14,077
Bronze powders ,,	1,360	1,526	9,127	10,341
Carbon blacks .. ,,	34,868	38,552	34,042	59,955
Other pigments and extenders, dry .. cwt.	24,745	22,782	7,440	7,188
All other descriptions ,,	11,408	8,457	23,232	21,334
Total .. .. value	—	—	836,922	881,492

Exports

	Quantities. month ended December 31, 1933.	1934.	Value. month ended December 31, 1933. £	1934. £
Acids—				
Citric .. .. cwt.	2,390	2,536	7,751	8,744
All other sorts .. value	—	—	21,712	19,296
Aluminium compounds tons	2,084	1,175	19,996	6,224
Ammonium compounds—				
Sulphate .. tons	17,713	14,683	113,445	82,852
All other sorts .. ,,	1,606	1,279	18,852	16,897
Bleaching powder (chloride of lime) .. .. cwt.	65,365	91,422	20,506	22,588
Coal tar products—				
Tar oil, creosote oil, etc. gal.	2,010,840	103,153	29,858	4,639
All other sorts .. value	—	—	31,689	19,305
Copper, sulphate of tons	1,931	1,383	25,206	17,925
Disinfectants, insecticides, etc. .. .. cwt.	38,907	35,208	93,979	72,359
Glycerine .. .. ,,	21,117	15,979	41,260	36,515
Lead compounds .. ,,	10,620	10,060	13,198	11,695
Magnesium compounds tons	406	356	9,141	8,914
Potassium compounds cwt.	6,118	4,250	11,987	9,381
Salt (sodium chloride) tons	19,041	20,860	52,225	58,196
Sodium compounds—				
Carbonate, including crystals, ash and bicarbonate cwt.	264,201	332,587	70,486	89,580
Caustic .. .. ,,	158,315	174,864	91,612	101,698
All other sorts .. ,,	115,258	119,788	78,018	85,327
Zinc oxide .. tons	956	1,164	19,424	21,487
All other descriptions value	—	—	152,131	207,775
Drugs, medicines, etc.—				
Quinine and quinine salts oz.	73,208	231,814	8,228	23,844
Proprietary medicines value	—	—	96,627	92,487
All other descriptions value	—	—	134,132	140,021
Dyes and dyestuffs—				
Finished dyestuffs (coal tar)—				
Alizarine and indigo (synthetic) cwt.	1,144	455	8,354	4,165
Other sorts .. ,,	5,685	6,911	70,804	83,883
All other descriptions cwt.	16,265	26,135	20,745	29,239
Painters' colours and materials—				
Ochres and earth colours cwt.	15,290	12,669	15,500	13,480
Other descriptions ,,	9,856	14,198	14,466	24,981
White lead .. ,,	4,950	5,637	9,630	10,124
Paints and painters' enamels, prepared cwt.	24,349	36,884	74,088	90,544
Varnish and lacquer (clear) .. gal.	55,106	84,157	22,649	30,595
All other descriptions cwt.	36,611	33,255	74,252	69,121
Total .. .. value	—	—	1,471,951	1,513,881

Re-Exports

	Quantities. month ended December 31, 1933.	1934.	Value. month ended December 31, 1933. £	1934. £
Chemical manufactures and products .. value	—	—	19,165	14,145
Drugs, medicines and medicinal preparations—				
Manufactured or prepared .. .. value	—	—	9,961	13,133
Raw or simply prepared value	—	—	9,985	16,368
Dyes and dyestuffs and extracts for dyeing and tanning .. .. cwt.	557	196	3,796	559
Painters' colours and materials .. .. cwt.	1,379	327	2,116	824
Total .. .. value	—	—	45,023	45,029

South African Oil-Bearing Seeds

Growers ask for Protection

THE Board of Trade and Industries has been instructed by the Government of South Africa to investigate the potentialities of oil-bearing seed production in the Union, and this has given the nut growers an opportunity to express their grievances. The groundnut growers of Potgietersrust could not last year dispose of their crops at any price, and owing to this failure to find a market the shelling of last year's crop has been stopped. This meant that even in the areas where nuts were the most favourable crop production had been allowed to decline. This state of affairs was due to competition from outside the Union. Large quantities of groundnuts are being imported from the East and Mozambique. Edible oils, competing with groundnut oil, are being imported as castor oil or treated peanut oil, known as olive oil, from Italy, France and Greece. This exportation is regarded as dumping, as the oils are produced under labour conditions differing from those in the Union, and their price is much below that of the Union product. Most competition comes from the Mozambique nuts, which the railways carry to Cape Town for £1 a ton, while Transvaal growers must pay £8 a ton freightage. The growers admit that they cannot produce substitutes for palm oil, copra and other hard oils, but they believe that in Potgietersrust they could produce sufficient nuts to make all the edible oil the Union could consume. The growers want protection for edible oil production, and have suggested that the amount imported be regulated by the state of the local crop. If the Government does not adopt a sympathetic attitude, it is likely that all nut-growing in South Africa will cease.

A New Plastic Material

Unusual Physical and Chemical Properties

ARTICLES built up from an entirely new plastic material have been shown at the Exhibition of Industrial Art held at the Royal Academy during this month. This new plastic, a product of Imperial Chemical Industries, Ltd., consists of a very clear colourless material which is peculiarly easy to turn and carve. Its optical properties closely resemble those of ordinary crown glass, but its softer appearance and a certain difference in quality would prevent it from being mistaken for glass. It is highly transparent, not only to visible light but also to light extending well into the region of the ultra-violet. In this respect it is intermediate in excellence between ordinary glass and quartz, and is about equal to the special glasses which are made for ultra-violet light transmission. It has the advantage over these that irradiation, at least by sunlight as received in this latitude, produces little deterioration of ultra-violet transparency.

High Tensile Strength

Since the resin is made by the gradual thickening of a clear limpid liquid, it is easily possible to prepare any required colour by introducing suitable amounts of dye into the liquid. The resin in mechanical properties is characterised by its abnormal toughness so that it is very nearly, though not quite, unbreakable. Its tensile strength is also very high as compared with that of other plastics. The specific gravity of the material is approximately 1.2, that is to say, about half that of glass. It can be cast into sheets and rods or into blocks of any shape. Inserts can be introduced into the blocks during the casting process. It machines very well and with great sharpness. In these respects it appears to compare favourably with all other materials available to the turner with the exception of ivory. The true softening point is a little above the boiling point of water. Pieces of the resin can be joined together by using a cement consisting of the liquid material itself, and the joint formed is practically as strong as the original block.

With regard to the chemical properties of the material, it is in the first place very resistant to water. It is unaffected by dilute acids and is less affected by alkalis than are plastics of the phenol or urea-formaldehyde type. On the other hand, the solid resin is soluble in a number of common organic solvents, such as acetone. Alcohol, however, and its mixtures with water do not dissolve the resin. With regard to the action of heat, it rapidly softens at a temperature of about 120° C. and at higher temperatures begins to decompose slowly. A lighted cigarette causes blistering and slow charring, whilst a lighted match held for a few seconds at the edge of a thin sheet is capable of setting it alight, when it burns quietly and regularly. It should therefore not be used under conditions where it will be subjected to temperatures above that of boiling water. Below this temperature it is perfectly satisfactory. In resistance to scratching it is about normal for a thermo plastic. A piece carried in the pocket for a few months may become covered with fine scratches, but these can easily be removed and the orginal brilliance completely restored by polishing with metal polish or other fine abrasive.

British-Made Decahydronaphthalene

A New Solvent for the Paint Industry

DECAHYDRONAPHTHALENE has for long been known to possess unique properties which make it of special value as a solvent and thinner in the paint and varnish industry, but the prohibitive price of the imported product hitherto available has stood in the way of any extensive use of it for this purpose in this country. It is therefore interesting to announce that Imperial Chemical Industries, Ltd., have recently put into operation a new process for the manufacture of decahydronaphthalene, made possible by an extension of hydrogenation technique at their Billingham factory. Henceforward plentiful supplies of the home-produced solvent, in an especially pure form, will be available to the trade in this country at a low and stable price under the registered trade name of "Dec."

Decahydronaphthalene ($C_{10}H_{18}$) is the fully-hydronated form of naphthalene, and as now manufactured is a water-white liquid of exceptional purity, with a pleasant terpene-like odour, not unlike that of turpentine. Its general properties, together with much valuable specialised data relevant to its uses in the paint and varnish industry, are fully summarised in an informative booklet which has been published by Imperial Chemical Industries, Ltd. The data given serve to show that it is not on the score of price alone that "Dec" may be used with advantage to replace turpentine as a paint thinner, and also, in many cases, the most costly solvents which are to-day becoming increasingly employed. Such intrinsic properties as a very high flash-point, leading to a reduction of the fire risks normally run with the more usual thinner, an absence of toxicity shown by prolonged tests and practical use; and a solvent power of exceptional range where paint and varnish materials are concerned, are claimed for "Dec" by the manufacturers and these claims are backed by the carefully collated facts given in the present booklet.

Superior Solvent Properties

The general solvency of "Dec" is illustrated in a number of comparative tables; natural and synthetic waxes, bitumens and glyptal type resins are set out against the corresponding values for turpentine and Roumanian white spirit. It is interesting to note that the "Kauri-Butanol" test shows "Dec" to be slightly superior to turpentine in solvent power. The limits of its miscibility with ethyl alcohol and methanol are clearly shown in the two solubility diagrams given for the systems "Dec"-anhydrous ethyl alcohol-water and "Dec"-methonal-water respectively. Other informative sets of comparative figures are given in respect of the drying times of "Dec" when compounded with a number of different types of paints and varnishes.

It is claimed for "Dec" that the film properties and flow of paints and varnishes containing it are superior to those of the corresponding mixtures with turpentine or white spirit. Greater abrasion resistance has been demonstrated by the Air Ministry "scratch test," and such defects as wrinkling, silking and webbing, especially of varnishes, are stated to be reduced by its use. Small amounts of "Dec" are also stated to improve the brushing properties of paints which otherwise would have poor flow, and white paints thinned with it are claimed to give no discoloration with metallic driers. In its anti-skinning properties, and in respect of such requirements as hiding power and gloss it is fully the equal of turpentine and it has no lifting or softening effect on the undercoat.

News from the Allied Industries

Whale Oil

THE REMAINDER OF THE 1934 WHALE OIL PRODUCTION, amounting to 60,000 tons, is stated to have been bought by the Unilever concern, at a price of £10 per ton ex tank at store.

Non-Ferrous Metals

THE INTERNATIONAL ZINC CARTEL, which had its seat at Brussels, has been officially dissolved, according to a message received from Brussels on January 12.

Tanning

THE YEAR HAS OPENED WITH A BRISK DEMAND for all kinds of leather. Usually there is a quiet period for two or three months after Christmas, but this year both tanners and leather dressers have only had sufficient time to take stock and production is in full swing again. Sole leather is in great demand in the cheaper grades and exports of those qualities are improving. Owing to financial difficulties abroad it is impossible to obtain certain lines of cheap lining leathers and numerous leather dressers are taking up the tanning of pickled sheepskins for linings. The firm of Bjornow, Ltd., Grantham, are extending their experimental work and production on a larger scale will soon be commenced. White lining leathers are being inquired for by Amercan buyers and this trade offers good prospects during the coming year. Generally, the leather trade is very optimistic about 1935.

Mineral Oil

THE FIRST OF FIVE CEREMONIES arranged to inaugurate the pipe-line system which the Iraq Petroleum Co. have built at a cost of £10,000,000 to carry oil from Iraq to Mediterranean ports took place at Kirkuk, in the east of Iraq, on January 14, King Ghazi of Iraq officiating. The new pipeline—1,150 miles long—connects the oil-fields with the terminal ports of Tripoli, in Syria, and Haifa, in Palestine, and is capable of delivering 4,000,000 tons of oil a year. Further ceremonies will take place in the four other countries through which the line runs—Syria, Lebanon, Palestine and Transjordan. The ceremony at Kirkuk was attended by 300 guests, including Sir John Cadman, chairman of the Iraq Petroleum Co.

Iron and Steel

THERE WERE NINETY-SIX FURNACES IN BLAST at the end of December, the same number as at the beginning of the month, one furnace having commenced operations and one having been blown out for repairs during the month. The production of pig-iron in December amounted to 513,500 tons, compared with 507,600 tons in November, and 409,300 tons in December, 1933. The production includes 128,600 tons of hematite, 245,300 tons of basic, 122,200 tons of foundry and 8,200 tons of forge pig-iron. Owing to the Christmas holidays the output of steel ingots and castings declined somewhat to 654,500 tons, compared with 766,000 tons in November, and 668,900 tons in December, 1933. The December figures bring the total pig-iron output for the year to 5,978,500 tons, compared with 4,136,000 in 1933, and of steel to 8,859,700 tons, compared with 7,024,000 tons in 1933.

China Clay

WITH THE DECEMBER SHIPMENTS the china clay industry has completed a very satisfactory year, revealing an improvement on the preceding year by over 20,000 tons of china clay alone. It should be remembered that the weather experienced in Cornwall for the past two months has been detrimental to shipping. In fact, the Liverpool Coasting Steamer "Pansy," which left Padstow, a North Cornwall port, with 650 tons of china clay for Fleetwood on December 13, was twelve days overdue after a terrible experience in the Bristol Channel. The shipping statistics for December were: Fowey 41,700 tons china clay, 1,393 tons china stone, 1,262 tons ball clay; Par 7,583 tons china clay, 171 tons china stone; Charlestown 4,073 tons china clay; Padstow 650 tons china clay; Newham 124 tons china clay; Plymouth 96 tons china clay; by rail throughout 4,277 tons china clay; the aggregate monthly tonnage being 61,329 tons. The volume of china clay dealt with throughout 1934 was 693,731 tons, compared with 673,401 tons in 1933. In the china stone section, although Cornwall has the monopoly, there was an increase of trade but it is still much below normal activity. There were 37,382 tons despatched in 1934 against 35,491 in 1933. Ball clay, which is not produced in Cornwall, showed a decline of 3,000 tons in comparison with the previous year.

Continental Chemical Notes

Norway

NITROGENOUS FERTILISERS are to be manufactured on an extensive scale by the Norsk Hydroelektrisk Kvälstof A.S. by a new process utilising sea-salts ("Chemiker-Zeitung").

France

THE MANUFACTURE OF PLASTIC MASSES is to be carried on by a new concern which has been registered in Paris as "La Cétylose" (capital 500,000 francs).

NEW LEGISLATION authorising the transfer to the Kuhlmann concern of a portion of the state powder factory at Oissel, has been approved.

PRODUCTION OF POTASSIUM CHLORIDE AND BROMINE in Alsace-Lorraine declined somewhat in 1933 so that the three potassium chloride factories erected in 1933 have not been put into production.

REACTION BETWEEN EQUIMOLECULAR PROPORTIONS of a sodium magnesium sulphate with sodium carbonate solution is claimed (French Pat. 767,391) to yield a magnesium carbonate of low density. The sodium-magnesium double salt solution is obtained in the first place by saturating by-product sodium bisulphite (152 grams per litre) with the magnesium carbonate mineral, gioberlite (43 grams).

SOLUTIONS OF PURE COPPER SALTS can be obtained by treating mixtures of copper with other metals with cupric chloride either alone or in the presence of an ammonium salt (French Pat. 767,026). On passing an air current, the cuprous chloride (formed by reaction between copper and the cupric salt) is precipitated as hydroxide or carbonate while cupric chloride is regenerated. The pure precipitate of copper carbonate or hydroxide is filtered off and the cupric chloride solution can be used again and again.

Switzerland

BY-PRODUCT HYDROGEN FROM BRINE ELECTROLYSIS is now being used in increasing quantities for catalytic reduction processes as well as in the production of tetrahydronaphthalene. Synthetic gem manufacture formerly absorbed most of the by-product hydrogen but is now conducted on a less extensive scale.

Germany

VITAMIN C IS EFFECTIVE in the treatment of severe hæmorrhage and hæmophillia according to Böger and Schröder, "Chemiker-Zeitung."

OF THE 300,000 TONS OF WOOD PULP annually produced in East Prussia, 70 per cent. is exported, principally to England, France and America ("Chemiker-Zeitung").

LABORATORY APPARATUS CONSTRUCTED OF V2A STEEL specially designed for studying hydrogenation of high temperature tar with high asphalt content is described in the "Chemische Fabrik," December 26, 1934. About 40 to 60 c.c. of tar can be treated per hour and the apparatus can be used up to temperatures of 500° C. and pressures of 400 atmospheres.

A NEW CHEMICAL SILVER PLATING METHOD (German Pat. 607,447) utilises a complex alkali-silver thiosulphate which avoids the inconvenience of converting silver nitrate into the chloride. This salt is formed by slowly stirring a one-tenth molar solution of silver nitrate into a molar solution of sodium thiosulphate when a clear solution of the complex salt is formed and can be used directly as a silver plating solution on metal with good results. It is preferably improved, however, by incorporating an alkali polishing agent, chalk and sodium sulphite.

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.

Complete Specifications Open to Public Inspection

CRYSTALLISATION.—Dorr Co., Inc. July 7, 1933. 18688/34.

ABSORBENT MATERIALS, sizing.—E. I. du Pont de Nemours and Co. July 1, 1933. 19521/34.

WATER-IN-OIL EMULSIONS, manufacture.—E. I. du Pont de Nemours and Co. July 1, 1933. 19522/34.

AQUEOUS EMULSIONS, manufacture.—E. I. du Pont de Nemours and Co. July 1, 1933. 19523/34.

DEGUMMING TEXTILE FIBRES.—M. Mazzetti. July 4, 1933. 19547/34.

DEPOLYMERISED STARCH to be used as adjunct in baking, manufacturing process.—Dr. H. Luthje. July 6, 1933. 19611/34.

MOULDING PLASTICS, manufacture.—E. I. du Pont de Nemours and Co. July 6, 1933. 19902/34.

SOLID DIAZONIUM SALTS, manufacture.—I. G. Farbenindustrie. July 7, 1933. 20080/34.

Specifications Accepted with Dates of Application

COMPOUNDS HAVING GERMICIDAL and disinfectant properties, manufacture.—W. W. Grove (Monsanto Chemical Works). March 30, 1933. 421,965.

DYESTUFFS of the anthraquinone series, application.—Imperial Chemical Industries, Ltd., N. Chappell, N. H. Haddock, and F. Lodge. May 18, 1933. 421,969.

NAPHTHALENE-1 : 4 : 5 : 8-TETRA-CARBOXYLIC ACID, manufacture.—I. G. Farbenindustrie. May 25, 1932. 421,813.

REGENERATION OF ALKALINE LIQUORS used for the absorption of hydrogen sulphide.—Gas Light and Coke Co., H. Hollings, and W. K. Hutchison. June 1, 1933. 421,970.

INSOLUBLE AZO DYESTUFFS on the fibre, manufacture.—I. G. Farbenindustrie. June 22, 1932. 421,971.

MONOAZO DYESTUFFS.—Imperial Chemical Industries, Ltd., and A. H. Knight. June 26, 1933. 421,975.

ANTHRAQUINONE DERIVATIVES, manufacture.—E. I. du Pont de Nemours and Co. July 2, 1932. 421,828.

FERTILISERS.—J. Radcliffe. July 3, 1933. (Cognate application 27492/33.) 422,126.

GLYOXALIDINEARYLMETHYLOLS, manufacture.—W. W. Groves (I. G. Farbenindustrie). July 4, 1933. 422,057.

FERTILISERS FROM CARBONACEOUS MATERIAL, manufacture and production.—J. Y. Johnson(I. G. Farbenindustrie). July 5, 1933. 422,061.

SYNTHETIC RESINS and compositions containing the same, manufacture.—E. I. du Pont de Nemours and Co. July 5, 1932. 422,130.

SYNTHETIC RESINS and compositions containing the same, manufacture.—E. I. du Pont de Nemours and Co. July 5, 1932. 422,131.

SODIUM AURO-THIOMALATE, process for the manufacture.—G. B. Ellis (Soc. des Usines Chimiques Rhone-Poulenc). July 7, 1933. 421,989.

PURE 1-AMINO-2.3-DIMETHYLANTHRAQUINONE, manufacture.—A. Carpmael (I. G. Farbenindustrie). July 7, 1933. 421,831.

VULCANISATION OF RUBBER and rubber-like substances.—Imperial Chemical Industries, Ltd., W. Baird and J. S. H. Davies. July 7, 1933. 422,136.

TRIMETHYLAMINE, manufacture and production.—J. Y. Johnson (I. G. Farbenindustrie). July 8, 1933. 422,139.

DI- AND TRIMETHYLXANTHINES with salts of camphoric acid, method of preparing double compounds.—Syngala Fabrik für Chemisch-Synthetische und Galenische Arzneimittel Ges. Oct. 11, 1932. 421,916.

ALUMINIUM FLUORIDE, manufacture.—J. Wilkinson and Son, Ltd., and C. J. Saurin. Nov. 3, 1933. 422,080.

MIXED FABRICS, manufacture.—Soc. of Chemical Industry in Basle. Nov. 30, 1932. 421,920.

HIGHER ETHERS, manufacture.—Henkel et Cie, Ges. March 28, 1933. 421,867.

WASTE SULPHURIC ACID and manufacture of sulphates and of absorptive carbon therefrom, treatment.—N. A. Sargent. May 10, 1934. 422,022.

CHROMIFEROUS AZO DYESTUFFS, manufacture.—Soc. of Chemical Industry in Basle. March 31, 1933. 421,935.

INSULATING MATERIAL by using carbonate of magnesium, process of manufacture.—Lüneburger Isoliermittel-und Chemische Fabrik A.-G. July 27, 1933. 421,941.

ARTIFICIAL OR RECONSTRUCTED LEATHER, processes for manufacture.—International Latex Processes, Ltd. May 18, 1933. 422,028.

CONDENSATION PRODUCTS from urea and formaldehyde, manufacture.—C. Arnold (I. F. Laucks, Inc.). May 2, 1934. 421,942.

ESTERS OF 2-ETHYL-BUTANOL-1.—Carbide and Carbon Chemicals Corporation. May 12, 1933. 421,943.

ALKALI NITRATES from alkali chlorides, preparation.—A. Guyer and A. Bieler. June 12, 1933. 422,165.

FERRIC OXIDE CATALYSTS, preparation.—Rütgerswerke A.-G. Oct. 12, 1933. 421,963.

Applications for Patents

(January 1 to 9 inclusive.)

METALLIC OXIDES, reduction.—P. E. Billinghurst. 238.

AZO DYESTUFFS, manufacture.—A. G. Bloxam. (July 8, '33.) 573.

AZO DYESTUFFS, manufacture.—A. G. Bloxam (Soc. of Chemical Industry in Basle). 74.

AMINES, manufacture.—A. G. Bloxam. 149.

SEPARATING VOLATILE ACIDS from combination with metallic bases.—Briton Ferry Chemical and Manure Co., Ltd., and J. P. Fraser. 464.

HYDROCARBONS FROM GASES, improving absorption.—D. Brownlie. 312.

ZIRCONIUM OXYCHLORIDE, manufacture.—A. Carpmael (I. G. Farbenindustrie). 441.

A BLOOD-SUGAR REDUCING SUBSTANCE, manufacture.—A. Carpmael (I. G. Farenindustrie). 783.

AZO DYESTUFFS, manufacture.—A. Carpmael (I. G. Farbenindustrie). 785.

CHINA CLAY for manufacture of pottery, etc., preparation.—A. Davies. 157.

RETORT BENCH for distillation of fuel briquettes.—C. Delkeskamp. (July 24, '34.) 100.

CELLULOSE ESTERS, manufacture.—Distillers Co., Ltd., H. A. Auden, H. M. Hutchinson and H. P. Standinger. 269.

ORGANIC COMPOUNDS, production.—H. Dreyfus. 219.

GASES, manufacture.—H. Dreyfus. 332.

RUBBER, hydrogenation.—E. I. du Pont de Nemours and Co. (United States, Jan. 5, '34.) 561.

FELTED CELLULOSIC FIBROUS MATERIALS.—E. I. du Pont de Nemours and Co. (March 26, '34.) (United States, April 1, '33.) 795.

LIQUID HYDROCARBONS, processing.—A. Fisher. 83.

FORMALDEHYDE, manufacture.—J. Francon. 443.

ARTIFICIAL FIBRES for spinning, manufacture.—W. W. Groves (I. G. Farbenindustrie). 666.

CORROSION-SENSITIVE METALS with acid liquids, treatment.—Henkel et Cie Ges. (Germany, Feb. 6, '34.) 662.

AZO DYESTUFFS, manufacture.—I. G. Farbenindustrie. (Germany, Feb. 22, '34.) 766.

AROMATIC AMINES, purification.—Imperial Chemical Industries, Ltd. 264.

GASES, wet purification.—Imperial Chemical Industries, Ltd., J. L. Pearson and G. Nonhebel. (Feb. 5, '34.) 560.

MONOAZO PIGMENTS, manufacture.—Imperial Chemical Industries, Ltd., W. G. Reid and W. A. Sexton. 659.

DISTILLABLE CARBONACEOUS MATERIALS with hydrogenating gases, treatment.—International Hydrogenation Patents Co., Ltd. 603.

OLEFINE DIBROMIDES, production.—R. G. Israel and H. P. Stephenson. 102.

HALOGENATION PRODUCTS of rubber, etc., production.—Metallges A.-G. (Germany, Jan. 24, '34.) 801.

ALKENES, preparing.—Naamlooze Vennootschap Bataafsche Petroleum de Maatschappij. (Holland, Jan. 10, '34.) 280.

ATOMISING LIQUIDS.—L. Peyeru. (Dec. 12, '34.) (Luxembourg, Dec. 10, '34.) (Cognate with 35723/34.) 433.

MOTOR FUEL.—H. E. Potts. 34.

ACETIC ANHYDRIDE, production.—H. E. Potts (Shawinigan Chemicals, Ltd.). 645.

DYEING LEATHER, process.—Soc. of Chemical Industry in Basle. (Switzerland, Nov. 24, '34.) 75.

HETEROCYCLIC MERCURY COMPOUNDS, manufacture.—Soc. of Chemical Industry in Basle. (Switzerland, Jan. 6, '34.) 532. (Switzerland, Dec. 13, '34.) 533, 534.

AZO DYESTUFFS, manufacture.—Soc. of Chemical Industries in Basle and A. G. Bloxam. (July 8, '33.) 573.

OLEFINE DIBROMIDES, production.—H. P. Stephenson. 102.

TETRA ALKYL LEAD, manufacture.—W. W. Triggs (Du Pont de Nemours and Co.). 456.

METALS, recovery.—W. W. Triggs (Soc. Générale Métallurgique de Hoboken). 324.

Weekly Prices of British Chemical Products

Review of Current Market Conditions

EXCEPT in the case of a few local quotations, there are no changes to report this week in the market prices of chemical products. Unless otherwise stated the prices quoted below cover fair quantities, net and naked at sellers' works.

LONDON.—Prices still remain firm with nothing of special interest to report. The demand generally continues steady. The prices are unchanged for coal tar products and pitch.

MANCHESTER.—Business in the principal lines of heavy chemical products on the Manchester market during the past week has been by no means extensive and has been largely a matter of small to medium-sized parcels for near delivery dates. This, however, is understandable in view of the contracts entered into by the majority of consumers during the last six or eight weeks, and prospects over the next few months are regarded fairly hopefully. The leading alkali products and some of the potash materials are being taken up in fair quantities, chiefly against contracts, and a moderate movement is reported in a wide range of miscellaneous products. Except in odd instances, the tendency of prices remains quite steady. Among the by-products, trading conditions in several lines have been more active than for about a month and this section of the trade appears to be gradually emerging from the seasonal slackness.

SCOTLAND.—Business in the Scottish heavy chemical market is showing signs of improvement.

General Chemicals

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

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

ACID, BORIC.—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 5%. 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°, £23 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 £55 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.—£37 to £45 per ton, carriage paid. 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. 2d. per lb.; crimson, 1s. 5d. to 1s. 7d. 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, £21 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.—2s. 5d. to 2s. 9d.

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, 3¼d. per lb.; liquor, £19 10s. per ton d/d.

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

CREAM OF TARTAR.—LONDON: £4 2s. 6d. per cwt. SCOTLAND: £4 2s. less 2½ per cent.

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, £34; brown, £32.

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 June 30.

POTASH, CAUSTIC.—LONDON: £42 per ton. MANCHESTER: £38 10s.

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: 9¾d. per lb. SCOTLAND: B.P. crystals, 9d. MANCHESTER: B.P., 10¼d.

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 15s. 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 10s. in drums; 70/73%, £14 12s. 6d., carriage paid buyer's station, minimum 4-ton lots; contracts 10s. per ton less. MANCHESTER: £13 5s. to £14 contracts.

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

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

SODIUM BICARBONATE.—Refined spot, £10 10s. per ton d/d station in bags. SCOTLAND: Refined recrystallised £10 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 lb. 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 (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, £15.

SODIUM META SILICATE.—£16 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.—LONDON: 10d. per lb.

SODIUM PHOSPHATE.—£13 per ton.

SODIUM PRUSSIATE.—LONDON: 5d. to 5½d. per lb. SCOTLAND: 5d. to 5¾d. 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 15s. per ton d/d station in bulk. SCOTLAND: Ground quality, £3 5s. per ton d/d. MANCHESTER. £3 5s.

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

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

SULPHATE OF COPPER.—MANCHESTER: £14 to £14 5s. 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, 3s. 11d. to 4s. 1d. 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.

Coal Tar Products

ACID, CARBOLIC.—Crystals, 7¾d. to 8¼d. per lb.; crude, 60's, 1s. 1½d. to 2s. 2½d. per gal. MANCHESTER: Crystals, 7¾d. per lb.; crude, 1s. 11d. 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, 9d. to 9½d. per gal.; standard motor, 1s. 3½d. to 1s. 4d.; 90%, 1s. 4d. to 1s. 4½d.; pure, 1s. 7½d. to 1s. 8d. LONDON: Motor, 1s. 6½d. SCOTLAND: Motor, 1s. 6½d.

CREOSOTE.—B.S.I. Specification standard, 5d. per gal. f.o.r. Home, 3¾d. d/d. LONDON: 3½d. f.o.r. North; 4d. London. MANCHESTER: 4¼d. to 5d. SCOTLAND: Specification oils, 4d.; washed oil, 4¼d. to 4¾d.; light, 4¼d.; heavy, 4¼d. to 4½d.

NAPHTHA.—Solvent, 90/160%, 1s. 6d. to 1s. 7d. per gal.; 95/160%, 1s. 7d.; 99%, 11d. to 1s. 1d. LONDON: Solvent, 1s. 3½d. to 1s. 4d.; heavy, 11d. to 1s. 0½d. f.o.r. SCOTLAND: 90/160% 1s. 3d. to 1s. 3½d.; 90/190%, 11d. to 1s. 2d.

NAPHTHALENE.—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, 48s. per ton. LONDON: 47s. 6d. per ton, f.o.b. East Coast port.

PYRIDINE.—90/140, 6s. 9d. to 2s. 6d. per gal.; 90/180, 2s. 3d.

TOLUOL.—90%, 1s. 10d. to 1s. 11d. per gal.; pure, 2s. 2d. to 2s. 3d.

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

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.

DINITROTOLUENE.—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, £9 to £10. 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.

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

CHARCOAL.—£5 15s. 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. 6d. to 4s. per gal.

WOOD TAR.—£2 to £4 per ton.

Nitrogen Fertilisers

SULPHATE OF AMMONIA.—Jan., £7 2s.; Feb., £7 3s. 6d.; Mar./June, £7 5s.; for neutral quality basis 20.6% nitrogen delivered in 6-ton lots to farmer's nearest station.

CYANAMIDE.—Jan., £7 1s. 3d.; Feb., £7 2s. 6d.; Mar., £7 3s. 9d.; Apr./June, £7 5s.; 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, for delivery up to June, 1935, in 6-ton lots carriage paid.

Latest Oil Prices

LONDON, Jan. 16.—LINSEED OIL was firm. Spot, £21 5s. (small quantities 30s. extra); Feb., £19 17s. 6d.; March-April, £20 2s. 6d.; Maay-Aug., £20 12s. 6d.; Sept.-Dec., £21, naked. SOYA BEAN OIL was dearer. Oriental (bulk), Jan.-Feb. shipment, £20 15s. per ton. RAPE OIL was steady. Crude, extracted, £29 10s.; technical refined, £31, naked, ex wharf. COTTON OIL was firmer. Egyptian crude, £25; refined common edible, £29 15s.; deodorised, £31 5s., naked, ex mill (small lots 30s. extra). TURPENTINE was steady, American, spot, 48s. 3d. per cwt.

HULL.—LINSEED OIL.—Spot, quoted £20 10s. per ton; Jan., £20; Jan.-April, £20 5s.; May-Aug., £20 12s. 6d.; and Sept.-Dec., £21, naked. COTTON OIL.—Egyptian, crude, spot, £26; edible, refined, spot, £28 10s.; technical, spot, £28 10s.; deodorised, £30 10s., naked. PALM KERNEL OIL.—Crude, f.m.q., spot, £18 10s., naked. GROUNDNUT OIL.—Extracted, spot, £30 10s.; deodorised, £33 10s. RAPE OIL.—Extracted, spot, £28 10s.; refined, £30. SOYA OIL.—Extracted, spot, £23; deodorised, £26 per ton. CASTOR OIL.—Pharmaceutical, 39s. 6d.; first, 34s. 6d.; second, 31s. 6d. per cwt. TURPENTINE.—American, spot, 50s. 3d. per cwt.

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).

Australia.—The Senior British Trade Commissioner in Australia reports that the Department of Railways, New South Wales, is calling for tenders, to be presented in Sydney by February 27, 1935, for the supply and erection of ventilating and air conditioning plant. (Ref. G.Y. 14678.)

Canada.—A firm of dealers at Toronto handling recording instruments and supplies is prepared to undertake United Kingdom agencies for commercial glass tube thermometers for industrial purposes, especially the long stem immersion type; also floating thermometers for pasteurisation tanks, etc., on a commission, consignment or purchase basis, as may be most applicable, throughout the Dominion. (Ref. No. 61.)

Ecuador.—A firm in Guavaquil desires to represent, on a commission basis, United Kingdom manufacturers of paints and linseed oil. (Ref. No. 77.)

Mexico.—An agent in Mexico City desires to import drugs and chemicals on an agency basis or on his own account. He is particularly interested in caustic soda, bicarbonate and other similar products. (Ref. No. 79.)

From Week to Week

A GYPSUM MINE is to be sunk on the outskirts of Whitehaven, where boring operations proved that there is a big deposit.

A MAN WAS KILLED at the works of the Tarbitumac Co., Ltd., Stoke-on-Trent, on January 11, while feeding slag into a crushing machine.

THE VICE-CHANCELLOR OF CAMBRIDGE UNIVERSITY announces a further gift from Dr. G. P. Bidder, Trinity College, for the benefit of occupants of the Cambridge table at the zoological station in Naples.

SCIENTISTS AT MOSCOW claim to have perfected a method of obtaining synthetic rubber from limestone and coal at very low cost. The product, "sovprene," is said to have excellent wear-resisting qualities, to be easily worked and to be almost immune from deterioration by age. It is also insoluble in petrol. A plant to produce the new rubber is being built at Erivan, the capital of Soviet Armenia.

ONE OF THE MOST USEFUL new year gifts received to date is an appointments diary and writing pad for the office desk, neatly bound in green imitation leather, issued by the Chemical Supply Co., Ltd. The Geigy Colour Co., Ltd., has issued a wall calendar noteworthy for its artistic effect. Its main feature is a reproduction of feminine beauty in rich colouring, while the calendar affords handy information concerning the company's branch offices and representatives.

THE IMPORT DUTIES ADVISORY COMMITTEE has received an application for the continuance, after the date of expiry of the Import Duties (Drawback) (No. 2) Order, 1934, of drawback under section 9 of the Finance Act, 1932, in respect of castor seed used in the manufacture of castor oil. Representations should be addressed in writing to the Secretary, Import Duties Advisory Committee, Caxton House (West Block), Tothill Street, Westminster, S.W.1, not later than February 6. The committee has decided not to make any recommendations in respect of the applications for the addition to the free list of dextrine and wheaten starch.

FAMOUS WOMEN will appear as the "queens" of Britain's leading industries at the British industries dinner and ball at Grosvenor House, on February 26, to give hospitality both to women buyers visiting the British Industries Fair from overseas and to women exhibitors at the Fair. The queens will take part in the pageant of British industry beginning at midnight with episodes representing transport, in which the queens of shipping, railway, roads and the air will be the principal figures. There will also be scenes in which queens of gold, jewels, steel, glass, beauty and light will appear. The function is being held under the auspices of the British Women's Hospitality Committee of which the Lady Bertha Dawkins is president.

THE FEDERATION OF BRITISH INDUSTRIES, as a result of the recent mission to the Far East, has appointed a committee to maintain contact with the committee already appointed by the Japan Economic Federation in Tokyo. The aims of the two committees will be to consider jointly the problems affecting the general industrial relations between Great Britain and Japan, and to offer their good offices to any individual industries which may desire to enter into discussions, with a view to a solution of the problems which confront them. Lord Barnby is chairman of the F.B.I. committee and its members include Sir George Beharrel (managing director of the Dunlop Rubber Co., Ltd.), Sir Harry McGowan, and Mr. W. J. U. Woolcock. The secretary of the committee is Mr. W. V. Jenkins, 21 Tothill Street, S.W.1.

A SYMPOSIUM on "Technical Aspects of Emulsions" was held at University College, London, under the auspices of the British Section of the International Society of Leather Trades' Chemists, on December 7, a report of which appeared in THE CHEMICAL AGE last week. Professor F. G. Donnan, F.R.S., presided, and the meeting was attended by over 220 chemists and technologists, many coming from abroad for the particular purpose of being present. The papers read at the symposium are to be published in a few days, in permanent book form, under the title of "Technical Aspects of Emulsions," and will collectively present a valuable addition to the limited readily accessible literature on a subject which has assumed considerable importance in almost all branches of industry as well as in medicine, etc.

THE TREASURY, on the recommendation of the Import Duties Advisory Committee, has issued the Additional Import Duties (No. 2) Order, 1935, amending the rate of import duty on sodium nitrite from 20 per cent. ad valorem to £4 per ton. The committee points out that since the 20 per cent. duty was imposed in 1932, British manufacturers have installed plant adequate for the production of this chemical in sufficient quantities and of the requisite quality, but notwithstanding the imposition of that duty, foreign sodium nitrite is being imported in increasing quantities at prices below the British cost of production. The committee is satisfied that the revised duty is likely to stimulate home production and the United Kingdom producers have given assurances, which the committee considers reasonable, as to the prices at which supplies will be available to consumers in this country.

TIMOTHY WHITES, LTD., have had their name changed to Timothy Whites and Taylors, Ltd.

DORMAN, LONG AND CO., LTD., are starting another steel furnace at their Redcar works in consequence of the order obtained ten days ago for 8,000 tons of universal plates for export to Russia.

THOMPSON AND CAPPER WHOLESALE, LTD., makers of chemical and pharmaceutical machinery, have appointed Mr. W. F. Whyman to be their London representative. There is a display of the company's machines at British Industries House, Marble Arch, London, where Mr. Whyman is always available to meet anyone by appointment.

AT A MEETING of the board of the Institute of Physics held on January 15, the following were elected to membership: Fellows: J. W. Buckley, J. N. Carruthers, E. G. Cox, F. H. Gage, D. T. Jones, C. Sykes, H. C. Webster; Associates: H. G. Jones, S. J. Metzler, M. P. Quinlivan, G. D. Rochester, R. Roscoe, W. H. Willott; Students: M. W. Alford, D. E. M. Garfitt, S. P. Hillson, G. M. Humphreys, H. Jefferson, M. E. Rowbottom; Ordinary member: R. F. J. Vogel.

WITH REFERENCE TO CORRESPONDENCE published by the Board of Trade on December 28 on the question of supplies and prices of lead and zinc and the provisions of the Ottawa Agreements in regard thereto, the Import Duties Advisory Committee announces that since the receipt of the letter from the President of the Board of Trade it has had the matter under consideration. It is now prepared to receive evidence, which should be forwarded in writing to the secretary not later than February 6.

A CONFIDENTIAL REPORT on Japanese markets for bi-chromates of potassium and sodium, alums and aluminium sulphates, hydrogen peroxide and hydrosulphates, based on information received from the Commercial Councillor to the British Embassy at Tokyo, has been issued by the Department of Overseas Trade to firms whose names are entered on its special register. United Kingdom firms desirous of obtaining a copy of the report, together with particulars of the special register service of information, should apply to the Department of Overseas Trade, 35 Old Queen Street, London, S.W.1. Reference number F.Y.2205 should be quoted. A report on the Trade of British West Africa, has also been issued by the Department. (Reference number C.Y.4390).

IMPORT DUTIES (EXEMPTIONS) (No. 1) ORDER, 1935, issued by the Treasury on the recommendation of the Import Duties Advisory Committee, provides for the addition to the free list as from January 17, of farina (or potato starch); and also of cassava (or tapioca) root, flour and starch, but not including the foodstuff known as tapioca. The committee points out that these articles are raw materials required in large quantities by the textile finishing trades, supplies of which are not available from home or Empire sources, with the exception of a small amount of cassava. It is satisfied that the removal of the duty will not only be of assistance to the British textile industry, but will also encourage the production of jute products, vegetable adhesives and glucose in this country.

Company News

Blundell, Spence and Co.—The profit for the year to October 31 amounted to £42,085, against £37,890, and £9,236 was brought in. To depreciation account is placed £5,000; to general reserve, £2,512; dividend 5 per cent. (unchanged); leaving to go forward, £10,086.

British Celanese, Ltd.—A further half-year's dividend on the 7 per cent. cumulative preference shares is announced payable on January 31 to holders registered on January 19. This will bring the payment of the first preference dividend up to October 31, 1931. A half-year's payment of arrears was made in October last. The second preference dividend is paid to April 30, 1930.

W. J. Bush and Co.—An ordinary interim of 5 per cent., less tax, has been declared, against 4 per cent. last year. For 1933 the total payment was 11 per cent.

Distillers Co.—The company announces an interim dividend of 7½ per cent., less tax, the same as a year ago. Last year's final dividend of 12½ per cent. raised the total dividend to 20 per cent. from 17½ per cent. for each of the two previous years and 20 per cent. for 1931.

Electrolytic Zinc Co. of Australasia.—The payment of the dividend for the six months ended December 31, 1934 on the preference shares will be made on March 13.

Shawinigan Water and Power Co.—The payment of 13 cents is announced on the common shares for the quarter ended December 31, 1934, payable on February 15, 1935. This makes a total of 50 cents for the year.

Veno Drug Co.—The payment will be made on February 1, of a dividend on the preferred ordinary shares, less tax, for the half-year to January 31.

Forthcoming Events

LONDON

Jan. 24.—British Chemical Plant Manufacturers' Association. Annual dinner. 7 p.m. Jules Restaurant, Jermyn Street, London.

Jan. 24.—Mineralogical Society. General meeting. 5.30 p.m. Burlington House, Piccadilly, London.

BIRMINGHAM

Jan. 21.—Institution of the Rubber Industry (Midland Section). "Risks in the Rubber Industry." Dr. E. R. A. Merewether. James Watt Memorial Institute, Great Charles Street, Birmingham.

Jan. 21.—Society of Chemical Industry (Birmingham and Midland Section). "Metals in the Food Industry." N. D. Sylvester. "Reduction of the Acidity of Chamber Plant Exit Gases by an Intermediate Water Wash." N. J. Price and A. Dooley. 6.45 p.m. University Building, Birmingham.

Jan. 23.—Electrodepositors' Technical Society. "Non-Metallic Protective Finishes." B. C. Taylor. 7.30 p.m. James Watt Memorial Institute, Gt. Charles Street, Birmingham.

Jan. 25.—Institute of Vitreous Enamellers (Midland Section). "Frit Kilns." J. H. Davidson. 7.30 p.m. Chamber of Commerce, New Street, Birmingham.

BRADFORD

Jan. 22.—Society of Dyers and Colourists (Bradford Junior Branch). "Silk Dyeing." A. Thomson. Bradford.

Jan. 24.—Society of Dyers and Colourists (West Riding Section). "The Effect of Certain Vat Dyes on Cellulose when exposed to Light and Atmospheric Influences." C. M. Whittaker. 7.30 p.m. Gt. Northern Victoria Hotel, Bradford.

EDINBURGH

Jan. 22.—Society of Chemical Industry and Institute of Chemistry (Edinburgh Sections). "Modern Methods of Factory Deodorisation and the Prevention of Fume Emission." Dr. B. Wylam. 7.30 p.m. North British Station Hotel, Princes Street, Edinburgh.

HUDDERSFIELD

Jan. 22.—Society of Dyers and Colourists (Huddersfield Section). "Recent Developments in Synthetic Resins and Rubber." Dr. F. J. Siddle. 7.30 p.m. George Hotel, Huddersfield.

LEEDS

Jan. 21.—Institute of Chemistry (Leeds Area Section). "Methods for the Determination of Hydrogen-ion Concentration." W. R. Atkin and F. C. Thompson. 7.30 p.m. The University, Leeds.

LEICESTER

Jan. 23.—Leicester Literary and Philosophical Society. "Colour—Theoretical and Practical and Colour Nomenclature." Robert F. Wilson. 7.30 p.m. College of Technology, Leicester.

LIVERPOOL

Jan. 23.—British Association of Chemists (Liverpool Section). "Crime and Chemistry." H. T. F. Rhodes. 7.30 p.m. Chemistry Lecture Theatre, University, Liverpool.

Jan. 25.—The Chemical Society. "Recent Developments in the Physical and Organic Chemistry of Long Chain Compounds." Dr. J. C. Smith. 7.30 p.m. University, Liverpool.

MANCHESTER

Jan. 23.—British Association of Chemists (Manchester Section). Discussion on "The Place of Professional Organisations on Society," opened by R. Brightman. 7.30 p.m. Grand Hotel, Aytoun Street, Manchester.

Jan. 24.—The Chemical Society. Meeting for the reading of papers. 7 p.m. University, Manchester.

Jan. 25.—Institution of the Rubber Industry (Manchester Section). Annual Dinner and Dance, "The Manchester," Ltd., Restaurant, Manchester.

NOTTINGHAM

Jan. 23.—Society of Dyers and Colourists (Midlands Section). "Dermatitis caused by Knitted Goods." S. R. Trotman. 7.30 p.m. University College, Nottingham.

Jan. 24.—Society of Chemical Industry (Plastics Group and Nottingham Section). "Modern Views on Polymerisation." Dr. L. A. Jordan. 7.30 p.m. University College, Nottingham.

SWANSEA

Jan. 21.—The Chemical Society. "Isothermal Sol-Gel Transformation, or Thixotropy." Professor Dr. H. Freundlich. 6 p.m. University College, Swansea.

Jan. 26.—Swansea Technical College Metallurgical Society. General discussion on "Roll Marks on Blackplate," opened by E. J. Thomas and J. S. Caswell. 6.45 p.m. Technical College, Swansea.

New Companies Registered

Fieldsend Pearson, Ltd.—Registered January 11. Nominal capital, £1,000. Designers of chemical and industrial plant, inspectors of plant, machinery and engineering materials, engineers' and manufacturers' agents. Directors: Fdk. C. A. Fieldsend, The Yews, Tankersley, near Rotherham, Wm. H. Pearson.

Norman, Hill Bros., Ltd., Salisbury House, Richmond Hill, Bournemouth.—Registered January 7. Nominal capital, £400. Manufacturing chemists, manufacturers and suppliers of chemicals, chemical substances, compounds, solutions, oils, powders, pastes, etc. Directors: Donald E. Norman, Mrs. Lena M. Norman, Wm. Hill, Edwd. J. Hill.

Petersham Pharmacy, Ltd., "Gort House," Petersham, Surrey.—Registered December 22. Nominal capital £100. Wholesale and retail chemists and druggists, chemical engineers, sterilisers, dyers, cleaners, makers of chemical plant and materials, etc. Directors: Mrs. Wilhelmina M. Mason, Howard J. Such.

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HYDRAULIC PRESSES AND PUMPS. Large stock in London. Price quoted for adapting and erecting.—THOMPSON AND SON, Maria Street, Millwall.

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THE Owners of Patent No. 320,589 are desirous of arranging by way of licence or otherwise on reasonable terms for the commercial development in Great Britain of this invention which concerns Improved Process for Obtaining Glumatic Acid. For particulars address H. Douglas Elkington, 20 to 23 Holborn, London, E.C.1.

THE proprietors of British Patents Nos. 242,512 and 265,197 are prepared to sell the patents or to licence British manufacturers to work thereunder. They relate to the manufacture of manures. Address Boult, Wade and Tennant, 112 Hatton Garden, London, E.C.1.