The Chemical Age

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Notes and Comments

The Silver Jubilee and After

WE reproduce on another page a photograph of the King and Queen during their memorable drive to St. Paul's Cathedral on Monday to attend the Thanksgiving Service for the completion of twenty-five years of their reign. The picture was taken in Fleet Street and has a special interest for readers of THE CHEMICAL AGE as it shows Their Majesties as they were passing Bouverie House, from which this journal is published week by week. No national celebration has ever been attended by more fortunate or favourable circumstances. A radiant summer day, happy, eager crowds completely filling the long processional route, the King and Queen most graciously responding to the heartfelt acclamations of their people, all contributed to an unforgettable scene which was not marred by the slightest accident or a single hitch. Up and down the country, as well as in London, the Silver Jubilee rejoicings were uniformly successful. There finally emerged from them, besides the reattestation of the nation's devotion to the present occupants of the Throne, a very definite feeling that May 6, 1935, would prove to be a date of high significance to the people at large. It was impossible to resist the prevailing impression that the King, who had seen the Empire triumphantly through the greatest war in history, was now proclaiming the passing of the most severe depression in living memory. The industrial and commercial community has every reason to be grateful for the wise measures taken under the King's guidance for the restoration of its old prosperity. The stability of our ancient institutions, with the King as the keystone of the central arch, is instinctively seen to be the moral base of progress now and hereafter. The Silver Jubilee has rightly struck a new note of optimism, and there are hopes in the air which a great nation is setting out with redoubled energy to vindicate.

Self-Government in Industry

SELF-GOVERNMENT in industry has been the subject of two noteworthy addresses to chemical engineers this year. In January Lord Melchett stated the case for his Industrial Reorganisation (Enabling) Bill at the annual dinner of the British Chemical Plant Manufacturers' Association, and on April 26 Lieut.-Colonel Sir Arnold Wilson stated the case against "self-government" at the annual dinner of the Chemical Engineering Group. On the former occasion representative industrialists were invited to express their views, and although there was no direct disagreement there was much search for more enlightenment as to the real advantages claimed in the Bill. At the Chemical Engineering Group dinner there was no such opportunity for debate, but if we are not mistaken there was a much more general consensus of opinion against the "planners" than there was in favour of the terms of Lord Melchett's Bill. As we understand Lord Melchett's proposals, his Bill is designed to give industries power to govern themselves, and to that extent is it opposed to Parliamentary interference, although much of the machinery by which self-government is to be established would have to be operated by Government departments. Lord Melchett holds the view that the vast majority of any industry is composed of sensible men, but that their wise arrangements are wrecked by small minorities who "won't play"; his Bill is therefore designed to make the minority "play" at the behest of the majority. At the same time he told the plant makers that the Bill was a small man's charter, giving the small man a definite right and status for the first time in a world which is tending to organise itself in larger and larger units.

Sir Arnold Wilson's interpretation of the Bill, however, is that it is a measure to provide for the self-government of industries by enabling a 75 per cent. majority of producers to coerce a minority in order to eliminate masterful competition and to promote efficiency. These, he says, are to be reckoned in terms of cash without any regard to human values. Small decentralised plants are to be closed and concentrated in our overcrowded industrial areas. The promoters, he points out, refuse to say whether the votes are to be weighted according to capital invested, or hands employed, or by regions, but he assumes that the large firms would be in a position to outvote the small firms. Sir Arnold does not question the need for planning or for reorganisation, but he claims that to succeed it must be voluntary, and not imposed from above. He does not doubt the need for centralised selling; it has sometimes, but not always, succeeded, but once it becomes compulsory it becomes rigid, and a new vested interest arises.

Beware of the Planners

SIR ARNOLD WILSON is a vigorous opponent of those who believe that industry would best serve its own interests by submitting voluntarily to a far greater degree of statutory control by Government and by itself than it has hitherto known. His wide experience in the East has convinced him of the necessity for a measure of organised marketing for foreign markets, but he sees in the present proposals a danger that the greater units in any given industry would be enabled through the proposed council to control the smaller units, to prevent price-cutting, to raise prices and to secure the making of profits not by the most efficient but on the whole by the least efficient in a group. A factor of great importance in the chemical industry is the need for affording full opportunity for the development of new plant, new processes and new products.

Lord Melchett's speech left some doubt in our minds as to whether his Bill would give free play to such developments, and Sir Arnold Wilson has stressed the point by remarking that those of us who have had some experience of industry know that as Mr. Walter Runciman said recently "a useful invention is worth more than seventy Acts of Parliament." How would such inventions be received by a fully-organised self-governed industry? Would the coachmakers have allowed the motor industry to grow up? Would a transport board, dominated by railway interests, have assisted the manufacture of motor cars and aeroplanes? At the back of the minds of all "planners" is the need to restrict production in the interests of profits, to be earned not by the most efficient but by the average manufacturer or dealer. "We are trying to do more governing and more controlling than any nation can undertake with success," said Sir Arnold, "and in doing so we are in danger of wasting our greatest asset —the independence of character which is the product of real responsibility."

Imperial Chemical Industries, Ltd.

CONTINUED improvement in demand for the company's products was the keynote of Sir Harry McGowan's speech at the annual meeting of Imperial Chemical Industries, Ltd., last week. Although the improvement in 1934 was not quite so marked as in the previous year, sales on the whole were quite satisfactory, and Sir Harry was able to point to many new projects, both on the technical and selling sides of the organisation, the effect of which should be to strengthen the position of the company still further in the future. Reference has already been made in our columns to the progress of the oil-from-coal scheme at Billingham and to Sir Harry's remarks on the manufacture of armaments, but there is another and more personal part of his speech that is worth noting—his reference to the continuance of the harmonious relations between the management and their co-workers of all ranks. A contented body of staff and workers is one of the most valuable assets which any company can have. The directors appreciate the loyal co-operation on all sides and spare no endeavour to meet that co-operation by their own interest in every common activity which binds members of the organisation more closely together. It is often alleged that large industrial organisations must inevitably be inhuman, but that is a superficial view. No large body of men and women working together in one corporate entity can give of their best unless those responsible for management take a real interest in so much of their personal happiness as arises from their daily work. Sir Harry believes this to be the case with most large organisations; it is certainly true of the company's 54,000 employees in this country.

The company's medical service has been extended during the year by the experimental establishment of dental clinics at three of the larger works. This step has been much appreciated by the workers, and, indeed, difficulty has been experienced in coping with the demand for dental work. Looked at by itself, the medical service involves considerable expenditure, but it brings an ample return in the minimisation of sickness and absenteeism, with a consequent enhancement of efficiency, and, most important of all, it gives men and women that sense of well-being only to be derived from good physical health. The company's relations with the trade unions continue to be excellent. For many years attention has been concentrated on safety in industry, and it is the practice to spare no expense and no effort in order to reduce industrial accidents. These preventive measures provide yet another opportunity of contact and co-operation with the workers, and the continuing fall in the accident rate in the company's works shows how much may be achieved.

Prospects for the Present Year

SO far as the present year has gone, the business of Imperial Chemical Industries, Ltd., has been satisfactorily maintained, and from such indications as are available of general conditions in this country, Sir Harry McGowan is hopeful that the company will continue to see steady progress. Outside this country, however, affairs are neither so settled nor so promising. The general monetary situation is not stable, as evidenced by the recent devaluation of the Belgian currency. Other weaknesses are apparent in the financial structure on the Continent, and even in America there is still considerable doubt as to the outcome of the struggle between those who advocate monetary inflation, on the one hand, and those who, on the other hand, trust to the restoration of enterprise in general. Until events have dissolved the uncertainties in these respects, there will be little purpose in entering upon international discussions for the stabilisation of the exchanges. On the other hand, so long as the exchanges are free to move within wide limits, world trade must labour under considerable difficulties.

Powerful organisations like Imperial Chemical Industries, Ltd., can take a measure of risk and afford a period of waiting which are beyond the resources of smaller concerns, the measure of whose importing and exporting activities, taken in the aggregate, however, is of considerable importance. Sir Harry looks anxiously, therefore, for a new monetary conference at no far-distant date.

The hopes which Sir Harry McGowan expressed last year of an extension of the present rate of new capital expenditure in this country have been partly realised by a greater activity in housing construction, and further progress is to be anticipated from the attack on the overcrowding problem which will commence with the passing of the Housing Bill. Stability in this country may encourage further capital expenditure on projects designed to improve general amenities, such as better water supplies, drainage systems and road development, as well as more active steps for remedial and restorative action in the distressed areas. In these circumstances at home and abroad the company will again neglect no opportunity of doing its part. The chairman looks forward, therefore, to a reasonably successful year, expecting neither any abnormal setback nor any outstanding extension of the company's manifold activities.

Organic Chemistry, 1910-1935

By E. A. Coulson, M.A., D.Phil.

TWENTY-FIVE years ago organic chemistry was pitiably neglected in England. The initiative, both in prosecution of fundamental research and in the development of new industries based on research, had passed wholly into German hands. German predominance in organic chemical manufacture is illustrated by the fact that she made over 80 per cent. of the world's consumption of dyestuffs (then the mainstay of the organic chemical industry), while we imported annually dyes worth £2,000,000, 90 per cent. of our consumption. Nothing was done in pre-war years to alter this state of affairs. The achievements of Willstätter and his school in their pioneering investigations of the colouring matters of flowers, plants and the blood (anthocyanidins, chlorophyll and haemin), and of Fischer in the field of tannins, were of a type and on a scale not paralleled elsewhere.

Organic Chemistry in War Time

The immediate problem when war cut off supplies of dyes and drugs from Germany was their replacement by home production. Equally important was the manufacture of explosives and aeroplane fabric dopes, whilst materials for chemical warfare were soon in demand. Organic chemical research and manufacture was thus stimulated to a feverish activity in restricted fields. In Germany, substitutes for unobtainable materials, like rubber, fats and motor fuels, were sought. Many investigations, commenced under the pressure of war-time necessity, have undergone remarkable development in post-war years.

Explosives.—The chief organic explosives used were nitrocellulose, nitroglycerine, trinitrotoluene (T.N.T.), tetranitromethylaniline (Tetryl) and picric acid. A fresh source had to be sought for toluene (the supply from coal tar was insufficient) and it was found in Borneo petroleum. A shortage of acetone (used in the manufacture of cordite) was made up by a process, due to Weizmann, in which starch was fermented by a special micro-organism and transformed into acetone and *n*-butyl alcohol.

Poison Gases.—Apart from chlorine and phosgene, the principal gas weapons were organic in nature: trichloromethylchloroformate and chloropicrin (lung irritants), xylyl bromide and ethyl iodoacetate (lachrymators), diphenylchloroarsene, diphenyl-cyanoarsene and ethyl-dichloroarsene (sternutators) and dichloro ethyl sulphide or "mustard gas" (a vesicant). In this branch of warfare, Germany's supremacy was countered only after costly improvisation.

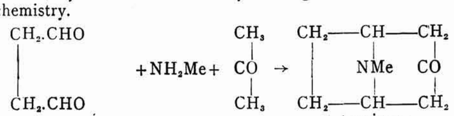
Rubber-Like Materials

Interest had been centred on rubber before the war. The rubber industry in 1910 represented an annual value of £45,000,000, more than twice that of dyestuffs. Great impetus was given to attempts to synthesise rubber-like materials, particularly in Germany, where, during the war, a rubber famine rapidly supervened. The polymerisation of isoprene to rubber had been observed by Tilden in 1892, but not till 1910 were the commercial possibilities generally realised. In that year, patents were applied for both by an English syndicate and by the German B.A.S.F. The English process was based on the polymerisation of isoprene made from the amyl alcohol in fusel oil. Various other processes for making isoprene were investigated, and butadiene and its 2:3-dimethyl homologue, which also polymerised to rubber-like substances, attracted notice. It was in the course of these investigations that use was first made of Fernbach cultures for fermenting starch to butyl alcohol and acetone. Ultimately it was realised that synthetic rubber was never likely in normal circumstances to replace the natural product, but butyl alcohol and acetone became very useful materials for the growing resin and lacquer industries. Interest in synthetic rubber was recently revived by the Dupont Company in America, and it was shown that chloroprene (β-chlorobutadiene—obtainable readily from acetylene) polymerised very rapidly to a mass resembling vulcanised rubber.

Hydrocarbons.—Transformation of coal by combination with hydrogen into liquid fuels suitable for internal combustion engines was foreseen by Bergius and carried out in Germany during the war, but only with the later discovery of more suitable catalysts did the process become commercially practicable in peace time.

Fatty Acids.—A shortage of fats was the cause in Germany of many attempts to transform paraffin waxes into fatty acids. It was found that paraffins were readily attacked by air or oxygen at temperatures over 160° and although complicated products resulted considerable yields of acids could be obtained.

Researches in Pure Chemistry.—Although in all countries research, except for war purposes, came almost to a standstill, one or two outstanding discoveries were made. Thus, Robinson's remarkable one-stage synthesis of tropinone (1917), which was accomplished by mixing succindialdehyde, acetone and methylamine broke entirely fresh ground in alkaloidal chemistry.

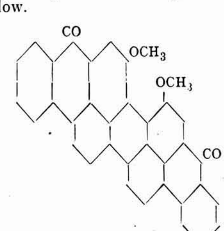


tropinone.

Post-War Developments

It was quickly realised that the permanent existence of a flourishing organic chemical industry was essential to our national economy. British Dyes (1915) amalgamated with Levinsteins to form British Dyestuffs Corporation (1918). Imports of dyes and intermediates were prohibited in 1919, except under Board of Trade licence. During 1920, owing to a judgment that this procedure was illegal, there was no restriction and a severe blow was dealt to the industry. Since 1921, imports have been regulated, but Germany has concentrated upon the faster and more expensive types of colour and regained much lost ground. The I.G. was formed in 1925. In 1926, Brunner Mond, Nobels, United Alkali and British Dyestuffs Corporation merged to form I.C.I., and the British chemical industry could face German and American competition on equal terms. The most spectacular achievements of post-war years in organic chemical industry include the synthetic production of methanol (methyl alcohol), the varied applications of hydrogenation and the development of artificial silks, synthetic resins and lacquers. Advances have also been made in the production of new vat dyes and therapeutic substances. In all these fields the British industry has been well to the fore.

Dyestuffs.—The most noteworthy discovery in dyestuffs chemistry is to the credit of Scottish Dyes (a company formed during the war to manufacture vat dyes fast to light). Caledon Jade Green is a bright green dye and the fastest so far made. It is obtained by condensing anthraquinone with glycerol, fusing with caustic soda, oxidising the product and finally methylating. Structurally, it is represented by the formula below.



Caledon Jade Green.

Synthetic Resins.—The synthetic resin industry, which to-day in this country employs 11,000 to 12,000 people and a capital of £2,500,000, took its rise from Baekeland's invention of 1909 in which phenol and formaldehyde were combined to yield products capable of use as moulding powders. Development was extremely rapid only after 1920. Other condensation reactions are now employed, such as those between urea, or thiourea and formaldehyde and the reaction of glycerol and phthalic anhydride. Lately, the polymerisation of esters of unsaturated acids to plastic masses has come into prominence. Acetylene, which adds on the elements of water under the catalytic action of mercury salts, acquired importance as a source of acetaldehyde, ethyl lactate, acetone, acetic acid, ethylene glycol and solvents, such as westron, acetylene tetrachloride. These products are of great application in the new industries.

Hydrogenation.—The hydrogenation of brown coal and tars was forced upon Germany by war-time exigencies. The experience then gained with pressure reactions led immediately to other post-war applications of hydrogenation. Of these, the methanol synthesis (from carbon monoxide and hydrogen), which is based on the researches of B.A.S.F., and the French workers, Patart and Audibert, the hydrogenation of phenols to *cyclo*hexanol and *cyclo*hexanone derivatives and naphthalene to tetralin and decalin (tetra- and decahydronaphthalenes), useful solvents for the growing resin and lacquer industries, may be instanced. Hydrogenation of bituminous coals to motor spirit, which is being carried out in this country by I.C.I., is a final culmination.

Present Trend of Research

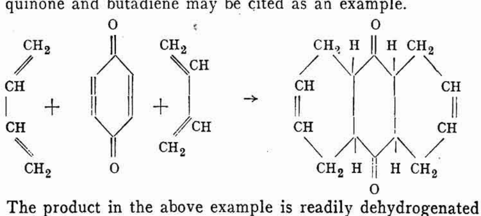
By 1919, research on problems raised by the war was being abandoned, although an increased interest in food and in deficiency diseases remained as a legacy. A general trend towards the study of products occurring in plants and animals, the original and always the most fruitful, if the most difficult, field of organic chemistry, was clearly discernable. In recent years, attention has been focussed upon alkaloids, polyterpenes, di- and poly-saccharides, chlorophyll and flower pigments and upon groups of substances important in medicine and physiology, particularly vitamins and hormones. Many discoveries of quite outstanding importance have resulted. Chemical theory has been enriched by the researches of Ruzicka on many-membered carbon rings, by the discovery of new types of optical activity, and by the application of electronic theories to reactions. Powerful new tools of research have come to hand. Of these may be mentioned micro-methods of analysis; the use of X-rays and surface-film methods for determination of structure, and new reagents and solvents. It may be said that the rate of progress during the past twenty-five years surpasses anything in the previous history of organic chemistry.

Research Technique.—Recent advances in the actual technique of research and in the basic theories of structure call for some attention. Micro-methods of elementary analysis were imposed upon Pregl (in 1910) during a research upon bile-acids. While no fault could be found with the time-honoured methods of Dumas on the score of accuracy, it became essential that there should be found some means of dealing with substances which could only be isolated in small amounts. The special technique and apparatus which has been evolved by Pregl and others for the determination of the empirical formula, when 3 to 5 milligrams only of material are available, is fully counterbalanced by the saving of time and precious substance. Without its aid, the rapid progress of investigation so characteristic of the present day could not have come about.

Variety of New Solvents

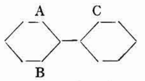
The organic chemist has a variety of new solvents for everyday use. Methylene dichloride, *iso*propyl ether, *cyclo*hexanol, tetralin and decalin, butyl alcohol, ethylene glycol, ethylene oxide, dioxane, furfural and di- and tetrachlorethane may be mentioned.

Diels's method of dehydrogenating saturated ring structures with selenium has been of valuable application since its introduction in 1927. A reaction of general applicability came to light through the work of Diels and Alder (1928), the so-called "diene" synthesis. The interaction of *p*-benzoquinone and butadiene may be cited as an example.



The product in the above example is readily dehydrogenated to furnish anthraquinone quantitatively, an interesting new synthesis. The potentialities of this reaction, both diagnostic and synthetical, are obvious.

The year 1926 was especially remarkable in the post-war period. Besides the synthesis of thyroxine, there occurred two developments of fundamental importance to structural theory. Optical activity in the substituted diphenic acid series was traced to a limitation of rotation about a single carbon bond by substituent groups. Thus, diphenyl derivatives of the type represented by the annexed formula occur in *d*- and *l*-forms.



The occurrence in nature of substances containing rings of 15 and 17 carbon atoms was demonstrated by Ruzicka. Muscone and civetone, the active principles of the perfumes obtained from the musk deer and the civet cat, are ketones represented by the following formulæ:

muscone	civetone
$CH_2.CH_2.CHMe$ $(CH_2)_{10}.CO.CH_2$	$CH.(CH_2)_7$ $\quad\quad\quad\quad\quad > CO$ $CH.(CH_2)_7$

Ruzicka was able to prepare the complete series of ketones of the type $(CH_2)_n$ CO where n had all values from 2 to 18. Baeyer's classical theory of ring structure which had long commanded respect and which postulated a maximum stability and ease of formation for 5- and 6-membered rings was thereby necessarily modified.

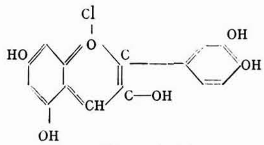
Development of Crystal Analysis

In the last few years, through the efforts of Bernal, crystal analysis has become an essential adjunct to structural chemistry. From determinations of the X-ray photograph, the cell size, molecular symmetry and electron density in crystals it is now possible to answer questions which have baffled purely chemical methods of solution. Thus, the identity or non-identity of two substances which do not depress one another in melting point can be settled at once. Molecular compounds can be differentiated from single individuals. Determinations of the disposition of the molecules in a crystal, and hence their size and shape, frequently allow of the rejection of proposed structures. (An example is the skeleton structure for the sterols and bile-acids—Wieland's skeleton was non-admissible on crystallographic grounds before it was rejected by Rosenhein and King on chemical evidence.) It is, in fact, possible by trial and error and laborious calculation to arrive at an exact knowledge of the actual positions of the atoms in the molecule. The value of these methods to the organic chemist cannot be overestimated. Enormous saving of effort will accrue, as the possibilities of these purely physical modes of structural determination are more widely appreciated.

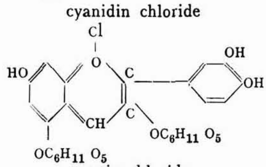
Some Complex Problems

Certain groups of organic substances early attracted attention, but presented problems of such complexity that the combined labours of generations of workers have been required for their full elucidation. During recent years steady progress has been made in sugar chemistry by Irvine, Haworth, Hirst, and their collaborators. The alkaloids have occupied Perkin, Robinson, Barger, Spath and others, and few outstanding problems remain, although brucine, strychnine and quinine have so far defied synthesis. The monoterpenes have given up most of their secrets and Ruzicka and his school have made progress on the sesquiterpenes. Since the war, H. Fischer has greatly extended Willstätter's researches on chlorophyll and its structure is now fairly well known. He has also succeeded in synthesising the blood pigment hæmin. Summary treatment of these great organised researches is not possible, but they must always remain classics of scientific investigation even if overshadowed in interest by the chemistry of hormones and vitamins.

Flower Pigments.—Chemical examination of the soluble pigments of flowers and the skins of berries (anthocyanins) was begun by Willstätter in 1913. Cornflower pigment (cyanin) was obtained as a chloride, $C_{27}H_{31}O_{16}Cl$, which was hydrolysed to two molecules of glucose and one of a crystalline substance, named cyanidin chloride, $C_{15}H_{11}O_6Cl$. The pigment was therefore a diglucoside. Degradation experiments gave a clue to the structure of the cyanidin and its synthesis by reduction with sodium amalgam in dilute alcoholic hydrochloride acid of quercitin established its constitution.



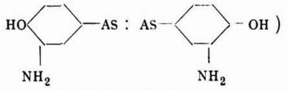
cyanidin chloride



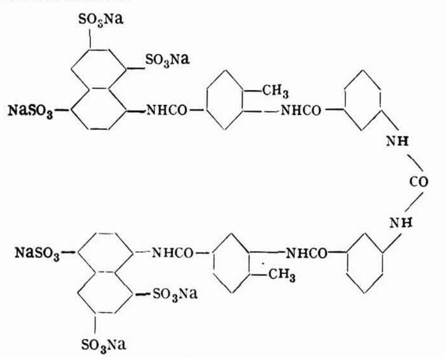
cyanin chloride.

It will be seen that it contains an heterocyclic ring containing quadrivalent oxygen and is closely allied to the flavones. The other cyanidins were found to differ only in the number and position of the OH groups attached to the benzenoid ring, while in the anthrocyanins various sugar residues were present. After Willstätter's researches came to an end during the war, Robinson and his school completed the study of this group, greatly improving the synthetical methods and as a final culmination established by synthesis the structure of hirsutin, malvin, pelagonin, peonin and cyanin as β-diglucosides of similar type substituted in the 3- and 5-positions.

Chemotherapy.—The aim of chemotherapy is to attack protozoa or bacteria, which cause infectious diseases, by administration of chemical substances. As a result of the pioneering work of Ehrlich, salvarsan was introduced in 1910 for the treatment of syphilis and its great value led during the last twenty-five years to vigorous prosecution of research into the germicidal action of various types of organic compound. At first, arsenicals were thought to show greater promise (salvarsan is the hydrochloride of 3:3'-diamino-4:4'-dihydroxyarsenobenzene,



Salvarsan is not effective against trypanosomes, but a very powerful substance known as Bayer 205 was introduced in 1920 to combat sleeping sickness. Although the firm of Bayer did not reveal its structure, the nature of this drug was established by Fourneau, who represented it by the annexed formula.

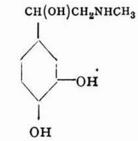


Bayer 205.

A striking fact is that substances only slightly different in structure have no comparable trypanocidal value.

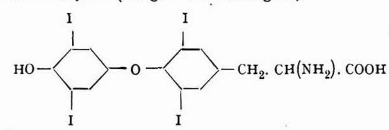
There have also been advances in the search for bactericides and antiseptics, and reference may be made to acriflavine (2:7-diaminomethylacridinium chloride) and chloramine-T (sodium *p*-toluene sulphonchloramide), which were largely used in war time for dressing wounds; and to the more recently introduced hexyl resorcinol.

The secretion of the adrenal gland was long known to contain a physiologically-active substance. Its isolation in the crystalline state and synthesis (1904) showed it to be a relatively simple compound, 1-α-methylamino-β-hydroxy-β-(3:4-dihydroxyphenyl)ethane.



adrenalin.

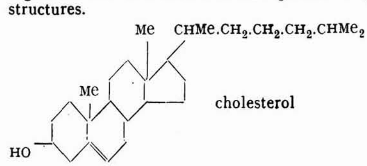
This remarkable result stimulated research into other so-called hormones, but the next advance did not come until many years later. Kendall isolated the active principle of the thyroid gland and named it thyroxine, in 1915. The brilliant degradative analysis of Harington (1926) showed this to be a derivative of tyrosine and of diphenyl ether and the formula put forward was proved correct by a synthesis effected in the same year (Barger and Harington).



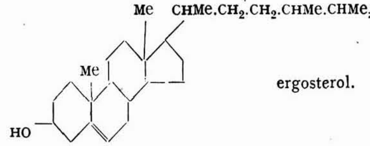
thyroxine.

Thyroxine can be made more cheaply than it can be isolated and it is now used in cases of thyroid deficiency.

The sterols, a class of substances widely distributed in animal and vegetable organisms, and the bile acids, obtained from liver secretions, have been subjected to laborious investigations during the period under review, by Borsche, Windaus and Wieland and their schools. Converging researches have recently shown close genetic relationships between these substances, the sex hormones, vitamin D and certain cardiac poisons derived from plants. Rosenheim and King made a considerable advance in 1932 by proposing a new skeleton structure for the sterols and bile acids which was based on their dehydrogenation with selenium (a method discovered by Diels and applied in this group in 1927) to chrysene and *cyclo*pentenophenanthrene derivatives, and on measurements of the crystallographic cell dimensions (Bernal, 1932). The new skeleton was at once accepted universally and all the substances of the group were reformulated. Cholesterol and ergosterol are now shown to be represented by the annexed structures.

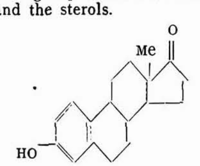


cholesterol

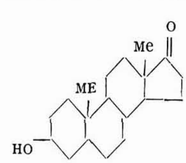


ergosterol.

Isolation of the follicular hormone (oestrone) was effected by Butenandt and by Marrian (1929). The structural formula which was established by the methods employed in the bile-acid group shows its close resemblance to these substances and the sterols.



oestrone



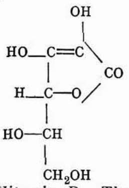
andosterone.

The male sexual hormone (andosterone), isolated by Butenandt (1933), was synthesised by Ruzicka by oxidation of epicholestanol and shown to be of closely related structure.

The pancreatic hormone (insulin), a protein of enormous molecular weight, was isolated in 1922.

The presence in foodstuffs of minute amounts of substances which are essential to diet (Hopkins, 1912) has furnished organic chemists with problems of surpassing interest and complexity. Six such vitamins have been recognised, A, B, B_2, C, D and E. Clear insight into the chemical nature of vitamins A, C and D has been obtained in recent years.

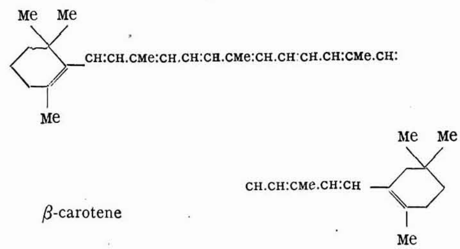
Vitamin C.—This, the anti-scorbutic vitamin, was isolated from oranges by Szent Györgyi in 1928. Its synthesis by Hirst and others (1933) showed it to be a substance of 1-ascorbic acid or vitamin C.



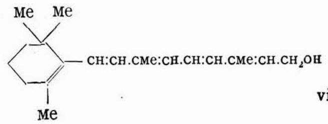
1-ascorbic acid or vitamin C.

Vitamin D.—That rickets could be cured by exposure of the subject or of animal fats used in diet and containing cholesterol to ultra-violet or sunlight was discovered between 1919 and 1924. Closer study showed that ergosterol, which accompanied cholesterol, was the true precursor of vitamin D. From the irradiated products of ergosterol, a crystalline isomeride (calciferol) was isolated, which was shown to be the vitamin itself (1932). This investigation was carried out by a team of workers at the Medical Research Council's Laboratory.

Vitamin A.—Along with vitamin D, another factor (vitamin A) is essential for proper growth and well-being. Halibut liver oil is the richest source of this vitamin, which has been isolated by Karrer and by Heilbron. Its relationship to a group of naturally-occurring poly-ene pigments (the carotenoids) has been made clear. β-Carotene (from numerous sources including carrots) has growth-promoting properties and is supposed to be the precursor of vitamin A from which the latter is formed in the organism.



β-carotene



vitamin A.

The names of Karrer and Kuhn are associated with these investigations.

Twenty-five years ago, in reporting on the progress of organic chemistry during 1910, Desch and Lapworth said "the problems connected with the chemistry of living matter are approached from two sides, the purely chemical and the physiological, and although the two lines still remain separated by a considerable interval their gradual convergence is clearly discernible." To-day the convergence is complete. Organic chemistry has passed through many phases, but in returning to its original aims it has achieved its greatest triumphs.

Modern Steel Tubes and Gas Cylinders

The Chesterfield Tube Co., Ltd.

THE works of the Chesterfield Tube Co., Ltd., are situated on the main road between Sheffield and Derby and to-day cover an area of approximately 23 acres. Twenty-five years ago the area occupied was only 11 acres and the plant then consisted of piercing presses, drawing plant and general machinery required for the production of cold drawn tubes of small dimensions. To meet the progressive demand for much larger sections and high quality products such as cold drawn pipes and tubing in special materials, additional facilities for production were necessary and year by year many important developments in matters dealing with research and improved methods of manufacture have taken place until now, the company's products are well-known all over the world. At one time, a cold drawn pipe 24 in. in diameter was inconceivable, but pipes of this description are now quite general.

The very considerable present-day uses of compressed gas have also been met and thousands of cylinders are now produced annually for the storage of compressed oxygen, hydrogen and air, liquefied nitrous oxide, carbon dioxide, ammonia, chlorine, acetylene, ethylene and other gases. An important recent development is the manufacture of alloy steel cylinders for very high pressures and an outcome of this was the official opening, by the Parliamentary Secretary for Mines, of the gas compressing station at the company's works in November, 1933, when representatives from the majority of the gas companies and technical societies were present. Local corporation vehicles running on coal gas obtain regular supplies of fuel from the plant daily.

A steadily increasing output and the growing popularity of the company's products at home and abroad has necessitated the employment of an increasing number of employees and the use of much larger supplies of raw materials, fuels and other requirements.

The close attention which has been paid at Chesterfield to the latest methods of manufacture, combined with the timely replacement of obsolete plant has also enabled the company to maintain its position as one of the leading undertakings in the tube industry and it is appropriate to mention that besides other recent additions, the company has extended its laboratory with up to date facilities for conducting important experiments, tests and research work.

In addition to executing regular contracts to the order of the British Admiralty, War Office and Air Ministry, the company's products have been supplied for most of the famous ships that have been built during the past twenty years, the Cunard liner " Queen Mary " being equipped with many cold drawn steam pipes manufactured at Chesterfield.

Weldless steel " Feroma " tubes produced from the latest corrosion and heat resisting materials are another special feature of the company's output and large quantities of these tubes are being used for chemical plant, bleaching and dyeing apparatus, and for the brewing and food-producing industries.

Colloidal Graphite for Lubrication

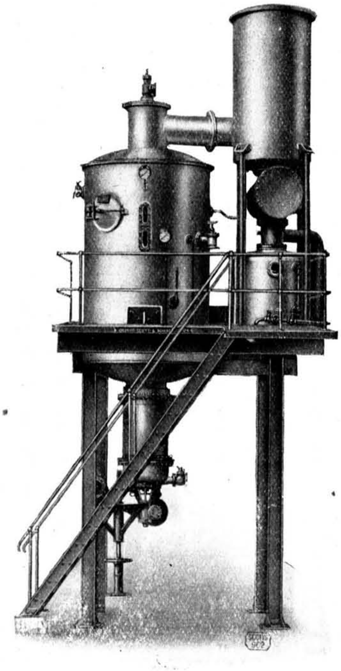
E. G. ACHESON, LTD., have a considerable experience of the unique product known as Acheson colloidal graphite, in which it has specialised for a quarter of a century. Their experience extends to almost every country of the world and into many industries. The exacting care which it has taken in the manufacture of this product is reflected in its wide use to-day. It is incorporated in oil for the lubrication of automobile engines, and as such is approved and used by motor manufacturers. Then again, it is used extensively in the electrical industry and printing trade, to name but two instances. Despite the variety of the application of this product, however, the object of the firm has always been to place the quality of its product before the quantity of consumption. This policy has justified itself by a popularity which has continued to grow with unwavering steadiness.

100 Years of Chemical Engineering

A Retrospect of the Early Days of the firm of George Scott

GREAT progress has been made in chemical engineering throughout the century which has elapsed since George Scott founded the business which is now known as George Scott and Son (London), Ltd. This progress is reviewed in detail in a special brochure which the firm issued to mark its centenary, 1834-1934.

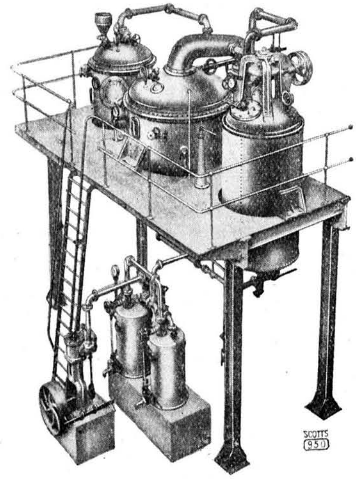
Like industry in general a hundred years ago, the chemical and other industries, in which chemical engineering plays such an important rôle to-day, were but a fraction, in magnitude and variety, of what they are now. The heavy chemical was practically limited to sulphuric acid, bleaching powder and Leblanc soda, the manufacture of which had



The Scott Patent High Vacuum Glycerine Distillation Plant.

been introduced into this country some years previously. The Solvay process did not exist, its inventor being born only in 1838. There was no dyestuffs industry, for the discovery of mauve by Perkin came in 1856, and benzene had not yet been isolated from coal tar. The explosives industry was confined to the manufacture of gunpowder; nitrocellulose and nitroglycerine explosives were not manufactured until some thirty or forty years later. There was as yet no fertiliser industry, but its foundations were being laid, for it was in 1834 that Lawes commenced his epoch-making agricultural experiments at Rothamsted. There were a number of paint and varnish factories in existence, and the manufacture of soap was increasing as a result of the cheaper soda available from the Leblanc process.

The early part of the nineteenth century was a period of fundamentally important advances in the design of evaporating plant. For many years evaporation in the sugar and salt industries had been carried out in open pans heated bv direct firing. In the sugar industry, progress was stimulated by the need to counteract the high fuel consumption and large losses of sugar by caramelisation due to the high temperatures used. The first step forward was the use of steam for heating the pans instead of direct firing. In England the use of evaporating pans with steam jackets dates from about 1800; in France the evaporation of beet sugar juice by steam was first carried out in 1828 in flat pans provided with steam coils, which were designed by Moulfarine and Pecqueur. The invention of the vacuum pan by Howard,

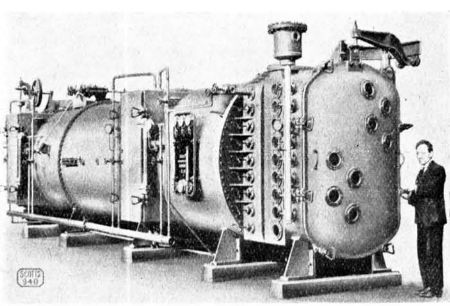


High Vacuum Fatty Acid Distillation Plant employing saturated steam only without addition of open steam.

in 1813, was a fundamental advance, and effected an immense improvement in the yield and quality of sugar through the lowering of the temperature of evaporation.

Early Vacuum Pans

The first vacuum pans had a steam jacket and were very shallow in order to provide an adequate heating surface and, consequently, they held only a small quantity of syrup. Later on, Howard provided steam coils for heating so that the height of the pans could be increased. For some years the vacuum pan was employed only in British sugar refineries: it first came into use in the raw sugar industry in 1832 in Demerara and Louisiana. In France it did not make any substantial headway until about 1840. In Germany, progress



Scott Patent Vacuum Band Dryer for a wide range of food and chemical products.

was even slower, and the first use of steam for boiling sugar in that country was at a Hamburg refinery in 1848.

The use of steam as a heating medium stimulated many attempts to utilise the latent heat of the vapour evolved during evaporation. As early as 1808, William Steel was granted a patent for evaporating brine by using the vapour from a direct-fired pan for boiling brine in a second pan provided with a steam jacket, the pressure in the first pan being maintained sufficiently high to ensure the necessary temperature difference, but no practical application seems to have been made of this invention. It was again in the sugar industry that practical progress was made. An early suggestion for the multiple use of steam is found in Cleland's patent of 1826, where the steam from open pans is used for heating juice. In 1834, a quadruple effect system was described in a French patent of Pecqueur; this consisted of a series of superimposed shallow vessels, in which the vapour evolved in each vessel heated the bottom of the vessel above it, but was not practical. Pecqueur has been claimed as the original inventor of multiple effect evaporation, but this claim can be justifiably disputed. The term " double effect " is really due to Degrand, who took out a patent in 1837, in which the vapour from an evaporating pan was condensed in an air-cooled condenser, the hot air being then utilised in sugar-drying stoves.

Multiple Effect Evaporation

A further advance was shown in the Derosne double effect system, which is described in a British Patent issued to Pontifex in 1836. The vapours from a steam-heated pan were used for heating a vacuum pan and, at the same time, a further heat economy was effected by providing the vacuum pan with an evaporative condenser cooled by sugar juice or syrup. A number of such plants were built about 1840 and met with a certain amount of success.

Rillieux, in 1830, conceived the idea of multiple-effect evaporation under vacuum. He endeavoured to interest various French manufacturers in his idea, and one of those to whom the idea was submitted was Pecqueur, whose patent in 1834 has been mentioned previously. These attempts proved unsuccessful and Rillieux returned to America where he continued his efforts. It was not until 1843, however, that Rillieux succeeded in getting a manufacturer to build a plant embodying his ideas. After many initial difficulties had been overcome, the plant proved successful and Rillieux developed his ideas further in subsequent plants. By 1851, there were some fifteen of these plants operating in Louisiana.

To obtain additional economy in steam, Rillieux combined his evaporator with a crystallising pan which was heated by the vapour from the first effect. This pan was thus operated in parallel with the evaporator proper from which it received the thick juice. The crystallising pan and the last evaporator effect were connected to a common condenser. A Rillieux plant with four bodies was thus a triple effect evaporator combined with a crystallising pan, while a plant with three bodies was a double-effect evaporator plus a crystallising pan.

The First Triple-Effect Evaporation

The first multiple effect plant in Europe was Tischbein's plant, erected at Magdeburg, Germany, in 1850. Though consisting of three bodies, it was only a double-effect system. A second plant was supplied by Tischbein in the same year to the sugar factory at Seelowitz, in Austria. During transport, several parts of the plant were lost, and Robert, the director of the Seelowitz factory, was under the necessity of completing and erecting the plant as best he could. Fortunately, he did this according to his own ideas and produced a quite different plant, the tubes being placed vertical instead of horizontal and the juice being inside the tubes and the steam outside. He also connected up the three evaporator bodies to work as a true triple effect. To Robert is therefore due the first triple-effect evaporator in Europe and the first vertical tube evaporator, though Tischbien, as soon as he heard of the new invention, claimed it as his own and applied for a patent. The vertical tube evaporator was generally preferred in Europe for many years on account of the easier cleaning of the tubes than in the Rillieux type. It suffered, however, from poor circulation, a defect which was later remedied in various ways by the introduction of the central downtake by Kasalovsky, the annular downtake by Riedel and the multiple downtake system of the Scott evaporator.

In 1879, Wellner and Jelinek brought out an improved horizontal tube evaporator. About 1870, Rillieux returned to Europe and was able to improve the standard of evaporator design considerably by demonstrating, not without some controversy, the principles on which his evaporator was based and which had been imperfectly grasped on account of the unorthodox manner in which his ideas had been conveyed to Europe. Rillieux was also responsible for many other important features of modern evaporator practice, such as the use of exhaust steam from steam engines for heating the evaporator, the use of vapour from the evaporator for heating juice, the substitution of iron for copper to reduce the cost of construction and the provision of save-alls to prevent entrainment between effects.

The history of evaporation, which has been briefly sketched above, is typical of the history of chemical engineering during the last hundred years. Progress during the latter part of the period has been largely due to the replacing of the older view that each industry consisted of a set of manufacturing problems bearing little relation to those of any other industry, by the conception of chemical engineering as a number of unit operations employed in different industries. With this conception it is a matter of course to apply the experience gained in carrying out a chemical engineering operation in one industry to other industries employing the same operation.

The Founder's Early Training

George Scott, the founder of the business which is now known as George Scott and Son (London), Ltd., was trained as an engineer, a fellow pupil of his being Sir Frederick Bramwell. On completing his training he entered the sugar industry and became interested in various sugar refineries in the East End of London. In the early part of the nineteenth century, there was an extensive sugar industry in the East End of London; in the Whitechapel district alone about twenty-five sugar houses carried on a flourishing trade. George Scott's intimate knowledge of this industry qualified him to design and supply a large variety of plant required by it. In course of time, the reputation of Scott plant became widely known and an extensive foreign trade was developed, particularly with the Netherlands and Germany.

At that time it was not customary, as it is now, for factories to maintain their own engineering staffs, and George Scott had numerous contracts for the maintenance of machinery, some of which continued as late as the 1890's. Such a system, which frequently made the constructor of a plant responsible also for keeping it in good condition, was not without a logical basis.

Apart from sugar-refining equipment, the earlier products of the firm covered a very wide range and included beam and horizontal steam engines, vacuum pumps, liquor and syrup pumps, sugar cutting and crushing machines, hoisting machinery, brewery tuns and equipment, oil mill machinery, soap plant, paint machinery, edge-runner mills and other grinding machines. Filter presses, centrifugals and biscuit-making machinery were also manufactured at a later date. In the meantime, George Scott had been joined in the business by his son, Frank Scott, who turned his attention to the manufacture of air compressors and blowing engines for raising liquids in conjunction with Montejus and blow-eggs. Frank Scott was one of the pioneers of high-pressure air compression and invented a two-stage compressor which enjoyed a large sale.

Pioneering in Solvent Extraction

Solvent extraction plant has been a product of the firm of Scott for many years. An interesting example is an installation, designed and constructed in 1890, which was probably the forerunner of all continuous solvent extraction plants. This plant was designed to deal with linseed and comprised seven extractors arranged for series washing, the solvent being recovered from the extracted seed in vacuum mixer dryers. The oil was recovered in vacuum stills. Any air which entered the system was extracted, compressed to 500 lb. per sq. in. and cooled to minimise loss of solvent. This feature, together with the use of the non-inflammable solvent, carbon tetrachloride, rendered the plant a unique achievement at that date.

In the manufacture of drying plant, Scott pioneering work has also been done in many directions. The first dryer patent of which the firm has a record was granted in 1879. Progress has been continuous ever since, and to-day a complete range of dryers is manufactured capable of dealing with any product under the conditions best suited to it and employing any heating medium. One of the most interesting of the recent developments is the Scott vacuum band dryer for the continuous drying of foodstuffs and similar delicate materials under high vacuum.

In 1890, the firm of Scott constructed the first triple-effect evaporator to be installed by Lever Brothers for the concentration of glycerine. Prior to that, soap lyes were concentrated in open pans, a process which was wasteful in fuel and was accompanied by a loss of glycerine. The application of vacuum evaporation to the recovery of crude glycerine was followed by the Scott glycerine refining or distillation plant. Some of these refining plants installed thirty to forty years ago are operating to-day and, with the original scarcely modified, are giving yields of chemically pure products which will bear comparison with the results obtained from the most modern equipment. The latest Scott glycerine distillation plant is a patent design employing high-pressure steam, operating under high vacuum, resulting in chemically pure glycerine in one distillation.

Prior to the introduction of Scott plant, the recovery of soda in British pulp and paper mills had been conducted on very primitive lines. The methods used were expensive and inefficient and many mills were regarded as being in an enviable position because they were able to dispose of the soda liquor in their effluent and thus avoid installing a recovery plant. Pass-out steam from steam turbines was not then available and the use of exhaust steam for evaporation had scarcely been applied. To-day, a recovery of 80 per cent. is regarded as inefficient working, and certain mills regularly recover 88 per cent. to 90 per cent. The Scott system of employing exhaust steam for evaporation is now standard practice, the pass-out turbine providing all the process steam requirements of the mill.

The Colour Users' Association

Some Changes During the Past Twenty Years

THE Colour Users' Association was the outcome of the formation on October 8, 1915, of a committee to watch colour users' interests in connection with the supplies of dyestuffs consequent upon the stoppage of imports from Germany as a result of the war. On February 25, 1919, the Colour Users' Association came into being and the late Mr. Henry Allen, who had been chairman of the Colour Users' Committee, was appointed first chairman. He was succeeded in August, 1920, by Mr. G. V. Clay, and on June 3, 1921, Sir Henry Sutcliffe Smith was elected chairman—a position which he has held to the present day.

Probably the most important work of the Association has been the assistance in the establishment and development of the dye-making industry in this country, and the administration of the Dyestuffs (Import Regulation) Act, 1920. Under this Act, the importation of dyestuffs was prohibited except under licence, and in order to facilitate the granting of licences, the Act provided for the setting up of a Dyestuffs Advisory Licensing Committee consisting of representatives of dye-makers, dye-users and independent members. This committee remained in operation until the passing of the Dyestuffs (Import Regulation) Act, 1934, an Act described as "An Act to amend and make permanent the Dyestuffs (Import Regulation) Act, 1920." A new Dyestuffs Advisory Licensing Committee was appointed by the Board of Trade on July 17, 1934, under the provisions of the 1934 Act, and is now functioning on the same lines as the previous committee, and with the same representation of dye-makers, dye-users, and independent members.

Under the constitution of the 1920 Act, a Dyestuffs Industry Development Committee was in operation for the purpose of considering and advising the Government with regard to the establishment and development of the dye-making industry in this country, but the new Act provided for the incorporation of this committee in the Dyestuffs Advisory Licensing Committee with the addition of several members of representative trades.

The Factor Ratio Established

The prices, both of foreign and domestic dyewares have been the subject of much negotiation over long periods and it is interesting to note that in 1921 the approximate average price per lb. of imported dyestuffs classed as "other sorts" was 66.7d. and 50.48d. in 1928, as compared with 11.7d. in 1913. British prices are still in excess of the general wholesale commodity prices index figure; so recently as last year the chairman (Sir Henry Sutcliffe Smith) in his address at the annual meeting, drew attention to "the great disparity existing between the dyestuffs index figure of approximately 200 and the Board of Trade wholesale commodity figure for June (1934) of 103.6d."

It was through the instrumentality of the Association that a means was found of dealing with applications for dyewares on price grounds, and the factor ratio established. After considerable negotiation, in September, 1922, a factor of three times pre-war level was adopted as a basis, which was then in conformity with general world prices. By progressive stages the factor was reduced to one of 1.75 and finally the British makers announced that they were prepared to meet genuine competition on the basis of equality of price.

It is a somewhat far cry to the days when dyestuffs were being received in this country as reparation from Germany under the provisions of the Versailles Treaty. Prior to April 30, 1921, about 4,000 tons of German dyes had been imported under this head, but the full quantities available to Great Britain out of current German production were not requisitioned. The Association co-operated with the Board of Trade in the selection of dyestuffs to be imported and an arrangement was made whereby members had a first option on such imports before they were offered on the open market. The importation into this country of dyestuffs as reparation ceased at the end of 1924 although some of the Allied Powers continued to exercise their privilege after that period.

The Safeguarding of Industries Act, 1921, was the subject of a great deal of attention from a committee appointed by the council of the Association and as a result of efforts in the early stages of the operation of the Act many imported chemicals used by the colour-using industries were exempted from the $33\frac{1}{3}$ per cent. duty imposed by the Act, resulting in a saving of many thousands of pounds to members.

The Dermatitis Committee

As a consequence of heavy claims made upon manufacturers and dyers for damages for skin infection or dermatitis alleged to be caused through the wearing of dyed garments, the whole question of the incidence of such claims is being investigated by a Dermatitis Committee on which the Association is representing the dye-users. This committee has done a great deal of preliminary investigation and is collating all the available information with a view to resisting such claims in the future.

One of the important changes in governmental policy—the imposition of a general 10 per cent. import duty in 1932—was the cause of great concern to dye-users, in that dyestuffs were prohibited from importation if made in this country, and those that were licensed for importation were, by the Import Duties Act, subject to a tariff of 10 per cent. Strong representations were made to the Import Duties Advisory Committee for the exemption of dyestuffs from this duty, and as a result dyestuffs were placed on the free list on the recommendation of the Import Duties Advisory Committee as from December 27, 1933. Some dissatisfaction arose owing to the fact that intermediate products used by dyers and printers were not included in the free list, and further representations were made. After many interviews and conferences between colour users, dye-makers and the Import Duties Advisory Committee, it was arranged that intermediates should be added to the duty free list by individual names and not as a class, on agreed recommendations by the joint consultative committee of dye-users and dye-makers set up by the Government.

In January, 1923, a Joint Technical Committee of Dye-makers and Dye-users was constituted, and this committee, working in a harmonious manner has proved of inestimable assistance to the Dyestuffs Advisory Licensing Committee in connection with technical matters arising out of the operation of the Dyestuffs Act. One of its most important works has been the compilation of a list of dyestuffs which are not made in this country and consequently are not the subject of objection by British makers so far as import licences are concerned.

The Case Against "Self Government" in Industry

Sir Arnold Wilson Replies to Lord Melchett

LIEUT.-COLONEL SIR ARNOLD WILSON presented the case against self government in industry in an address at the annual dinner of the Chemical Engineering Group at the Waldorf Hotel, London, on April 26. He had been asked to do so because the case for self government had been stated in January by Lord Melchett at the dinner of the British Chemical Plant Manufacturers' Association. Sir Arnold constituted himself the opposition to those who believed that industry would best serve its own interests by submitting voluntarily to a far greater degree of statutory control by Government and by itself than it had hitherto known. He emphasised, at the same time, that he was not an opponent of planning in general. It was quite clear, for example, that organised marketing for the foreign market was, in general, desirable. Having lived in the east for 25 years, he appreciated that the essence of Government was to foresee and to plan.

The conception with which Sir Arnold dealt at length was that put forward in the Industrial Reorganisation (Enabling) Bill, which had been sponsored by Lord Melchett and had been discussed both in the House of Lords and in the House of Commons. If the scheme were approved by Government and by 75 per cent. of the particular industry, it would have statutory effect. That sounded all very fine. One began by inquiring on what basis the 75 per cent would be calculated—whether by heads of firms, on the amount of capital involved, on output or on the number of men employed. But, whatever the basis, it was clear that the effect of the Bill would be that the greater units in any given industry could, through the Council, control the smaller units, could prevent price-cutting, could enable prices to be raised, and profits to be made, not by the most efficient but, on the whole, by the less efficient, even the least efficient, in a group.

Unfettered Efforts

There had been many amalgamations in various industries and great efforts to reduce overhead expenses and prevent cut-throat competition. So far as such efforts were voluntary, unfettered by statutory regulations, he had no doubt that they were healthy and necessary. It was not possible to plan very far ahead: but certain principles could be laid down and adhered to, provided they were not statutory. Once the principles became statutory, they became frozen; it was far easier to pass an Act of Parliament than to cancel it; whereas if regulations were based on voluntary agreements reached between parties it was possible to modify them rapidly when necessary.

Last year, Lord Melchett had observed that the only things settled had been settled by the political governments; Mr. Walter Elliot, in charge of the British farmers, had done the impossible; he had combined them and they had agreed upon a scheme. The electricity grid had not been done by the electricity companies of England; it was done when the Government intervened. We were interested in grain and wheat all over the world; the Governments of the different countries had come together and had created the great Wheat Pool. It was done by the great Wheat Pool, not by business men, but by the Government. And Lord Melchett had described these matters as "problems which had been solved."

Was it possible, twelve months later, to share his optimism or to accept even conditionally his theory that the Government had succeeded in "planning" for industry what industry had failed to plan for itself? Sir Arnold did not think so. Mr. Elliot had not put more men on the land, nor had he begun to create conditions in which small-scale family farming could become a factor of importance in national economy. Every step he had taken had penalised the small farmer and the small retailer. He was not planning for employment, nor for an increase in the number of those who might become their own masters and not wage earners. What he had done was to increase the market value of shares in every distributing organisation handling agricultural produce. The electricity grid had come to pass, but Sir Arnold ventured to question whether, in all the circumstances of the case, the capital invested in it might not have been better invested in other directions. Knowledge was constantly progressing and he considered that part of the action taken in that connection was due to a very widespread belief, which extended back a good many thousands of years, that the age of discovery was coming to an end and that we were living in a static world. Sir Arnold had an idea, on the other hand, that there were greater things by far in store. As to the Wheat Pool, he said it had succeeded in some measure simply because there was a drought and a short crop in 1934—not because the Governments agreed. They had failed to agree upon action.

Had the motor manufacturers of Great Britain been organised as a statutory body thirty years ago, was it possible that the impertinent garage proprietor, Mr. Morris, would have been allowed to develop an industry for making cars? He would have been told that there was already an ample manufacturing capacity for cars in England, that overproduction would be the sole result of putting up an extension to his garage, and he would have been required to undertake not to make more than 10 cars per month, that being the total capacity of England at that time. Moreover, he would have been told to restrict his cars to certain types, in order not to compete with the well-established and highly-efficient manufacturers already at work in this country. We should not have seen the great, and wholly beneficial, outcome of the individual enterprise, individual resource and the intense personal love of a trade for its own sake which characterised our great men.

The Mainspring of Human Activity

One of the weakest points about planning for industrial organisation was the assumption that the mainspring of human activity was money. We knew very well that that was not true. The men who had done great things in England were not the men whose sole ambition had been to place one bond upon another; they were the men who had cared for their professions, who had in them a spiritual urge to accomplish and develop—and that could not be explained to a trade committee sitting around a table, asking what justification there might be for a further development of its rather unfortunate industry. Such a committee might say that an invention was useless; but the inventor would say that if he had permission to market it he would find a way, and he would obtain assistance. The Bill, called, almost by sarcasm, an "Enabling" Bill, would place the legal responsibility upon those already in the industry of saying whether or not a particular group of inventions, or of natural ancillary developments, should or should not proceed.

The London Passenger Transport Board had been hailed as a triumph for rationalisation and amalgamation under Government control. It was perhaps too soon yet to say whether it was a success, but Sir Arnold could speak with certainty of services in his own county of Hertford that were fewer and less efficient. Fewer buses, fewer men employed, he believed there were fewer passengers carried than during the corresponding periods of 1932-33, though the population was increasing fast, and there was much public dissatisfaction. There was less personal contact, undue concentration and a notable lack of elasticity.

The Business of Government

The business of a Government in a civilised country was not to engage itself officially or by deputy in the complexities of production and distribution of perishable commodities. Its primary function was to establish conditions in which private persons could undertake such tasks to mutual advantage in the service of the consumer. We could not plan consumption, though more might be done by the central Government, by stipulation that those who were fed at the cost of the State in the Services and in institutions should be fed with local produce and not, as at present, so as to save trouble to the staff, mainly with foreign produce.

Sir Arnold did not believe in Government research in general, though he believed intensely in research associations in which Government might well play an important and sometimes a predominant part. But the initiative must come from the industry itself; if it did not then in the long run the thing would fall flat. The essence of research was initiative; the essence of initiative was that there must be some body of men, themselves personally interested in applications. So long as the iniative remained in the hands of industry in that and many other directions he had no fear of Government control. The planners wished to place control in the hands of a small hierarchy, which would be fatal to the individual interest which men would take in promoting their own particular industries; it would be fatal to the independent scientific work which could only be carried on successfully in many industries because the boss was personally interested and was determined to see it through. It was not merely money that was required, but personal interest and encouragement.

Planning in the shape of voluntary, flexible, easily terminable agreements between private individuals or public companies would succeed in proportion to the ability of those who plan and of the flexibility of the scheme. Statutory planning would fail because it was too rigid. The mechanistic, as against the organic view of society, could not long prevail because it involved at every point compulsion—even to the consumer—and entailed a progressive limitation of freedom to the consumer, who fixed the price. Every officially sponsored scheme involved discrimination between rival industries and a demand for compensatory consideration in a second scheme from the interest adversely affected by the first. The gospel of planned national economy presumed, contrary to all experience, that the immense and continuous process of automatic adjustment of the industrial machine to new processes, new markets, new tastes, could be effectively supplied by the plans of autonomous boards and government departments. The lobbying of successive groups of industries for assistance was bound to provoke suspicion and, later, indignation, while all the time private enterprise was responsible for finding the money for the very policy which was designed to restrict and perhaps ultimately to abolish its own activities. If the Government's policy was to be one of continuing interference with industry, it must be accompanied by the assumption of public responsibility for the control of industry. People would not lose their liberty without unloading their responsibilities. In order that good might prevail there must be life and vigour in the people, and this could only be where freedom existed. If freedom did not exist, if life and vigour had died, then protection—whatever its form—could not prevent, it could only put off for a short time, the inevitable ruin and disaster. Nations only continued to exist as long as they kept in themselves the great simple virtues. If we wished for a practical example let us look carefully at the poisonous mixture of politics and trade influences, the use of the State power to watch over and favour great money monopolies.

Letters to the Editor

Methyl Bromide

SIR,—I, in common, no doubt, with many more of your readers, perused with interest the short article on "Methyl Bromide as a Fire-Fighting Medium" in THE CHEMICAL AGE of April 27. As the original inventor of methyl bromide for fire extinguishing and the first manufacturer in this country of the product, I trust you will allow me space to say a few words on the matter. As far back as 1920 I took out world-wide patents in relation to methyl bromide for fire extinguishing and for refrigeration. Your correspondent is quite right when he says that little authoritative research has been performed with regard to methyl bromide, and I venture to state that during the next ten years very rapid strides will be made in its application in hitherto unsuspected directions. For example, no one has apparently yet arrived at the result of certain very simple methods of procedure whereby very quick alterations in temperature can be brought about. There is a means whereby methyl bromide can be made to produce an increase of nearly 100° C. in two or three minutes, and, conversely, it can produce about 60° C. of cold in a similar time.

For a period of about fifteen years I have been the strongest advocate and agitator for methyl bromide, and, during that time, I have not been content to confine investigation into its application to fire extinguishing alone.—Yours faithfully,

ALBERT HENNING,
Chairman and Managing Director.
Hedley and Co. (Leytonstone), Ltd.

New Tax on Diesel Oil

SIR,—There is considerable confusion of thought in connection with the new tax on diesel oil and it has been freely stated that this impost will penalise a new form of power for transport vehicles. These criticisms, however, are not borne out by the facts. Some years ago, when the tax on petrol was raised to 8d. per gal, the attention of research workers was concentrated on producing an engine for use in transport vehicles which would utilise a fuel not subject to this high duty. Thus, the development of the light high-speed diesel engine was begun. Progress was rapid and, as the number of diesel engine vehicles on the roads increased, the loss of revenue due to this cause became so pronounced that it seemed inevitable that the Chancellor would, one day, take steps to rectify the position. During 1934, over 7,000 of these vehicles were licensed and it became obvious that this advance had taken place at the expense of the ordinary spark ignition petrol engine which was compelled to pay the full duty on its fuel.

In the new Budget, the duty on the two fuels has been equalised and the relative progress of each type of engine will now be determined solely by its efficiency. The sequence of events outlined above has been admirably planned; thus, during the initial period of development the new industry has been carefully fostered by a tariff against the fuel of its competitor and, now that the development period is complete, the light diesel engine has been placed on an equal footing with its rival the petrol motor. The manufacturers of diesels claim that this type of engine is more efficient than any other internal combustion motor and, if their claim can be substantiated, the future of the new road transport vehicle is assured.

It has been asked how heavy oil used in a diesel road engine can be discriminated from that employed for many other purposes. The answer is simple, for, under the existing law, kerosene occupies an exactly similar position. In other words, if a transport company or private motorist mixes kerosene with his petrol he must pay the full duty of 8d., whereas if the same kerosene is used for other purposes a duty of only 1d. per gal. is payable. The Excise authorities have successfully implemented this tax and rebate for a number of years and will presumably have no difficulty in making a similar arrangement for diesel oil. The most important aspect of the new tax, however, is contained in the announcement that diesel oil produced from coal is not subject to the duty.

Aviation petrol, diesel oil and fuel oil can all be produced from indigenous material by the process of low temperature carbonisation. The new tax, therefore, will stimulate the production of oil from British coal and must inevitably result in increased employment in the coalfields. In view of the present state of our international relations, it is somewhat disquieting to reflect that of the total world production of natural petroleum less than 1 per cent. is found within the British Empire. The National Government, therefore, is to be congratulated on the fact that it has again demonstrated the desire to promote the production of liquid fuels from our own resources.—Yours faithfully,

W. A. BRISTOW,
Chairman.
Low Temperature Coal Distillers Association of Great Britain.

CALCIUM ARSENATE IN PERU is used in large quantities as an insecticide, especially on cotton plants. In 1927, an American company, later purchased by Peruvian interests, initiated the practice of dusting cotton fields from aeroplanes. This company alone, which has dusted on the average some 30,000 acres yearly, accounts for the consumption of 110 to 125 short tons of calcium arsenate each year, representing approximately 15 per cent. of the total amount used in the country.

Notes and Reports from the Societies

Chemical Engineering Group

Annual Meeting and Dinner

THE sixteenth annual general meeting and dinner of the Chemical Engineering Group was held at the Waldorf Hotel, London, on April 26, Dr. W. R. Ormandy (chairman of the Group) being in the chair. The report recorded another successful year in which much had been accomplished. The membership, which had dropped slightly in the previous year, was again on the up-grade, the number being 438 as compared with 435 the year previously. It was pointed out that chemical industry, in common with every other industry, had been passing through a difficult time, but that there was positive evidence of a genuine improvement in trade, and the hope was expressed that the membership of the Group would show a welcome increase. Members were asked to make a personal effort to introduce new members.

Thanks were offered to the committee for their whole-hearted co-operation in promoting the welfare of the Group, and particularly to Mr. D. McDonald, who relinquished the hon. secretaryship owing to ill-health. The policy of holding joint meetings with local sections and with other subject Groups had been pursued and proved successful. During the year, visits were paid to the Birmingham, Liverpool and Yorkshire Sections and meetings were held jointly with the London Section, with the Food, Plastics and Road and Building Materials Groups, and with the Institution of Chemical Engineers, the Institution of Structural Engineers and the Institute of Fuel. The Group also took part in a large joint meeting organised by the Institution of Automobile Engineers, in which some ten other kindred societies also joined. The accounts showed a sound financial position. The committee expressed appreciation of the support and encouragement it had received from the council of the Society of Chemical Industry, and also of the work of the assistant secretary, Mr. C. J. T. Mackie, and his staff.

Election of Officers

The following were elected to fill vacancies on the general committee: C. S. Garland, J. M. Macqueen, Dr. W. R. Ormandy, Dr. A. J. V. Underwood and Professor S. G. M. Ure. The officers were elected as follows: Chairman, Mr. Stanley Robson; hon. secretary, Mr. J. M. Leonard; hon. treasurer, Mr. F. A. Greene. A vote of thanks was accorded to Dr. Ormandy, who had served the Group as chairman during the past year, contrary to the advice of his doctor.

At the annual dinner the members and their guests were addressed by Lieut.-Colonel Sir Arnold T. Wilson, M.P., who had stepped into the breach at short notice owing to the fact that Lord Amulree, who had promised to speak, had recently undergone an operation. Sir Arnold Wilson presented the case against self-government in industry. (His speech is reported in pp. 422-423.)

Mr. J. F. RONCA, who proposed the toast of "The Society of Chemical Industry," said that if one reviewed its activities one became quite convinced that it was fulfilling to the utmost the injunction to do good to all men. The members of the Society were the chemist Marthas, who were doing good to their brothers and their more distant relatives, the sons of Mary.

Mr. EDWIN THOMPSON (president of the Society), in the course of his response, said that the formation of the Chemical Engineering Group had done more than anything else he could remember to ginger-up the Society. It had given the Society a really healthy stimulus and it was the fore-runner of other Groups.

Mr. H. W. CREMER proposed the toast of the guests and Mr. W. A. S. CALDER (president-elect of the Society of Chemical Industry) responded.

Mr. J. M. LEONARD (hon. secretary of the Group) proposed the toast of the chairman and said it had been one of the fondest desires of the members that Dr. Ormandy should become chairman. Until the last year, one circumstance after another had prevented the fulfilment of that desire. In spite of ill-health, Dr. Ormandy had consented to take office and had been a gracious chairman throughout the year.

Dr. ORMANDY, in his response, said he had enjoyed doing the little he had been able to do, and he was grateful for the fact that he had been able to make a heap of good friends.

Society of Chemical Industry

Newcastle Section: Annual Meeting

THE annual meeting of the Newcastle Section of the Society of Chemical Industry was held on April 26, with Professor G. R. Clemo, vice-president, in the chair. The Saville Shaw Memorial Medal was presented to Dr. E. E. Aynsley in recognition of his investigation of the reaction between hydrogen and sulphur. The reports of the treasurer and secretary were adopted, and the officers for next session were announced as follows: Chairman, Mr. M. P. Applebey; secretary, Mr. J. W. Craggs; treasurer, Mr. B. P. Hill; vice-chairman, Professor Clemo; committee as last year, with the replacement of the two retiring members, Mr. Walmsley and Dr. Braunholtz, by Dr. P. L. Robinson and Mr. Halliwell. The meeting considered the draft agreement between the three principal chemical organisations. The chairman referred to the meeting of the section last year, which was the subject of an article in THE CHEMICAL AGE, and outlined the proposals since circulated; these were explained further by Dr. J. T. Dunn, and, after expressions of agreement by most of the members, a resolution was passed approving the proposals for agreement and regarding it as a first step towards ultimate fusion.

Royal Institution

Annual Meeting

THE annual meeting of the Royal Institution was held on May 1. In the absence of the president, Lord Eustace Percy, the chair was taken by the hon. secretary, Major C. E. S. Phillips. The annual report of the visitors showed a further increase in membership. An important change had been made in the method of admission of the public to the courses of afternoon lectures, by which single lecture tickets could now be purchased; and a ticket not used for the course for which it had been issued would admit to a lecture of any other course.

The report of the Davy Faraday Research Laboratory of the Royal Institution, directed by Sir William Bragg, showed substantial progress in the researches during the year. As in previous years, these had been largely on problems connected with the structure of organic molecules. The work of Dr. A. Muller and Mr. R. E. Clay, Dr. J. M. Robertson, Mr. B. W. Robinson, Dr. W. H. J. Childs and others was referred to. "It has been interesting to observe," the report states, "that each determination of a new structure strengthens the conviction that the distances that separate the atoms in the molecule are very nearly constant from molecule to molecule." The relations which are being ascertained are of value, it is suggested, "because they give precision to chemical ideas and lend themselves to mathematical calculation."

The following officers were elected: President, Lord Eustace Percy; treasurer, Sir Robert Robertson; secretary, Major Charles E. S. Phillips. Managers: Professor E. N. da C. Andrade, Sir Frederick Berryman, Sir James Crichton-Browne, Professor F. G. Donnan, Dr. C. V. Drysdale, Professor Alfred Fowler, Mr. J. S. Highfield, Mr. C. H. Merz, Mr. Emile S. Mond, Sir Richard Paget, Professor A. O. Rankine, Dr. G. C. Simpson, Mr. W. J. Tennant, Mr. R. S. Whipple and Mr. James Whitehead. Visitors: Dr. F. H. Carr, Mr. H. T. Davidge, Major F. A. Freeth, Captain A. C. Goolden, Captain H. L. Hitchins, Professor F. L. Hopwood, Mr. Arthur Jaffe, Mr. James Kewley, Mr. Arthur Marshall, Dr. E. H. Rayner, Dr. Godfrey Rotter, Professor G. P. Thomson, Major W. S. Tucker, Mr. Frank Twyman and Colonel W. A. Vignoles.

EXPORTS OF SODIUM FERROCYANIDE from Netherlands, which during 1933 declined to 652 metric tons from 1,825 tons in 1932, increased to 725 tons in 1934. The United States became the leading buyer, increasing purchases from 202 to 473 tons, while Great Britain, which took 273 tons in 1933, dropped to 56 tons in 1934. Other purchasers in 1934 included Japan, 55 tons; Poland, 31 tons, and Spain, 17 tons.

Their Majesties the King and Queen passing the offices of "The Chemical Age" on their memorable drive to St. Paul's Cathedral on Monday, to attend the Thanksgiving Service for the completion of Twenty-Five years of their Reign.

Manufacture of Pumping Machinery

Worthington-Simpson, Ltd.

THE history of Worthington-Simpson, Ltd., and their achievements in various parts of the world is one of the most interesting in engineering circles. The business was established in 1790 by James Simpson, and works were set up in Eccleston Street, London. The founder of the enterprise became civil engineer to the Chelsea Water Works, and received the higher appointment of engineering adviser to the British Government. In 1838 the business was transferred to larger premises in Belgrave Road, and thence to Grosvenor Road, where a large and complete plant was laid down. At these works were built the pumps for the New River Water Works, the London Water Companies, and for the water works of many of the capitals of the world. In 1866 the business was converted into a private limited liability company, and it became necessary to erect extensive new works at Newark-on-Trent in 1900. To-day, the Worthington-Simpson works cover an area of about 15 acres, with workshops containing the most modern plant and machinery, and giving employment at the present time to about 1,200 men.

The works are about three miles from Newark, situated adjacent to the Newark-Nottingham section of the London and North-Eastern Railway. The offices are situated at the end of the works and include large and well-equipped drawing offices accommodating approximately 100 draughtsmen and technical assistants. The ironfoundry is understood to be the largest in the Midlands, and is equipped in the most up-to-date manner with the latest appliances.

Among the specialities for which Worthington-Simpson, Ltd., are famous are their castings, and there is a laboratory in connection with the iron and brass foundries, in which research work is carried on to determine the very best mixtures for the various castings which are in continuous demand for special requirements. At the present time, Worthington-Simpson, Ltd., are devoting considerable attention to the manufacture and use of high-tensility cast iron—tensile strengths of 25 tons being now called for in many cases. The foundry is suitable in every way for dealing with castings of weights up to 40 tons. The height of the erecting shop is arranged to allow for the erection of the huge triple-expansion waterworks engines for which the firm has become famous.

Large condensing plant of fabricated mild steel shell construction has recently been completed for the Shanghai Power Company, the steel being of special copper-bearing quality to resist corrosion. Adjoining the erecting shop is the pump test house. Transformers are installed so that any desired voltage is available. The pumps are put through the most exacting tests and the discharge is measured over calibrated rectangular weirs. A boiler is provided for supplying steam to the steam pumps at a pressure of 300 lb. per sq. in., and a superheater is installed to impart 200° F. of superheat.

Among the many machines manufactured is the horizontal duplex pump, used for general purposes in addition to being extensively used for boiler feeding. The type "N" vertical duplex pump is a comparatively new type and is a distinct advance in design, being particularly suitable for high-speed work.

The Chemical Age Lawn Tennis Tournament

Draw for the First Round

ENTRIES for the fifth annual CHEMICAL AGE Lawn Tennis Tournament closed last week and the draw for the first round was made during the week-end. We invite all who have been drawn to play matches in the preliminary and first rounds to arrange their fixtures without delay in accordance with the rules of the tournament. The closing date for the first round is Monday, June 10 (Whit Monday), but if all the results are received before that date it may be possible to expedite the second and subsequent rounds and thus to obviate inconvenience due to the holiday season.

There are prospects of an interesting season, as a number of players who have participated in the tournament in previous years, including winners of the cups, are again competing, while a considerable proportion of new players are appearing in the tournament for the first time. THE CHEMICAL AGE silver challenge cups will be presented to the winners of the doubles and singles, to be held for twelve months, and smaller trophies will be presented outright both to the winners and runners up.

Players are requested to read carefully the brief rules of the tournament, copies of which have been supplied to them, and adhere to them, as failure to do so may lead to disappointment. For ready reference the principal rules may be summarised as follows.

Summary of the Rules

The competition is conducted on the knock-out principle, and the best of three advantage sets are to be played in all matches, except in the final of the singles, when the best of five sets may be played. The Editor of THE CHEMICAL AGE has the right to scratch any players who fail to play off their matches by the stipulated dates, or who otherwise fail to conform with the rules and regulations.

Except in the case of the final, players drawn against each other must make their own arrangements for playing off their matches on a court mutually agreed upon. In the event of disagreement, the first name drawn has the right to choose the ground.

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

Having found their position in the draw, all that the players now have to do is to write or telephone each other, decide on a suitable date, time and ground, play their matches and forward the results to us in accordance with the rules. Results of the first round matches and details of the draw for the second round will be published as soon as the first round is completed.

Appended are details of the draw. The first name or names drawn has the right to choose the ground.

Singles

Preliminary Round

MATCH 1.

Munns, Albert Edward. Paper Goods Manufacturing Co., Westmead Road, Sutton, Surrey. (Sutton 3562.)
v
Francis, B. T. Bakelite, Ltd., 68, Victoria Street, London, S.W.1. (Victoria 5441.)

MATCH 2.

Backinsell, William G. C. Le Grand Sutcliff & Gell, Ltd., The Green, Southall, Middx. (Southall 2211.)
v
Porter, R. F. Howards & Sons, Ltd., Uphall, Works, Ilford, Essex. (Ilford 1113.)

MATCH 3.

Smith, P. Bakelite, Ltd., 68, Victoria Street, London, S.W.1. (Victoria 5441.)
v
Lewis, A. Stafford Allen and Sons, Ltd, 7, Cowper Street, Finsbury, London, E.C.2. (Clerkenwell 2100.)

MATCH 4.

Jones, John I. T. The Mond Nickel Co., Ltd., Thames House, Millbank, London, S.W.1. (Victoria 5353, Ext. 8.)
v
Hudson, J. Bakelite, Ltd., 68, Victoria Street, London, S.W.1. (Victoria 5441.)

MATCH 5.

Hayman, R. D. Doulton & Co., Ltd., Lambeth, London, S.E.1. (Reliance 1241.)
v
Window, J. Spencer Chapman & Messel, North Woolwich Road, Silvertown, London, E.16. (Albert Dock 2168, Ext. 11.)

MATCH 6.

Blow, D. G. The British Drug Houses, Ltd., 16-30, Graham Street, City Road, London, N.1. (Clerkenwell 3000, Ext. 23.)
v
Lusty, H. H. Bakelite, Ltd., 68, Victoria Street, London, S.W.1. (Victoria 5441.)

MATCH 7.

Grape, L. F. Borax Consolidated Ltd., Regis House, King William Street, London, E.C.4. (Mansion House 8332.)
v
Pritchard, F. Le Grand Sutcliff and Gell, Ltd., The Green, Southall, Middx. (Southall 2211.)

MATCH 8.

Baxter, Albert. The United Yeast Co., Ltd., 238, City Road, London, E.C.1. (Clerkenwell 0303.)
v
Thompson, V.D. Stafford Allen & Sons, Ltd., 7, Cowper Street, Finsbury, London, E.C.2. (Clerkenwell 2100.)

MATCH 9.

Copp, C. G. Doulton & Co., Ltd., Lambeth, London, S.E.1. (Reliance 1241.)
v
Marcar, A. S. Bovril, Ltd., 148-166, Old Street, London, E.C. (Clerkenwell 1202.)

First Round

Match 1 winner. (Munns or Francis.) *v* Match 2 winner. (Backinsell or Porter.)

Match 3 winner. (Smith or Lewis.) *v* Match 4 winner. (Jones or Hudson.)

Match 5 winner. (Hayman or Window.) *v* Match 6 winner. (Blow or Lusty.)

Match 7 winner. (Grape or Pritchard.) *v* Match 8 winner. (Baxter or Thompson.)

Match 9 winner. (Copp or Marcar.) *v* **Rhead, Alan V.** Chance & Hunt, Ltd., Oldbury, Birmingham. (Broadwell 1521.)

Alldis, W. L. Brandhurst Co., Ltd., Vintry House, Queen Street Place, London, E.C.4. (Central 1411.)
v
Stewart, Ronald. Central Pulverising Co., Ltd., 32-34, Thomas Street, London, E.14. (East 6964.)

Bruce, R. N. B. D Gas Light and Coke Co., No. 1 Laboratory, Fulham, London, S.W.6. (Fulham 5531, Ext. 10.)
v
Bennett, R. A. J. Nobel Chemical Finishes, Ltd., Wexham Road, Slough, Bucks. (Slough 528, Ext. 210.)

Coller, R. H. Stafford Allen & Sons, Ltd., 7, Cowper Street, Finsbury, London, E.C.2. (Clerkenwell 2100.)
v
Tickner, A. British Celanese, Ltd., 22-23, Hanover Square, London, W.1. (Mayfair 8000, Ext. 137.)

Seabrook, L. J. The British Oxygen Co., Ltd., Angel Road, Edmonton, London, N.18. (Tottenham 2488.)
v
Law, R. S. Howards & Sons, Ltd., Uphall Works, Ilford, Essex. (Ilford 1113.)

Hughes, A. E. Limmer and Trinidad Lake Asphalt Co., Ltd., Artillery House, Artillery Row, London, S.W.1. (Victoria 8313.)
v
Collins, Arthur C. Sparklets, Ltd., Angel Road, Upper Edmonton, London, N.18. (Tottenham 2647.)

Songhurst, C. J. Bakelite, Ltd., 68, Victoria Street, London, S.W.1. (Victoria 5441.)
v
English, Chas. S. H. Johnson & Co., Ltd., Carpenters Road, Stratford, London, E.15. (Maryland 3657.)

Dearman, P.E. British Oxygen Co., Ltd., Angel Road, Edmonton, London. (Tottenham 2488.)
v
Maronge, L. Bakelite, Ltd., 68, Victoria Street, London, S.W.1. (Victoria 5441.)

Hawley, F. G. Anglo-Persian Oil Co., Britannic House, Finsbury Circus, London. (National 1212.)
v
Whittaker, H. R. Williams (Hounslow), Ltd., Hounslow, Middx. (Hounslow 1166.)

Sleap, Reginald Joseph. United Yeast Co., Ltd., 238, City Road, London. (Clerkenwell 0303.)
v
Haines, J. Anglo-Persian Oil Co., Ltd., Britannic House, Finsbury Circus, London. (National 1212.)

Wilson, J. S. British Celanese, Ltd., 22/23, Hanover Square, London, W.1. (Mayfair 8000, Ext. 137.)
v
Lewis, Evan Prosser. Stafford Allen & Sons, Ltd., Cowper Street, London, E.C.2. (Clerkenwell 2100.)

Verney, G. E. The Pyrene Co., Ltd., Great West Road, Brentford. (Ealing 3444.)
v
Robbins, William A. Le Grand Sutcliff & Gell, The Green, Southall, London. (Southall 2211.)

Doubles

First Round

Haines, J., & Hawley, F. G. Anglo-Persian Oil Co., Ltd., Britannic House, Finsbury Circus, London. (National 1212.)
v
Dearman, P. E., & Seabrook, L. J. British Oxygen Co., Angel Road, Edmonton, London, N.18. (Tottenham 2488.)

English, Chas., & Woodforde, Leslie. S. H. Johnson & Co., Ltd., Carpenters Road, Stratford, London, E.15. (Maryland 3657.)
v
Tinkler, R., & Triggs, A. E. Murex Welding Processes, Ltd., Ferry Lane Works, Forest Road, London, E.17. (Larkswood 2284.)

Willshere, A. E., & Grape, L. F. Borax Consolidated, Ltd., Regis House, King William Street, London, E.C.4. (Mansion House 8332.)
v
Wilson, J. S., & Tickner, A. British Celanese, Ltd., 22/3, Hanover Square, London, W.1. (Mayfair 8000, Ext. 137.)

Backinsell, W. G. C. & Pritchard, F. Le Grand Sutcliff & Gell, Ltd., The Green, Southall, Middx. (Southall 2211.) *v*

Shaw, J. A., & Stanford, G. Johnson, Matthey & Co., Ltd., 73/83, Hatton Garden, London, E.C.1. (Holborn 6989.) *v*

White, F. C., & White, A. W. Howards & Sons, Ltd., Ilford, Essex. (Ilford 1113.) *v*

Copp, C. G., & Hayman, R. D. Doulton & Co., Ltd., Lambeth, London, S.E.1. (Reliance 1241.) *v*

Allen, F. R. O., & Bennett, R. A. J. Nobel Chemical Finishes, Ltd., Wexham Road, Slough, Bucks. (Slough 528, Ext. 210.) *v*

Bruce, R. N. B. D., & Badger, E. H. M. Gas Light and Coke Co., No. 1 Laboratory, Kings Road, Fulham, S.W.6. (Fulham 5531, Ext. 10.)

Steel, Henry A., & Grosse, F. G. Society of Chemical Industry, Central House, Finsbury Square, London, E.C.2. (Met. 3773.)

Lusty, H. H., & Songhurst, C. J. Bakelite, Ltd., 68, Victoria Street, London, S.W.1. (Victoria 5441.)

Lewis, A., & Thompson, V. D. Stafford Allen & Sons, Ltd., 7, Cowper Street, Finsbury, London, E.C.2. (Clerkenwell 2100.)

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

Byes

Blow, D. G., & Cripps, V. G. The British Drug Houses, Ltd. 16/30, Graham Street, City Road London, N.1. (Clerkenwell 3000.)

Almond, E. G., & Barnett, G. Bakelite, Ltd., Redfern Road, Tyseley, Birmingham. (Acocks Green 1181.)

Prosser, V. J., & Baxter, A. John Haig & Co., Ltd., 2, Pall Mall East, London, S.W.1. (Whitehall 1040.)

George, R., & Pennington, R. C. J. Crosfield & S n , Ltd., Bank Quay, Warrington. (Warrington 800.)

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

Harbour, S., & Webb, A. J. Williams (Hounslow), Ltd., Hounslow, Middx. (Hounslow 1166).

Maronge, L., & Hudson, J. Bakelite, Ltd., 68, Victoria Street, London, S.W.1. (Victoria 5441.)

Sibley, Harold A. C., & Collins, Arthur C. The British Oxygen Co., Ltd., Angel Road, Upper Edmonton, London, N.18. (Tottenham 2488.

Continental Chemical Notes

Bulgaria

THE 1934 OPIUM HARVEST amounted to six tons as against four tons in 1933.

Poland

LIQUID CARBON DIOXIDE IS TO BE PRODUCED and marketed by the "Fluid" Company, recently registered with a capital of 1 million zloty.

Jugoslavia

THE AREA UNDER POPPY CULTIVATION is reported to be over 8,000 hectares, and the opium yield is estimated at 100,000 kg. A carry-over of 50,000 kg. still remains from last year's harvest.

Russia

FOLLOWING EXPERIMENTAL WORK ON PEAT CARBONISATION, plans are being drawn up for a plant with an annual throughput of 15,000 tons. One ton dried peat, it is stated, yields 300 kilos coke, 500 cubic metres gas with a calorific value of 4,000 to 4,300 calories, 15 litres benzol and other hydrocarbons.

Germany

THE DEUTSCHE SOLVAY WERKE A.G. increased its net profits from 3.16 million marks in 1933 to about 4 million marks in 1934, distributing an increased dividend of 5 per cent. (4 per cent. previously).

ABSOLUTE ALCOHOL is in regular production at the Leverkusen works of the I. G. Farbenindustrie A.G. by a process based upon passage of aqueous alcohol vapour over calcined or finely powdered gypsum. The latter is converted into the semi-hydrate without losing its powdered condition, and is eventually regenerated in a drying drum at a temperature of 175 to 185° C. The absolute alcohol vapour is conducted through a filter which entirely retains the gypsum dust. According to E. Belani ("Chem. Apparatur," 1935, No. 3, 25), 70,000 litres of absolute alcohol are produced in 24 hours, starting from 94 per cent. alcohol, with a yield of 99.8 per cent.

France

A GAS-TREATING PLANT FOR FRUIT AND VEGETABLES is reported to have been installed at Bordeaux. The gas mixture in general use comprises 7 parts carbon dioxide and one part ethylene oxide, but corn is treated with carbon bisulphide.

THE OUTPUT OF FRENCH ROSIN PRODUCTS declined 15 to 20 per cent. in 1934, as compared with the previous year. Actual production figures for 1933 were 60,000 to 65,000 tons rosin and 20,000 tons oil of turpentine.

RE-DISTILLED MAGNESIUM is much more chemically active than the ordinary commercial metal reports Remy-Gemmete. It decomposes water at the ordinary temperature, the reaction proceeding for several hours until the metal becomes coated with magnesia. On exposure to pure and dry carbon dioxide, the metal gradually absorbs the gas at the ordinary temperature with formation of a small quantity of magnesium carbide ("Bull. Soc. Chim.," December, 1934).

Roumania

CALCIUM CHLORIDE gives a quantitative yield of hydrochloric acid when reacted with hydrogen in presence of silica and ferric oxide at a temperature of 1,000° C. The process was developed at the Polytechnic School, Timisoara, by C. Candea and I. G. Murgulescu. With a view to utilising methane-containing natural gas, the reaction was studied with methane in place of hydrogen, when the satisfactory yield of 90 per cent. was achieved at an operating temperature of 900° C. ("Chimie et Industrie," April).

Italy

A PROCESS FOR PRODUCING CARBON TETRACHLORIDE by direct chlorination of carbon bisulphide utilises gaseous or liquid chlorine under pressure and operates at a temperature avoiding formation of intermediate chlorinated derivatives. It depends upon the presence of a catalyst selected from an element of the third or fourth periodic group (Italian Pat. 308,932).

PLANS HAVE BEEN APPROVED for a new department to produce chlorinated naphthalene, chlorinated rubber and chlorinated derivatives of oils and resins in the works of Soc. Elettrica ed Elletrochimica del Caffaro (Milan). A concession has also been granted to Cobalti and Derivati S.A., of Genoa, to construct plant for the production of cobalt, cobalt salts, cobalt oxide and (as by-products from the foregoing) arsenic acid, arsenic sulphide and nickel sulphate.

Lancashire Industrial Activities

An Exceptional Storage Tank

THE Lancashire Industrial Development Council reports that a Bolton firm of structural engineers, John Booth and Sons (Bolton), Ltd., has recently secured an order for an all-welded storage tank of rather exceptional size. It will have to hold 2,000,000 gal. of oil, representing a contents weight of 8,415 tons. The tank's principal dimensions are 100 ft. diameter and 40 ft. high, while the roof, which is conical in shape, will be supported on braced girders. All the joints in this tank will be welded, the plates being sent to the site and welded together in position.

Walmsleys (Bury), Ltd., are building and erecting for Edward Lloyd, Ltd., two paper machines each of which will be the largest of its kind in the world. One is a Fourdriner paper machine having a wire width of 320 in., while the other is a super calender, which will not only be the largest but the fastest in the world.

The manufacture and use of plastic materials are often regarded as introductions of the last few years, and it will surprise some people to learn that a Preston firm, Attwater and Sons, has been producing synthetic resin, mouldings and laminated sheet for some 20 years. This company uses weekly 15,000 lb. of cotton cloth impregnated with plastic material out of which are pressed thousands of timing gears for a well-known motor company, as well as other products. Laminated Bakelite produced by the firm is used on every British warship, and Bakelite boards are being supplied to many overseas countries.

Pottery Printing Tissue Paper

Chemical Preparation

IN a paper read before the Ceramic Society (Pottery Section) at Stoke-on-Trent on April 8, Mr. B. J. Bell stated that the principal materials substituted for rags in the paper-making industry are Esparto grass, sulphite wood pulp and "ground wood" or mechanical pulp. Pottery printing tissue is one of the few papers still made entirely from rag. This term includes any flax, hemp or cotton material. The paper has great strength, especially strength when wet, absorbency to take the colours, freedom from hard substances and from surface fibres or fluff. Also it comes away from the ware readily on soaking in water as well as being reasonably white. These qualities are obtained by chemical preparation of the material and by careful "beating" in the mill so as to draw out the fibres, preserving a reasonable length on which the strength depends, but at the same time splitting the fibres into fibrillæ which bind the sheet together.

Ream paper is moistened with soap size before application to the engraved copper plate, and the composition of the oily colour mix has much to do with the result achieved. Where roll paper is used no such sizing takes place, the precision obtainable being somewhat inferior.

Testing in the paper mill is done by instruments which test the strength of the paper in the dry state; tensile strength (both in the length direction and in the cross direction); elongation, bursting strength and resistance to tearing. Absorbency is determined by various means, one of the simplest being the measuring of the rate at which air can be drawn through the paper under a given manometric head.

Brussels International Exhibition

British Chemical Exhibit

BRITISH-MADE chemicals occupy a prominent position in the British Government Pavilion at the Brussels International Exhibition which opened on April 27 and will close early in November. This exhibit has been organised by the Association of British Chemical Manufacturers on a national basis. It is of exceptional interest in that so comprehensive a view of the greatness of the British chemical industry has not been available to the general public for many years. All sections of the industry have co-operated in its organisation and industrial firms have sunk their identity in order that the display might be truly national.

The exhibit is comparatively small, but so numerous and varied are the chemicals on show and so numerous and varied are their uses that the visitor obtains a striking picture of what the chemical industry means and of the key position it occupies relative to other industries. Chemical products are utilised at some point in every factory; in its construction, in the machinery or in the processes carried out therein, or in the control of its products. To visitors from this country the exhibit should prove of special attraction, for it displays in a vivid manner some of the recent advances that have been made in British chemical factories, for example, in the domains of dyestuffs and of fine chemicals, two branches that scarcely existed here before the war, and in other sections that are quite new to this or any other country.

The exhibit is divided into six main sections grouped round a central octagon: Heavy chemicals, agricultural chemicals, dyestuffs, coal tar products, fine chemicals and pharmaceutical chemicals. There are also exhibits of rayon and of the products of the new plastics or synthetic resin industry.

Although the display includes a wide range of chemicals of every description, it has been designed more particularly to show, by a series of tableaux, the modern applications of some of them in industry. Thus, although acids and alkalies of every kind are prominent in the heavy chemical section, a special feature is made of the new uses of sodium carbonate and sodium cyanide in the treatment of metals and of the latest methods of water purification, using ammonia, chlorine, lime and soda, for industrial and other purposes.

In the agricultural section are seen not only a complete range of fertilisers, but also the many chemicals available to the farmer for the protection of his crops and his flocks against the ravages of insect and other pests. Again, in the dyestuffs section, a vast number of colours manufactured for the textile industry are associated with exceptionally pure dyes for oils, fats, food and medical purposes. In the pharmaceutical section will be seen a special display of biological products, including vitamins, hormones and sera, which play so important a part in the fight against disease, together with exhibits of medicinal dyes, veterinary medicines, alkaloids and other products employed in the prevention and treatment of human and animal ailments.

The section devoted to fine chemicals demonstrates the remarkable progress of this branch of British chemical manufacture in the past 25 years and displays a selection of the more recent developments in solvents and plasticisers, stains and indicators, analytical and research chemicals, rare earths, essential oils and phosphorus derivatives. The coal tar section is also of special interest from the manner in which the main differences between the tars obtained from high- and low-temperature carbonisation are exemplified, and because of the effective indication of the value of creosote for the preservation of timber and of tar for road construction.

National Certificates in Chemistry

Arrangements and Conditions of Award

ARRANGEMENTS and conditions for the award of national certificates in chemistry to students in technical colleges and schools in England and Wales are set out in a leaflet just issued by the Board of Education (H.M. Stationery Office, price 2d.). The Institute of Chemistry is undertaking the functions assigned to it under the scheme at the invitation of the Board of Education. The Institute in conjunction with the Board is prepared to approve schemes, submitted by technical colleges or schools, for the award of certificates relating to part-time grouped courses in chemistry conducted under approved conditions. To avoid possible misunderstanding, the certificates will bear a statement indicating that they are distinct from the Associateship and Fellowship Diplomas awarded by the Institute. Experience gained in the working of schemes for full-time courses led the Institute and the Board to the conclusion that the continuance of arrangements for the award of certificates for these courses was not justified. Students who are undergoing full-time training should be advised to work for a University degree and/or the Associateship of the Institute of Chemistry.

Courses for the purpose of a part-time course certificate under the rules must be carried on for at least 180 hours in each year. If the instruction is given exclusively in evening classes, the course should, as a rule, be carried on for three evenings a week during the school session. Schemes for the joint approval of the Institute and the Board must be submitted in accordance with instructions set out in the leaflet. Before approving a scheme, the Institute and the Board will require to be satisfied as to the equipment of the school, the qualifications of the staff, and the curriculum and syllabuses of instruction in the several subjects.

Distinction may be awarded to any candidate qualified to receive a Part-time Course Certificate in Chemistry (Higher), who gains not less than 80 per cent. of the possible marks in the final examination in any subject, other than a technological or applied subject, of the final year of the course. Subject to the previous approval of the Institute and the Board, a candidate may take in the final examination any branch of chemistry or of applied chemistry studied in an earlier year of the course, but not in the final year, and may be awarded distinction in any branch of pure chemistry so taken, provided the conditions of this paragraph have been fulfilled. The certificate will record any award of distinction.

For the present, the following scale of fees has been adopted: Part-time Course Certificate.—Fee to be paid by the college or school authorities in respect of each group of candidates entered for a final examination of a senior or advanced course: Senior:—In respect of the first group 5 guineas. In respect of each additional group, for each subject which is not taken in the first or a subsequent group 1½ guineas. Advanced:—In respect of the first group 5 guineas In respect of each additional group, for each subject which is not taken in the first or a subsequent group 1½ guineas. Fee to be paid in respect of each candidate entering for a final examination 7s. 6d.

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

ALPHA CELLULOSE, manufacture.—J. Sala Pou. Oct. 21, 1933. 35401/33.

ZIRCONIUM SANDS AND ORES, concentration.—Zircon Rutile, Ltd. Oct. 16, 1933. 28218/34.

COPPER ALLOYS, and methods of heat-treating the same.—Osnabrücker Kupfer-und Drahtwerk. Oct. 18, 1933. 28799/34.

INTERMEDIATE PRODUCTS, manufacture.—Soc. of Chemical Industry in Basle. Oct. 17, 1933. 29151/34.

PIGMENTS, and their manufacture.—Krebs Pigment and Color Corporation. Oct. 16, 1933. 29520/34.

PYRIDINE DYESTUFFS, manufacture.—I. G. Farbenindustrie. Oct. 18, 1933. 29709/34.

ACETATE ARTIFICIAL SILK, printing.—Soc. of Chemical Industry in Basle Oct. 21, 1933. 29834/34.

RUBBER VULCANISATES, manufacture of dense, soft or hard.—Dr. H. Ziegner. Oct. 18, 1933. 29835/34.

DYEINGS ON WOOL, discharging.—Soc. of Chemical Industry in Basle. Oct. 21, 1933. (Cognate application, 29968/34.) 29967/34.

DYESTUFFS of the anthracene series, manufacture.—I. G. Farbenindustrie. Oct. 19, 1933. 30044/34.

HYDROCARBONS, reduction.—E. I. du Pont de Nemours and Co. Oct. 20, 1933. 30250/34.

ALCOHOLS from germinal gland hormones, manufacture.—Schering-Kahlbaum A.-G. Oct. 21, 1933. (Cognate application, 30298/34.) 30297/34.

Specifications Accepted with date of Application

DYEING OF TEXTILES.—Deutsche Hydrierwerke A.-G. July 12, 1932. (Cognate application, 19746/33.) 427,089.

INTERMEDIATES FOR DYES, manufacture.—Imperial Chemical Industries, Ltd., and E. G. Beckett. Aug. 18, 1933. 427,251.

VINYL ETHERS, manufacture and production.—J. Y. Johnson (I. G. Farbenindustrie). Oct. 16, 1933. (Addition to 369,297.) 427,036.

MAGNETIC ALLOYS.—Heraeus Vacuumschmelze A.-G. Dec. 6, 1932. 427,205.

DYEINGS on the fibre, process for producing.—Soc. of Chemical Industry in Basle. Jan. 16, 1933. 427,208.

BARIUM SULPHATE and composite titanium pigments containing the same, production.—Titan Co., Inc. March 7, 1933. 427,220.

ALKYL SULPHATE ESTERS for the production of alcohols and ethers, hydrolysis.—N. A. Sargent. May 12, 1933. 427,223.

PHENOL, production.—Rütgerswerke A.-G., and L. Kahl. May 10, 1933. 427,145.

MONO-OXYCHRYSENE, manufacture.—Soc. of Chemical Industry in Basle. June 30, 1933. 427,236.

ZINC BASE ALLOY.—New Jersey Zinc Co. April 9, 1934. 427,238.

COLLOIDAL SOLUTIONS, precipitation of materials.—Kodak, Ltd. Aug. 22, 1933. 427,155.

DYESTUFFS, manufacture.—I. G. Farbenindustrie. July 25, 1933. 427,241.

META-CRESOL from liquid phenolic mixtures containing it, separation.—Monsanto Chemical Co. Nov. 25, 1933. 427,246.

CELLULOSIC PIGMENTS, production.—E. I. du Pont de Nemours and Co. Aug. 24, 1933. 427,248.

CARBONACEOUS MATERIALS, destructive hydrogenation of solid.—International Hydrogenation Patents Co., Ltd. Sept. 29, 1933. 427,275.

ZIRCONIUM ALLOYS.—Electro Metallurgical Co. May 16, 1934. 427,076.

FORMIC ACID, process for concentrating.—R. Koepp and Co. Chemische Fabrik A.-G. Sept. 30, 1933. 427,079.

2-KETO-LAEVO-GULONIC ACID, process for the manufacture.—T. Reichstein. Oct. 25, 1933. 427,286.

1-PHENYL-2.3-DIMETHYL-4-ISOPROPYL-5-PYRAZOLONE, process for the manufacture of compounds.—F. Hoffmann-La Roche and Co., A.-G. Jan. 8, 1934. 427,296.

4-ALKYL-4-CYCLOALKYL and 4-aralkyl-di-hydro-resorcinols, process for the manufacture.—F. Hoffmann-La Roche and Co., A.-G. Jan. 20, 1934. (Addition to 416,892.) 427,297.

Applications for Patents

(April 18 to 24 inclusive).

SAPONIFYING MATERIALS made from cellulose esters, process.—Aceta Ges. (Germany, April 21, '34.) 12186.

FILMS, ETC., from cellulose esters.—H. A. Auden, Distillers Co., Ltd., and H. P. Staudinger. 12011.

BLEACHING WOOD PULP, ETC.—A. Danninger. 12022.

DISSOLVING CELLULOSE, ETC.—R. L. Davies. 12009.

COUMARIN, ETC., preparation of derivatives.—L. S. E. Ellis. 12243.

DYESTUFFS OF ANTHRAQUINONE SERIES, manufacture.—W. W. Groves. 12037.

DITERPENES, manufacture.—Howards & Sons, Ltd., and W. E. Huggett. 12036.

4-HYDROXYPYRENE, manufacture.—I. G. Farbenindustrie. (Germany, April 19, '34.) 12185.

THIXOTROPES, treating.—I. G. Farbenindustrie. (Germany, April 21, '34.) 12196.

HYDROGEN FROM GAS MIXTURES, recovery.—J. Y. Johnson. 12209.

AQUEOUS DISPERSIONS OF ANHYDRIDES OF FATTY ACIDS, manufacture.—J. Y. Johnson. 12211.

CELLULOSE DERIVATIVES, manufacture.—L. Lilienfeld. 12183, 12184.

COPPER, ETC., bronzing.—Metallwerke A.-G. Dornach. (Germany, May 2, '34.) 12390.

COPPER, ETC., bronzing.—Metallwerke A.-G (Germany, May 2, '34.) 12390.

UNSATURATED MONOHALIDES, treatment.—Naamlooze Vennootschap de Bataafsche Petroleum Maatschappij. (United States, April 27, '34.) 12066.

ALUMINIUM ALLOYS.—Northern Aluminium Co., Ltd. 12379.

ANTI-CORROSIVE FILMS on aluminium, etc., production.—Peintal Soc. Anon. (Switzerland, April 25, '34.) 12330, 12331.

DESTRUCTIVE HYDROGENATION OF COAL.—H. E. Potts (International Hydrogenation Patents Co., Ltd.) 12157.

HYDROGENATION PRODUCTS of follicle hormones, manufacture.—Schering-Kahlbaum A.-G. (Oct. 26, '33.) 12079.

PROPYLENE OXIDE, production.—Soc. Française de Catalyse Généralisée. (France, April 24, '34.) 12353.

QUARTERNARY AMMONIUM SALTS, manufacture.—Soc. of Chemical Industry in Basle. (Switzerland, April 23, '34.) 12187, 12188.

New Chemical Trade Marks

Compiled from official sources by Gee and Co., patent and trade mark agents, Staple House, 51 and 52 Chancery Lane, London, W.C.2.

Opposition to the registration of the following trade marks can be lodged up to May 24, 1935.

Cromodine. 557,789. Class 1. Chemical substances for the treatment of metal surfaces so as to obtain improved resistance to corrosion of the surfaces when subsequently painted. Nobel Chemical Finishes, Ltd., Imperial Chemical House, Millbank, London, S.W.1. February 7, 1935.

Alda. 558,700. Class 1. Calcium carbide. The British Oxygen Co., Ltd., Angel Road, Upper Edmonton, Middlesex. March 11, 1935.

Umbrador. 558,394. Class 1. Chemical substances for steeping colouring and brightening textile fabrics and leather in the course of their manufacture. H. Th. Bohme Akt., 29 Moritzstrasse, Chemnitz, Saxony, Germany. February 28, 1935.

Opposition to the registration of the following trade marks can be lodged up to June 1, 1935.

Floxive. 558,527. Class 1. Chemical substances used in manufactures, photography, or philosophical research, and anticorrosives. Hadfields (Merton), Ltd., Western Road, Mitcham, Surrey. March 6, 1935.

Sunalba. 559,034. Class 1. Paints enamels (in the nature of paints), varnishes and distempers. Craig and Rose, Ltd., 172 Leith Walk, Leith, Edinburgh, 6. March 23, 1935.

Verdasan. 558,122. Class 2. Chemical substances used for agricultural, horticultural, veterinary, and sanitary purposes. British Dyestuffs Corporation, Ltd., Imperial Chemical House, Millbank, London, S.W.1. February 19, 1935.

Books Received

Optical Rotatory Power. By T. M. Lowry. London: Longmans, Green and Co. Pp. 484. 30s.

Origins and Development of Applied Chemistry. By J. R. Partington. London: Longmans, Green and Co. Pp. 597. 45s.

Weekly Prices of British Chemical Products

Review of Current Market Conditions

PRICES of chemical products have remained steady during the week, the only change in general chemicals being a rise of 2d. per lb. in the price of cadmium sulphide. Unless otherwise stated, the prices below cover fair quantities net and naked at sellers' works.

LONDON.—There is no change in the general heavy chemical market. In the coal tar products section prices remain unchanged except in the case of benzol and solvents which have been increased by a penny per gal. owing to the rise in the price of petrol.

MANCHESTER. — The Jubilee celebrations have had a noticeable effect on trading conditions on the Manchester chemical market during the past week. Contract deliveries have naturally been reduced in consequence of the closing of consuming works, and there has been a falling off in the placing of new business. In other respects, however, conditions appear to be fairly healthy. Sellers are disposed to look for reasonably active buying during the next two or three months—at all events, until the holidays begin to make their influence felt. At the moment new business in heavy chemicals is only on a moderate scale, but some acceleration of the demand is anticipated during the next few weeks. Meanwhile, apart from the interruption this week deliveries are being steadily maintained in most directions, and here and there are reported to be improving slightly, whilst price conditions are generally steady. Business in the by-products this week has been moderate.

SCOTLAND.—Business in the Scottish heavy chemical market during the past week has been exceptionally brisk, and prices have remained unchanged.

Price Changes

General Chemicals.—CADMIUM SULPHIDE, 3s. 4d. to 3s. 8d. per lb.

Pharmaceutical Chemicals.—ATROPINE SULPHATE, 11s. 11d. per oz.

Essential Oils.—SANDLEWOOD, Australian B.P., 92/95%, 15s. 3d. per lb.

Coal Tar Products.—MOTOR BENZOL (London), 1s. 3½d. per gal., f.o.r.; SOLVENT NAPHTHA (London), 1s. 3½d. to 1s. 4½d. per gal., f.o.r.

All other prices remain unchanged.

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.—10¼d. 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°, £24 ex station full truck loads.

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

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

ACID, TARTARIC.—1s. per lb. less 5%, carriage paid for lots of 5 cwt. and upwards. MANCHESTER: 1s. 0⅜d. per lb.

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

ALUMINA SULPHATE.—LONDON: £7 10s. to £8 per ton. SCOTLAND: £7 to £8 ex store.

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

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

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

AMMONIUM CARBONATE. SCOTLAND: Lump, £30 per ton; powdered, £33, in 5-cwt. casks d/d buyers' premises U.K.

AMMONIUM CHLORIDE.—LONDON: Fine white crystals, £18 to £19. (See also Salammoniac.)

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

ANTIMONY OXIDE.—SCOTLAND: Spot, £34 per ton, c.i.f. U.K. ports.

ANTIMONY SULPHIDE.—Golden, 6⅞d. to 1s. 3d. per lb.; crimson, 1s. 5½d. to 1s. 7½d. per lb., according to quality.

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

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

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

BARYTES.—£6 10s. to £8 per ton.

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

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

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

CADMIUM SULPHIDE.—3s. 4d. to 3s. 8d. per lb.

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

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

CARBON BLACK.—3⅞d. to 4⅞d. 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.—£3 19s. per cwt. less 2½%. LONDON: £3 17s. per cwt. SCOTLAND: £4 2s. less 2½%.

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

DIPHENYLGUANIDINE.—2s. 2d. per lb.

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

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

LAMPBLACK.—£45 to £48 per ton.

LEAD ACETATE.—LONDON: White, £34 10s. per ton; brown, £1 per ton less. SCOTLAND: White crystals, £33 to £35; brown, £1 per ton less. MANCHESTER: White, £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.—7⅞d. to 8½d. per lb. for delivery up to December 31.

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

POTASSIUM BICHROMATE.—Crystals and Granular, 5d. per lb. less 5% d/d U.K. Discount according to quantity. Ground. 5¼d. 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 10s.

POTASSIUM CHROMATE.—6½d. per lb. d/d U.K.

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

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

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

POTASSIUM PRUSSIATE.—LONDON: Yellow, 8¼d. to 8¾d. per lb. SCOTLAND: Yellow spot, 8½d. ex store. MANCHESTER: Yellow. 8¼d.

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

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

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

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

SODIUM ACETATE.—£22 per ton. LONDON: £22. SCOTLAND: £20.

SODIUM BICARBONATE.—Refined spot, £10 10s. per ton d/d station in bags. SCOTLAND: Refined recrystallised £10 15s. ex quay or station. MANCHESTER: £10 10s.

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

SODIUM BISULPHITE POWDER.—60/62%, £20 per ton d/d 1-cwt. iron drums for home trade.

SODIUM CARBONATE, MONOHYDRATE.—£15 per ton d/d in minimum ton lots in 2 cwt. free bags. Soda crystals, SCOTLAND: £5 to £5 5s. per ton ex quay or station. Powdered or pea quality, 7s. 6d. per ton extra. Light Soda Ash £7 ex quay, min. 4-ton lots with reductions for contracts.

SODIUM CHLORATE.—£32 10s. per ton.

SODIUM CHROMATE.—4d. per lb. d/d U.K.

SODIUM HYPOSULPHITE.—SCOTLAND: Large crystals English manufacture, £9 5s. per ton ex stations, min. 4-ton lots. Pea crystals, £14 10s. ex station, 4-ton lots. MANCHESTER: Commercial, £10 5s.; photographic, £14 10s.

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

SODIUM IODIDE.—B.P., 6s. per lb.

SODIUM NITRITE.—LONDON. Spot, £18 to £20 per ton d/d station in drums.

SODIUM PERBORATE.—10%, 9¾d. per lb. d/d in 1-cwt. drums. LONDON: 10d. per lb.

SODIUM PHOSPHATE.—£13 per ton.

SODIUM PRUSSIATE.—LONDON: 5d. to 5½d. per lb. SCOTLAND: 5d. to 5⅜d. ex store. MANCHESTER: 5d. to 5½d.

SULPHUR.—£9 15s. to £10 per ton. SCOTLAND: £8 to £9.

SODIUM SILICATE.—140° Tw. Spot £8 per ton. SCOTLAND: £8 10s.

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

SODIUM SULPHATE (SALT CAKE).—Unground spot, £3 12s. 6d. per ton d/d station in bulk. SCOTLAND: Ground quality, £3 5s. per ton d/d. MANCHESTER: £3 2s. 6d.

SODIUM SULPHIDE.—Solid 60/62% Spot, £10 15s. per ton d/d in drums; crystals 30/32%, £8 per ton d/d in casks. SCOTLAND: For home consumption, Solid 60/62%, £10 5s.; broken 60/62%, £11 5s.; crystals, 30/32%, £8 7s. 6d., d/d buyer's works on contract, min. 4-ton lots. Spot solid 5s. per ton extra. Crystals, 2s. 6d. per ton extra. MANCHESTER: Concentrated solid, 60/62%, £11; commercial, £8 2s. 6d.

SODIUM SULPHITE.—Pea crystals spot, £13 10s. per ton d/d station in kegs. Commercial spot, £8 15s. d/d station in bags.

SULPHATE OF COPPER.—MANCHESTER: £14 10s. to £14 15s. per ton f.o.b.

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

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

VERMILION.—Pale or deep, 4s. 5d. to 4s. 7d. per lb.

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

ZINC SULPHATE.—LONDON: £12 per ton. SCOTLAND: £10 10s.

ZINC SULPHIDE.—11d. to 1s. per lb.

Coal Tar Products

ACID, CARBOLIC.—Crystals, 7¾d. to 8¼d. per lb.; crude, 60's, 1s. 1½d. to 2s. 2½d. per gal. MANCHESTER: Crystals, 7¾d. to 8d. per lb.; crude, 2s. 1d. per gal. SCOTLAND: 60's 2s. 6d. to 2s. 7d.

ACID, CRESYLIC.—90/100%, 1s. 8d. to 2s. 3d. per gal.; pale 98%, 1s. 6d. to 1s. 7d.; according to specification. LONDON: 98/100%, 1s. 4d.; dark, 95/97%, 1s. SCOTLAND: Pale, 99/100%, 1s. 3d. to 1s. 4d.; dark, 97/99%, 1s. to 1s. 1d.; high boiling acid, 2s. 6d. to 3s.

BENZOL.—At works, crude, 8½d. to 9d. per gal.; standard motor, 1s. 2d. to 1s. 2½d.; 90%, 1s. 3d. to 1s. 3½d.; pure, 1s. 6½d. to 1s. 7d. LONDON: Motor, 1s. 3½d. SCOTLAND: Motor, 1s. 6½d.

CREOSOTE.—B.S.I. Specification standard, 5½d. to 5¾d. per gal. f.o.r. Home, 3¾d. d/d. LONDON: 4½d. f.o.r. North; 5d. London. MANCHESTER: 4¾d. to 5½d. SCOTLAND: Specification oils, 4d.; washed oil, 4¼d. to 4⅜d.; light, 4½d.; heavy, 4½d. to 4½d.

NAPHTHA.—Solvent, 90/160%, 1s. 6d. to 1s. 7d. per gal.; 95/160%, 1s. 6d.; 99%, 11d. to 1s. 1d. LONDON: Solvent, 1s. 3½d. to 1s. 4½d.; heavy, 11d. to 1s. 0½d. f.o.r. SCOTLAND: 90/160%, 1s. 3d. to 1s. 3½d.; 90/190%, 11d. to 1s. 2d.

NAPHTHALENE.—Purified crystals, £10 per ton in bags. LONDON: Fire lighter quality, £3 to £3 10s.; 74/76 quality, £4 to £4 10s.; 76/78 quality, £5 10s. to £6. SCOTLAND: 40s. to 50s.; whizzed, 70s. to 75s.

PITCH.—Medium soft, 40s. per ton. LONDON: 45s. per ton, f.o.b. East Coast port. MANCHESTER: 37s. 6d. f.o.b. East Coast.

PYRIDINE.—90/140, 6s. to 8s. 6d. per gal.; 90/180, 2s. 3d.

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

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

Nitrogen Fertilisers

SULPHATE OF AMMONIA.—£7 5s. per ton; for neutral quality basis 20.6% nitrogen delivered in 6-ton lots to farmer's nearest station.

CYANAMIDE.—£7 5s. per ton delivered in 4-ton lots to farmer's nearest station.

NITRATE OF SODA.—£7 12s. 6d. per ton for delivery to June, 1935, in 6-ton lots, carriage paid to farmer's nearest station for material basis 15.5% or 16% nitrogen.

NITRO-CHALK.—£7 5s. per ton to June, 1935, in 6-ton lots carriage paid for material basis 15.5% nitrogen.

CONCENTRATED COMPLETE FERTILISERS.—£10 5s. to £10 17s. 6d. per ton according to percentage of constituents, for delivery up to June, 1935, in 6-ton lots carriage paid.

NITROGEN PHOSPHATE FERTILISERS.—£10 5s. to £13 15s. per ton.

Latest Oil Prices

LONDON, May 8.—LINSEED OIL was steady. Spot, £22 15s. per ton (small quantities); May, £20 5s.; June-Aug., £20 12s. 6d.; Sept.-Dec., £21 5s., naked. SOYA BEAN OIL was quiet. Oriental (bulk), May-June shipment, £22 12s. 6d. per ton. RAPE OIL was inactive. Crude extracted, £32 per ton; technical refined, £33 10s., naked, ex wharf. COTTON OIL was steady. Egyptian crude, £24 10s. per ton; refined common edible, £28; and deodorised, £30, naked, ex mill (small lots £1 10s. extra). TURPENTINE was firm. American, spot, 58s. 6d. per cwt.

HULL.—LINSEED OIL, spot, quoted £21 5s. per ton; May, £20 15s.; June-Aug., £21; Sept.-Dec., £21 5s. COTTON OIL, Egyptian, crude, spot, £25; edible, refined, spot, £27 10s.; technical, spot, £27 10s.; deodorised, £29 10s., naked. PALM KERNEL OIL, crude, f.m.q., spot, £21 10s., naked. GROUNDNUT OIL, extracted, spot, £32 10s.; deodorised, £35 10s. RAPE OIL, extracted, spot, £31; refined, £32 10s. SOYA OIL, extracted, spot, £26 10s.; deodorised, £29 10s. per ton. CASTOR OIL, pharmaceutical, 40s. 6d. per cwt.; firsts, 35s. 6d.; seconds, 32s. 6d. COD OIL, f.o.r. or f.a.s., 25s. per cwt., in barrels. TURPENTINE, American, spot, 60s. 6d. per cwt.

Company News

British Match Corporation.—A final dividend of 4 per cent. is declared on the ordinary shares, making 6 per cent., free of tax, for the year to April 30 last.

National Drug and Chemical of Canada Co.—There is a loss of £5,260 reported for the year to January 31, 1935, which reduces the surplus balance to £47,753, of which £34,931 is transferred to contingencies reserve, leaving £12,821 to carry forward.

Crosfields Oil and Cake Co.—The net profit to March 31 last, amounted to £12,927 (against £6,201), plus £475 brought in. A dividend of 1s. 6d. per 10s. share, less tax, against 1s. last year, absorbs £11,625, leaving to be carried forward £1,777.

Park Gate Iron and Steel Co.—A dividend of 3 per cent. is announced for the year to March 31 last. This compares with 2 per cent. for the previous year and 1 per cent. for 1932-33. An amount of £35,000 has been written off for depreciation, and £20,000 is placed to reserve, against £10,000 a year ago.

Alexander, Ferguson and Co.—The report for 1934 shows a profit, after fees and taxation, of £22,212, against £20,768 last year. To this is added £14,425 brought forward, making £36,637; £5,000 to depreciation, leaving £13,637; dividend 12½ per cent., tax free, on "A" and "B" ordinary shares, and a bonus of 7½ per cent., tax free, leaving to be carried forward £14,925.

Goodlass Wall and Lead Industries.—The net trading profit and dividends, etc. received for 1934 totalled £239,316, compared with £237,344 for 1933, but as the latter figure included a profit of £20,885 arising from the realisation of investments, there was a rise of £22,858 in trading results. The ordinary dividend has been raised from 5 per cent. to 6 per cent. The staff pensions allocation is £5,000, against £10,000, and the carry-forward is up from £76,394 to £97,629.

Boots Pure Drug Co., Ltd.—The directors announce that, subject to audit, net profits for the year ended March 31 amounted to £750,037, as against £744,866 for the preceding year. In addition to the four interim dividends already paid amounting to 24 per cent., less tax, a bonus of 3d. per share (or 5 per cent.) free of tax, will be paid to shareholders registered in the books on May 2. This is the same distribution as paid for the past six years.

From Week to Week

MR. RALPH MARTIN BEWICK, of Caterham, Surrey, formerly director of the United Alkali Company, left £15,721 (net personalty £13,052).

MR. WALTER ELLIOT, Minister of Agriculture, speaking at a luncheon of the British Sugar Beet Society in London on May 2, gave an assurance that the question of the continuance of the sugar-beet subsidy would be fully and adequately examined.

THE TRADE NAME of the analytical balance and the gas-heated muffle furnace, manufactured by F. E. Becker and Co., was incorrectly spelt in THE CHEMICAL AGE of April 27. The correct name is "Nivoc" (not "Nivco").

MR. C. FROST, of Newport, has died. Mr. Frost left Newport for Rainham in 1883 to erect the acid chambers for the firm of Morris and Griffin, with whom he remained as manager and chemist until he retired in 1924.

A NEW RUBBER FACTORY is to be started in Travancore. It is proposed to manufacture rubber tyres and tubes, and the total output of the factory will amount to more than Rs.4 lakhs annually in value. The factory will be ready to start as soon as the electric cables for the supply of power are laid.

AN ORDER of March 18 exempts from the prohibition covering the importation into Spain of all types of sulphur dutiable under Tariff Nos. 853-5, special preparations of sulphur, such as colloidal, precipitated, and other forms of sulphur to be used for pharmaceutical or industrial purposes which are not specifically mentioned in the headings of the above-mentioned tariff numbers.

THE COMMITTEE appointed to consider the position that will arise on the expiry, in August, 1936, of the Key Industry duties has commenced its sittings. Any representations which consumers of articles or substances chargeable with Key Industry duty may desire to make to the committee relative to the duties should be addressed to the Secretary to the Committee, Board of Trade, Great George Street, S.W.1, not later than May 23.

THE SALERMO PROCESS of low-temperature carbonisation and the extraction of oil from oil shales and torbanites, is described in a brochure which has been issued by Salermo, Ltd. This brochure indicates the widespread search which is being made for sources of supply of liquid fuels from indigenous resources so as to secure for a nation a measure of independence from foreign supplies. A detailed account of the Salermo retort and of the method of retorting is given, together with results obtained in large scale operations.

MR. THEOPHILUS HORNER, of Southport, Lancs., manager of Cupal, Ltd., manufacturing chemists, Blackburn, left £3,600 (net personalty £3,526).

MR. ARTHUR STANLEY CLARK, research chemist for the past eleven years to the Washington Chemical Co., Co. Durham, has died, aged 45, at his home at Sunderland.

THE NEW SWIMMING BATH of the Thames House Squash Racquets Club was open for the first time on Thursday, when a number of visitors were the guests of the club for a bathing parade and refreshments.

A NEW SUPER BLAST FURNACE, built by Colvilles, Ltd., at the firm's Clyde Iron Works, Tollcross, Glasgow, was blown in on May 4. It will be capable of producing 2,000 tons of pig iron a week, and is the first of its kind in Scotland.

PURE COAL and its applications was discussed by M. Maurice F. Bertrand, Ingenieur Civil des Mines A. I. Lg. Sté Ame d'Ougrée-Marihaye (Belgium), in a paper read before the Institute of Fuel at Burlington House on April 30. The chair was taken by Professor W. A. Bone.

A PETITION presented to the High Court of Justice, Chancery Divisionfi on April 8, 1935, for confirming the reduction of the capital of Hadfields, Ltd., from £2,500,000 to £1,570,108 by cancelling capital which has been lost or is unrepresented by available assets is to be heard before Mr. Justice Luxmoore on May 28.

THE FIRST INTERIM REPORT of the Engineers' Study Group, on schemes and proposals for economic and social reforms, will be presented at a meeting of the British Science Guild on Thursday, May 16, at 5.30 p.m., in the Lecture Theatre of the Institution of Civil Engineers, Great George Street, Westminster. The report will be presented in brief by Lt.-Col. J. V. Delahaye, and will be followed by a discussion.

MANCHESTER EDUCATION COMMITTEE offers a limited number of scholarships and exhibitions tenable in any one of the three years' full-time day courses leading to the degree of Bachelor of Technical Science (B.Sc.Tech.) at the Municipal College of Technology (Faculty of Technology in the University of Manchester). Forms of application and all information may be obtained by written application to the Registrar, College of Technology, Manchester, 1. Completed forms of application must be received on or before June 20.

Forthcoming Events

LONDON

May 13.—Society of Chemical Industry (London Section). "Some Lines of Research in Chemotherapy." Professor F. L. Pyman. 8 p.m. Annual general meeting. Burlington House, Piccadilly, London.

May 15.—British Chemical and Dyestuffs Traders' Association, Ltd. 12th annual general meeting. 2.30 p.m. London.

May 15.—Society of Chemical Industry (Road and Building Materials Group). "Chemical Research in the Road and Building Industries." Discussion. Annual general meeting. London.

May 15.—Electrodepositors' Technical Society. Spring meeting. Third William James Memorial Lecture. "The Evolution of the Plating Bath." 8.15 p.m. Northampton Polytechnic Institute, St. John Street, Clerkenwell, London.

May 16.—Chemical Society. Discussion on "The Significance of Phosphoric Esters in Biochemical Processes," opened by Professor R. Robison. 8 p.m. Burlington House, Piccadilly, London.

May 17.—Royal Institution. Conversazione. 8.30 p.m. 21 Albemarle Street, London.

FOLKESTONE

May 16-18.—Fourth British Glass Convention. Presided over by Geoffrey L. Pilkington. Folkestone.

NEWCASTLE-ON-TYNE

May 17.—Institute of Chemistry. (Newcastle-on-Tyne Section). Joint meeting with Bedson Club. "The Importance of the Minute Trace." Dr. G. Roche Lynch.

STOKE-ON-TRENT

May 13.—Ceramic Society. Annual General meeting of the Pottery Section. 7.30 p.m. Annual general meeting of the Society. 8 p.m. North Staffordshire Technical College, Stoke-on-Trent.

Commercial Intelligence

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

Companies Winding-Up Voluntarily

TOWER DYEING CO., LTD. (C.W.U.V., 11/5/35.) By special resolution April 25. Albert Chadwick, 16 Bolton Street, Bury, appointed liquidator.

AGDEN SALT WORKS, LTD. (C.W.U.V., 11/5/35). By reason of its liabilities April 23. Richard Caton de Zouche, 8, Cook Street, Liverpool, 2, appointed liquidator.

BYROM DYEING CO., LTD. (C.W.U.V., 11/5/35). Creditors' debts or claims by June 3, 1935, to John McRobbie Petrie, Martins Bank Buildings, Bacup, liquidator of the company.

UNIVERSAL LATEX PRODUCTS, LTD. (C.W.U.V., 11/5/35). By special resolution April 30. Arthur Rawlins, of Smallfield, Rawlins, Lindsay Fynn and Co., 1 Ironmonger Lane, London, E.C.2, appointed liquidator.

BROUGHTON GLASS WORKS, LTD. (C.W.U.V., 11/5/35). Creditors' debts or claims by May 31 to Charles Ernest Garnett, Lloyds Bank Chambers, Lord Street, Rochdale, liquidator of the company.

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).

Brazil.—A well-known doctor in Sao Paulo desires the representation of United Kingdom manufacturers of high-class pharmaceutical products. (Ref. No. 425.)