The Chemical Age

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Notes and Comments

Factory Cleanliness

CLEANLINESS in the factory—the subject of a joint discussion from the sanitary and chemical points of view, at the Royal Sanitary Institute last week—has become one of the strongest selling points in the food industry. Those of us who have been privileged, as members of the consuming public and more especially as representatives of the Press, to visit some of the model factories for the production of foodstuffs in this country have been tremendously impressed by the high standard of cleanliness attained by the manufacturers, and the sub-conscious influence of that impression upon our preferences in the retail shop and at the meal table has been unmistakeable. Primarily, of course, cleanliness in the food factory is essential from the health and chemical standpoint, and, as Sir Isidore Salmon observed during last week's discussion, it must not merely be like beauty—skin deep. It is receiving considerable and increasing attention from Government Departments and from scientific organisations, and examples of carelessness in the handling and manufacture of foods are becoming more and more rare.

We are well aware that certain cleanliness "stunts" may be stages on the occasion of public visits to factories, but we are convinced that these merely serve to emphasise, and certainly not to misrepresent, the care and attention normally bestowed upon the products when the doors are closed. There is undoubtedly a great advertising advantage about the scrupulously clean factory, and in these days of precise accounting methods it would seem only fair to suggest that a part of the cost of cleanliness measures should be debited to advertising and part to cost of production. It would be interesting to know if this is, in fact, done by any of the concerns which encourage organised visits or whether the total cost is added to the amount shown for production alone.

The Memory of Frankland

PROFESSOR H. E. ARMSTRONG, the oldest living pupil of Sir Edward Frankland, the distinguished chemist, has consented to become the founder-president of a new organisation inaugurated at Lancaster last week to perpetuate the memory of that great master. Frankland had associations with Lancaster in his early life, receiving part of his education at the Royal Grammar School, and serving his apprenticeship to the profession, which he was later to adorn. Mr. W. French and a few other admirers of Frankland have taken the initial step to form the new organisation, the exact nature of which is still to be determined, having as its object, the payment of the honour due to a great man. They set the ball rolling last week, very auspiciously, when at a short notice, both senior and junior members of the profession of chemistry assembled at Lancaster to meet Professor Armstrong, who paid a generous tribute to Frankland, whose contribution to the general well-being of the community, through his work to secure for the nation pure water supplies, must ever remain an outstanding fact in history.

Professor Armstrong does not wish the new body to become merely a society or organisation, meeting together occasionally, to sing the praises of their hero. It is his view that they, as chemists, and others too, who are entitled to become associated with them—Frankland not having been merely a chemist—should honour him by following his lead and seeking by research and experiment, to find a solution to some other point which at present is perplexing many minds. Professor Armstrong pointed out that the question of a pure and better milk supply was one which offered wonderful scope, and suggested that if the organisation to be formed could give a lead in this direction which would result in discoveries beneficial to the community, it would be the best type of memorial to the famous chemist. A meeting is to be held to appoint officials, decide upon the constitution, and arrange a programme. The success of the organisation seems assured. It has the blessing of each of the firms in Lancaster who have chemists on their staff, and also appeals to the practising chemists, one of whose number prepared Frankland for his life's work, by accepting him as an apprentice, and giving him an abundance of work to occupy his attention.

Industry and Taxation

THE heavy burdens imposed on industry by high taxation have again been under review by the Federation of British Industries, whose membership includes several representatives of the chemical manufacturing firms in this country, and a series of recommendations have been prepared for submission to the Chancellor of the Exchequer. In the opinion of the taxation committee of the Federation, the most important relief which can be given would be by lowering the high rate of income tax and surtax and taking further steps in the direction of drastic economies in order to make this possible. In addition, it is felt that considerable relief to industry would be effected by a further increase in the rates of allowance for wear and tear of machinery. This is not a new principle, as the last Finance Act granted an addition of 10 per cent. to the ruling rates, and the Federation feels that the principle might well be extended. It was also decided that efforts should again be made to secure some reduction of the duty on light hydrocarbon oils, in-so-far as such oils are used in manufacturing processes.

Similarly, it was decided that support should be given to any recommendation made by the interests concerned protesting against the excessive rate of duty on spirits and beer. The Federation will continue to press for the equitable taxation of co-operative societies. Considerable importance is attached to the deterrent effect on industry of the drastic and penalising legislation which in certain circumstances imposes surtax on the whole of the profits of a large number of companies to the extent that surtax would have been payable by the members if the whole of such profits had been distributed to them. This is a direct discouragement to the setting aside of adequate reserves. Suggestions have been formulated by which to amend the law with a view to removing this penal element.

The Profession of Engineering

"ENGINEERING is the most universal profession," declares the foreword of a pamphlet prepared by the Education Research Committee of the American Engineering Foundation. Addressed to young men and to parents and teachers, the pamphlet, entitled "Engineering: A Career—A Culture," clarifies for youth the broad field of engineering. The professional functions of the engineer are stated with the precision which accompanies intimate knowledge of engineering in theory and practice. The major divisions of engineering are dealt with from this standpoint, the text being "descriptive of the profession of engineering—of its spheres of action, of the training and the qualities required for its successful pursuit; of the obligations which it imposes, and the rewards which it affords." The pamphlet carries the discussion of engineering as a profession to higher levels than have yet been attained by works of this character. The cultural aspects of engineering, too long obscured, are clearly brought out. The authors put no limitations upon the cultural possibilities inherent in engineering, which in this respect they rank with the fine arts. In so doing they dissipate illusions as to the quality and direction of the engineering mind. "Contrary to common opinion," they say, "engineering education possesses cultural values comparable to those which inhere in the fine arts. The significance of engineering is made clear in order to aid a young man in deciding whether through this profession he can realise his ideals and ambitions." An authoritative and comprehensive exposition of the engineer's vocation has combined realism with romance, utility with culture.

The objective being guidance to prospective professional engineers, the pamphlet describes generally the opportunities of engineering as a whole and the personal qualities which are required. A chapter of six pages presents chemical engineering as a fascinating field for students possessing perseverance, brains and imagination. The work of the chemical engineer is revealed as something which transcends mere professional tasks. The student is reminded that the industrial applications of chemical processes, and hence the opportunities for chemical engineers, are much more widespread than is generally supposed. For instance, they play important parts in nine of the fifteen groups into which American industry is divided for census purposes, and as yet the chemical engineer is only occupying a portion of the field open to him. The development of chemical industry and the related chemical process industries is so rapid that the chemical engineer finds himself confronted constantly by new problems, and even the young chemical engineer may find himself a pioneer.

The Prince's Appeal

To those employers of labour in the chemical industry who are favourably placed as regards current orders and forward contracts, there is no need to commend the Prince of Wales's recent broadcast appeal for united efforts by men and women of good will to support the activities of the National Council of Social Service on behalf of the unemployed, unless it be for financial help. They will naturally absorb labour to the extent of their present production capacity. But there is a great deal more in this personal service drive than some people realise. The Prince of Wales himself has laid the foundations of progress in this direction, and there are signs that Great Britain has begun a new era of voluntary help for its army of unemployed. The Rotary movement with its "Service above Self" motto, has got a little nearer to business with its numerous local drives for employment. By collecting and announcing all the little things done by everybody, the Rotary Clubs are spreading a spirit of activity and enterprise, which in its turn serves to promote more trade. How can the chemical and allied trades help in this new enterprise? Whilst there are definite indications of a forward movement in the British chemical plant industry, conditions will have to improve considerably before any appreciable absorption of the unemployed can be anticipated, but there remains the possibility of little bits of work being found here and there, the cumulative effect of which would be to act as a powerful stimulus to the whole industry.

We therefore invite our readers to register in our columns week by week all the extra bits of work they put in hand to help employment at this juncture. Benn Brothers, Ltd., publishers of THE CHEMICAL AGE have contributed to the movement in recent months by adding two new journals—"Television" and "The Laundry World"—to their group of publications. If developments of this nature are practicable in the publishing world, we believe corresponding enterprise is possible in the industry which we serve. One firm in the industry reports that it is a little busier at the moment, with several interesting contracts in hand, and others have expressed their sympathy with the spirit of the Prince's appeal. We hope that the industry generally will enable us to record its individual efforts to put the appeal into practice.

Synthetic Rubber

New Soviet Method of Production

THE Russian State Institute of Applied Chemistry in Leningrad has reported to the Soviet Government its success in obtaining synthetic rubber from acetylene. The Leningrad branch of the Scientific Research Institute of the Rubber Industry has carried out tests of samples of this synthetic rubber and claims that it is better than synthetic rubber obtained from other raw materials and in some properties it is superior to natural rubber. Cost of production of synthetic rubber from acetylene, they state, will be considerably lower than of rubber obtained by other methods. Abundance of natural resources necessary for this kind of rubber, limestone and coal, should permit large scale production of this commodity at an early date.

The Functions and Training of a Chemical Engineer

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Speaking at a joint meeting of the Liverpool Section of the Society of Chemical Industry and the Liverpool and North-West Section of the Institute of Chemistry, at the University of Liverpool on January 20, Professor W. E. Gibbs attacked the existing system by which chemists are trained. His observations are fully reported below.

TO-DAY, industry is being transformed in all directions through the work of the chemist. His processes strike at the very foundations of industry by bringing about the physical or chemical transformation of the materials themselves. He makes possible the utilisation of new raw materials—*e.g.*, the atmosphere, cellulose, coal—thus increasing the available wealth of the world. He provides industry with entirely new substances—artificial silk, solvents, resins, lacquers, alloys—many of which become starting points for new industries. Not only the technique of production, but also the economic structure of industry, is being drastically altered as a result of the impact of chemistry upon it.

The chemist is the man who matters in industry to-day. It is to him that industry should look for inspiration and leadership. He should be playing an active part in its control and administration. His advice should be sought by the large financing houses. He should be at once the apostle and the architect of the new order. But, unfortunately, the facts are quite otherwise. At a time when industry depends increasingly upon the chemist for its inspiration and development, he is a person of but little account. Although he discovers new processes or new materials, it is left to others to work them out, however inefficiently, and develop their industrial possibilities. The manufacturer regards him as a useful but obscure member of his production staff, rather lacking in initiative and driving power. In every direction, the chemist, although skilful and efficient at his job, is singularly ineffective in his contact with industry. This in a chemical age presents a striking anomaly. It is also something of a calamity.

A Lack of Personality

What is the reason for it? I cannot think that it is to be attributed to a lack among chemists of men of the right kind of personality. I think it is due in the first place to the kind of training the chemist receives in many of our colleges, and in the second place to the unfortunate attitude that is adopted towards him by many manufacturers who have had to pay for his lack of industrial ability. He may be intellectually capable and also possess the right kind of personality, but, unless he has been specially trained in the methods by which his special knowledge can be applied under industrial conditions, it will take him a long time to become a really useful member of the production staff.

Probably seventy per cent. of the students trained in any school of chemistry in this country are destined for some kind of industrial career. It is not unreasonable, therefore, to assume—in fact, they have a right to expect—that the training they receive at college shall fit them to play their part effectively in industry, *i.e.*, to carry out on an industrial scale the operations which they have studied in miniature in the laboratory, and to take an intelligent interest in the organisation and adminstration of an industrial community. Many people appear to think, however, that the modern university exists solely for the purposes of culture and research. They ignore the fact that practically every student attends a university to-day to be trained for some profession, whether it be teaching, medicine, engineering or chemistry. The courses in medicine and engineering are framed with that end in view, and are definitely vocational in scope and spirit. The chemist and, perhaps, the physicist, is peculiar in that he is still trained to be a natural philosopher rather than a man of affairs. When he takes his degree and goes out into the world, he knows practically nothing about the practice of his profession. He knows nothing, for example, of works conditions, of co-operating with labour or of the primary importance of costs. Naturally, he is worth very little, is paid accordingly and relegated to an obscure laboratory and given a subordinate position in the works. To his employer, he is rather a weird specialist who must be provided with an unusual kind of workshop. His analytical reports, important though they may be, are mere incidents in the production routine. The results of his researches, although potentially valuable, have to be developed at considerable expense before they become practical politics. By the time they have been so developed, the part played by the chemist, vital though it was, has become comparatively insignificant.

The Importance of Research

To the average manufacturer, production is a more important matter than analysis or even research. This is unfortunate for the laboratory-trained chemist, who so often has to follow where he should have led. It is much more unfortunate for the manufacturer who falls into the fatal error of underrating the value to his industry of the scientifically trained man, and consequently fails to obtain the very kind of co-operation that he most needs. He is unable to keep in touch with those scientific developments which closely affect his business. He is less enterprising and up-to-date than he might be. Ultimately, this means a loss to the whole community. Many manufacturers in this country fail, also, to appreciate the real function and importance of chemical research. During the war and immediately after it, some of them established research laboratories out of their excess profits, rather in the spirit of the man who puts a beautiful mascot on the bonnet of his car. It looks well, and it might bring him luck. You know what happened. Some of them made good; far too many of them failed, either because the personnel had received a lop-sided training and had no sense of proportion or because the manufacturer was impatient for results and tried to extract the golden egg from an immature bird.

The results of chemical research will never be utilised fully in this country until the chemist is properly trained and the manufacturer has learned by experience that the results of well directed research work, when intelligently and encouragingly applied, invariably lead to increased efficiency and prosperity. The first step to be taken towards a more effective utilisation of chemistry in industry is the introduction of a rational course of training, whereby the chemist will be taught a good deal less of the theory but a great deal more of the practice of his trade. Every chemist should be industrially minded, for his real business to-day is not to play at noughts and crosses with the physicist, but to take a leading part, along with financiers, engineers, economists and labour, in building up a highly efficient and well organised industrial community. He will not take his rightful place in industry until he has been trained to be effective as well as efficient. Only then will the manufacturer learn his real value and give him his proper task of direction and development. It is for the manufacturer in the first instance to take steps to see that the colleges provide him with the right kind of man, who can not only analyse his materials and investigate his problems but can also run his processes efficiently and give him sound advice as to their improvement or replacement.

Chemical Engineering

A direct result of the average chemist's lack of industrial training is the development of that curious hybrid, the chemical engineer. His job in life is to make good the deficiencies in the practical training of the chemist and the theoretical equipment of the engineer, in face of the special demands made by chemical industry for new and more efficient processes and plant.

Generally speaking, any industrial process in which a material is subjected to a physical or chemical change properly belongs to the domain of chemical engineering. This includes not only the design and operation of the necessary reaction vessels, but also the choice, arrangement and operation of the auxiliary plant by means of which the raw material and products are stored, measured and transported. When we consider the wide variety of raw materials, intermediates and products, and the numerous processes to which they may be subjected, the domain of chemical engineering appears to be all-embracing and almost without limit. Beneath this variety of material and multiplicity of processes, however, there is an underlying simplicity. Every chemical process is made up of certain unit operations, carried out in a proper sequence. If we ignore the complete chemical processes themselves and concentrate our attention upon the unit operations of which they are made up, we have something which is fundamental to all chemical industry. By studying these unit operations intensively from the standpoint of the design and operation of the corresponding unit plant, we obtain an intimate knowledge of the anatomy and articulation of every type of industrial chemical process.

Unit Operations

These operations provide the industrial counterpart of the chemist's skilful play in the laboratory with test tubes, beakers, flasks, filters, condensers, etc. The more important of these unit operations are:—

Physical.—Crushing and grinding; dissolving; filtering and settling; evaporating; drying; distilling; and crystallising, etc.

Chemical.—Oxidation, combustion, etc.; reduction, hydrogenation; nitration, chlorination, etc.; electrolysis; double decomposition; catalysis; and pyrolysis, etc.

We may regard these as the warp threads of the chemical engineering fabric, but when we study the design of the plant required to carry out one of these unit operations, we find that it depends upon three sets of factors:—

(1) *Physical and chemical.*—Fluid flow; heat transmission; mass action; heterogeneous equilibrium; surface energy (colloidal behaviour); electrochemistry, etc.

(2) *Engineering.*—Properties of constructional materials; methods of plant construction and erection; principles of plant arrangement and control.

(3) *Economic.*—Construction costs; operating costs.

These three sets of weft threads impart to the fabric its distinctive character and serve to distinguish it from the pure white fabric of chemistry which is unsullied by the intrusion of engineering economics. In industry, however, a process has not only to be chemically efficient; it has also to be a sound engineering job, and, after satisfying a long list of costs demands, both direct and indirect, still show a handsome profit.

Chemical engineering consists primarily in the application of the principles of physics, chemistry, mathematics and economics to the design and operation of these unit plants, in the selection of the necessary auxiliary plant, in the arrangement of the different unit plants and their auxiliaries in the complete scheme, and, finally, with the control and operation of the complete process.

Functions of the Chemical Engineer

A chemical engineer is essentially a chemist who has been trained to be industrially effective. To show that he is something more than a chemist, as at present understood—*i.e.*, that he is effective as well as efficient—he has to adopt the sub-title of engineer. He may be defined as a scientific man whose duty it is to plan the large-scale commercial operation of chemical processes, and to design and operate the plant required for the carrying out of the chemical reactions and physical changes involved. Every chemical process is at heart a chemical reaction between dissimilar molecules or ions. Upon the direction in which, and the extent to which, the reaction proceeds depends the success or failure of the process. The chemical engineer, therefore, must be familiar with the chemical reactions involved and be able to appreciate fully the physical and chemical conditions that are essential to the successful working of the process.

Generally speaking, the function of the chemical engineer is to transform a laboratory process into a profitable industrial undertaking. Pure chemical research is not his job, nor is the actual construction of plant, machinery or buildings. He should, however, be able fully to understand the results of chemical research work and appreciate their practical implications. He should also have a sound understanding of the engineering requirements of the complete process. He is to bridge the gap between the laboratory experiments and the large-scale production unit. By devising and carrying out suitable intermediate and semi-large scale experiments, he determines the precise effect of each departure from the laboratory conditions that is made necessary by the engineering or economic requirements of the production unit. Finally, he designs the full-scale units, selects suitable auxiliary plant and prepares the necessary lay-out and arrangement diagrams for the complete process. He co-operates with the chemists, the engineers, the costing and sales departments in checking the various requirements of the process. He superintends the erection of the plant, selects the necessary skilled and unskilled labour, and organises the starting up, the testing and the continued operation of the complete process. He works out the running costs and prepares a complete process specification and operating procedure.

It will, therefore, be observed that the functions of the chemical engineer, as I have defined them, are those of a mature and experienced professional man. Such a man is not produced simply by a particular kind of training—this can only teach him how to *become* a chemical engineer. He develops his special skill and effectiveness by experience, but the right kind of training is necessary in the first instance if he is to make the fullest and most effective use of his experience.

Training the Chemical Engineer

There are those who say, and with a considerable amount of truth, that a chemical engineer is born rather than made. In so far as he should be equipped with certain personal qualities, such as a firm will, a clear mind, a capacity for forming rapid yet sound judgments upon men and events, a talent for direction and leadership, a capacity for really hard work and an incurable optimism, the observation is sound. But everyone who has to do with the training of youth knows how the development of latent powers both of intellect and character depends very largely upon right training and opportunity. As far as possible, students who wish to become chemical engineers should be carefully selected in the first instance, not only for their intelligence but also for their personal qualities. They should then be trained adequately and in a rational manner.

I am frequently asked whether a chemical engineer should be trained in the first instance as a chemist or as an engineer. I hold the opinion emphatically that, in the first instance, he needs to be a first-class chemist. In the first place, chemical industry is concerned with chemical reactions; the calculation of the materials and energy requirements of a process and of the conditions for its successful operation demands a thorough knowledge of the principles of chemistry and of their applications. Although the design of chemical plant depends largely upon physical principles, yet the selection of materials and the maintenance of the plant, which are vital matters to so many processes, demand a wide knowledge of chemical behaviour. Secondly, chemistry is essentially a system of facts and of relations between facts which have to be committed to memory, whereas engineering is the skilful use of certain principles and must be learned by experience. A student, during his subsequent industrial career, has more opportunities to obtain a training in the practice of engineering than to obtain a systematic knowledge of chemistry.

A Sound Groundwork of Knowledge

At the present time, a student may acquire a knowledge of chemical engineering in a number of ways. He may graduate in pure chemistry at a university and obtain a junior position on the production staff in some works. At first, he is completely at a loss to know what to do or where to begin. Gradually, if he is of the right type, he will acquire the special knowledge and experience necessary for the particular job he has to do and begin to see the process from the chemical engineering standpoint. He will not necessarily study the fundamental chemical engineering principles upon which the design and operation of the plant are based—he may have neither opportunity nor the necessary guidance for that—consequently, the knowledge he gains tends to be somewhat superficial and is limited to the particular kind of process upon which he is engaged. This is a very slow method of gaining a wide or a deep acquaintance with the principles and practice of chemical engineering. At the outset, he is worth very little to his employer; all his experience is gained at his employer's expense; his usefulness, and, therefore, his value, to his employer develops slowly. Altogether, it is a thoroughly unsatisfactory arrangement, both for the chemist and for his employer.

Alternatively, he may join the staff of an up-to-date organisation which, realising the industrial shortcomings of its young recruits, organises a special course of training for them in the principles of chemical engineering. Here, the young graduate in chemistry will be encouraged to study the fundamental principles of such matters as fluid flow, heat transmission and the properties of constructional materials. He will get some training in a semi-technical laboratory in the development of chemical processes from the laboratory to the works scale. Such a training, to be effective, must be adequate in scope and not limited to a particular kind of process or plant. It must also be systematic and continuous, and combined with ample opportunity for applying and practising the knowledge that is gained. Expert assistance and advice for such training, if it is to be effective, must be a full-time job for teacher and student. This method costs the employer much more than the old system, but it certainly produces a better product. There is no doubt, however, that such a training can be carried out far more effectively in a properly equipped department of a university, which is designed and organised specifically for this purpose.

Post Graduate Study

This brings us to the third alternative, which is the post-graduate study of chemical engineering in a special laboratory at some university. Many graduates in chemistry take such a post-graduate course to-day. There are forty graduates, at the present time, taking a chemical engineering course in the Ramsay Memorial Laboratory of Chemical Engineering at University College, London. In such a laboratory the course is both comprehensive and systematic. The student is not only taught the fundamental principles of fluid flow and heat transmission, and of the design and operation of the different types of unit plant, but he is also shown, in the drawing office, in problems classes and in specially equipped laboratories, how to put these principles into practice. Such a thorough-going, systematic training in the theory and practice of chemical engineering produces a type of man who can go into industry and not only develop his full output of efficient service without undue loss of time, but, throughout his career, be better able to operate existing processes with a maximum of efficiency and also plan the profitable development of new ones. If the employer still wishes to give him a special training in some special branch of chemical engineering, here, at any rate, is first-class material to work upon.

This is the best method of training that is at present available in this country. It is, however, unnecessarily wasteful. Much of the teaching time in such a post-graduate course is taken up in dealing with theory and experimental work of an elementary character that should be taken in undergraduate years. I believe that it is possible, without taking from it anything that is vital, so to modify the undergraduate course in chemistry as to bring it more closely into touch with the realities of an industrial career. The average college course in chemistry contains too much theory of the wrong kind, too little of the right kind and not enough practice in laboratory and industrial method. The greater effectiveness of the engineer in industry is due mainly to the confidence he gains from knowing how to do his job. The chemist probably knows—or, at any rate, has been taught—far more theory; he may even, in theory, know all about the job the engineer is doing, but he has no plant sense—no flair for getting things done. The right kind of man, given time and opportunity, may, and frequently does, get over this initial disadvantage, but he would mature more rapidly and more effectively if he were properly prepared and guided in the first place.

An Outline of University Training

I consider that the university training of a chemist or a chemical engineer should occupy four years. The first three would lead to a general or ordinary B.Sc. in chemistry. In the fourth year, he would specialise in physical, inorganic or organic chemistry or chemical engineering, and take the Honours degree in the appropriate subject. Thereafter, he would carry out research or gain practical experience in his special subject. For the intermediate examination, he would, as at present, take chemistry, physics and mathematics. After the intermediate examination, the course leading to the general degree of B.Sc. would differ materially from the present degree course in chemistry. Much of the more advanced physical and organic chemistry would be relegated to the Honours year for those who wished to specialise in those subjects, and the course as a whole would be made more practical and better adapted to prepare the student for an industrial career.

In the first post-intermediate year, he would get a thorough, systematic training in the facts of inorganic and organic chemistry and in the principles of physical chemistry. Each course would have a strong experimental backing, both in the preparation and in the analysis of a wide range of substances and in the quantitative study of the effects of conditions upon chemical reactions. This training in chemistry would be supported by theoretical and practical courses in applied mechanics and the properties of matter, leading up to, and including, a preliminary study of the strength of materials and the flow of fluids. In the second year, he would be well grounded in the theory of chemical thermodynamics, chemical kinetics, heterogeneous equilibria and colloidal chemistry, and given a thorough training in their practical industrial applications. He would take special engineering courses in materials of construction, heat engines, in heat transmission and in the elements of machine drawing. He would also take a course in the principles of political economy and the organisation of modern industry and commerce, and should become familiar, either by training in a specially equipped industrial laboratory or by visits to suitable works, with the general design and operation of chemical process equipment.

The Design of Special Plant

After graduating B.Sc., he would read for Honours in either inorganic, organic or physical chemistry or chemical engineering. The Honours course in chemical engineering would consist of advanced courses dealing, from the chemical engineering standpoint, with the flow of fluids, the transmission of heat and the mechanical and chemical properties of constructional materials (including a course in practical metallography). These would lead up to a course in the principles underlying the design, construction and operation of the different types of unit chemical plant. The lectures would be supplemented by a good problems course, and by practical experience gained both in the laboratory and in some works. In the drawing office, he would study the design of special plant and the preparation of arrangement diagrams. In the problems class, he would get ample experience in industrial calculations and in the construction of flow sheets and balance sheets for materials and energy and costs in industrial chemical operations.

The course of training suggested for the ordinary degree would prepare a chemist for a general industrial career, and, if he wished to specialise in development work and in the design and operation of special plant required for new processes, he would take Honours in chemical engineering, either immediately after his first degree or after he had spent a few years in a works. He would tend to become a research or development chemical engineer, as distinct from an operating chemical engineer.

If chemists were trained in the way I have suggested, they would, on entering the chemical engineering laboratory, already possess an elementary knowledge of the subject. This would make it possible to dispense with preliminaries and deal more thoroughly with the principles of chemical engineering and with their practical applications, without overcrowding the course. It would also leave more time for developing a closer contact with industry through visits to works, special lectures, etc., or by gaining actual practical experience under works conditions.

Clay Products Industry in Canada

THE High Commissioner for Canada has received from the Dominion Bureau of Statistics, at Ottawa, a report on the clay and clay products industry in Canada in 1931. The value of domestic clay and clay products sold by Canadian producers during the year reached £1,568,257, a decline of 25.9 per cent. Ontario was the leading producing province, accounting for 45 per cent. of the Dominion total, Quebec following with 30 per cent., but production also took place in Alberta, British Columbia, Nova Scotia, Sasketchewan, New Brunswick and Manitoba. In all, 203 plants, with a capital of £7,627,909, operated in Canada in the production of clay products from domestic or imported materials.

Improved Means for Spectroscopic Investigations

Activities of a Well-known Instrument Manufacturer

THE investigation of spectrophotometric absorption curves of substances is now simplified by apparatus recently introduced by Adam Hilger, Ltd. The notched echelon cell (Fig. 2), for instance, is a device for the rapid and accurate measurement of absorption curves of solutions by photographic means. It enables ten spectrum photographs of the absorption spectra of as many different thicknesses of solution to be taken with one exposure of less than one minute, and interleaved with similar spectra obtained through a control solution (ordinarily the solvent in use) and a revolving sector disc. Inspection of the resultant spectrogram yields the data for the absorption curve. The apparatus is used in conjunction with a Hilger quartz spectrograph to the slit of which it is directly attached. It possesses the following principal advantages: The extreme rapidity with which measurements can be made accurately, enabling measurements to be made even upon substances which change under irradiation; the small amount of liquid (about 0.4 ccs.) required for an experiment; the simplicity of the apparatus required; the ease with which the results may be interpreted. The two cells used are shown in the accompanying photograph. The method used has been fully described in a recent paper by Twyman, Spencer and Harvey ("Trans. Optical Soc.," 1931); details were also given in Tywman's lecture to the Physical Society, October 21, 1932.

Recent work in absorption spectrophotometry has shown that there is a great need for an instrument which will enable absorption curves to be obtained very much more rapidly than is possible with any of the photometers now in use. It is impossible with these latter to study any substance whose absorption is changing rapidly, and in many cases such changes are produced by the exposure to radiation which is necessary to obtain the absorption curve. The echelon cell has, therefore, been introduced specifically for the study of such problems, but even in those cases where the absorption is not changing with time the instrument is of value in that it permits of a very great reduction in the time required to obtain absorption data, even when used for high extinction coefficients.

The Spekker spectrophotometer (Fig. 3) bears greater similarity to the earlier types of ultra-violet spectrophotometer in its principle, but it is novel in its construction and possesses very great advantages over its forerunners. The photometer portion was developed during the latter part of 1931 as the Spekker photometer and now it has been mounted on one base with an all metal quartz spectrograph (F $_D$ 20 cm.) forming a complete and very convenient outfit for absorption spectrophotometry in the ultra-violet. This outfit, while it is less rapid than the notched echelon cell, is considerably faster than earlier forms of sector spectrophotometer. The spectrograph is so arranged that it can instantly be ready for taking ordinary emission spectra and is swung back into its former position just as quickly and without any need for re-adjustment of the whole system. It is superior to the earlier sector photometers in the measurement of high extinction coefficients but falls below the notched cell in this respect, whereas for very low extinction coefficients it is superior to the latter.

This spectrophotometer consists of two instruments, a photometer and a quartz spectrograph, on one rigid base. The photometer contains an optical system that divides the light from a fixed source between two symmetrical paths, subsequently re-combining them in two closely adjacent areas on the slit of the spectrograph. The substance whose absorption to be studied is inserted in one of the paths and photometric comparison is made by adjusting a shutter system in the other path. Twin spectra, corresponding with the two light paths, are thereby produced on the photographic

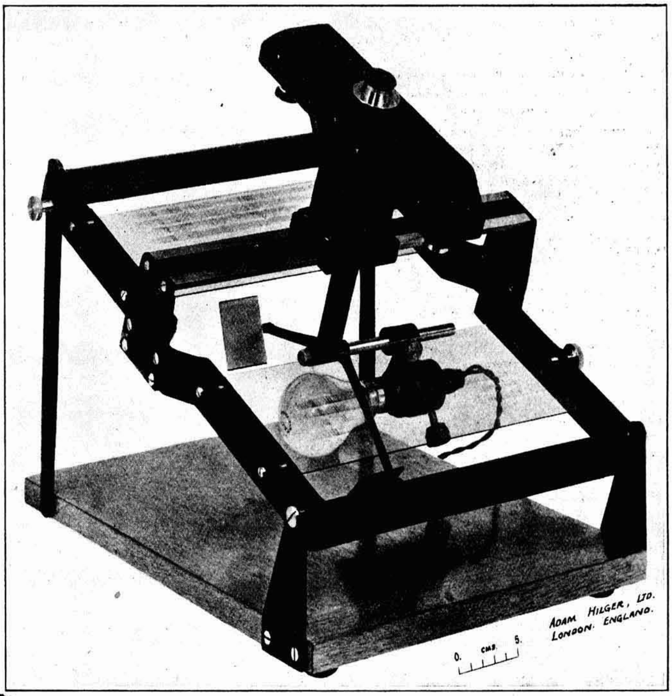


Fig. 1. The Judd-Lewis Comparator for Spectrum Photographs.

plate and inspection of them reveals the wavelengths at which the absorption of the substance corresponds with the reduction of intensity caused by the shutter system. By taking a number of photographs on one plate, using progressively varying shutter openings, complete data for drawing the absorption curve is readily obtained. The main features of the spectrograph are permanent adjustment; brilliant definition through a spectrum which extends from 9000 A to 1850 A; photographic rapidity; and internal wavelength scale. The latter is so arranged that in a few second it can be printed in accurate register with the spectrum on the photographic plate. The length of spectrum is adequate for most absorption investigations, and when fine detail in absorption bands is

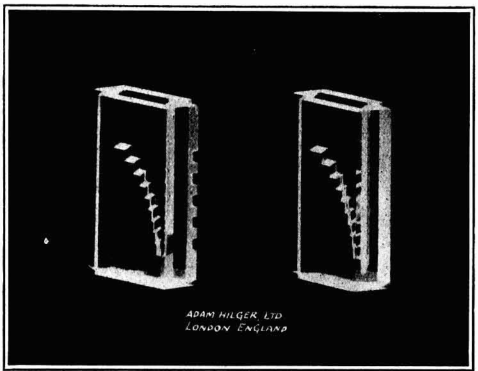


Fig. 2. The Notched Echelon Cell.

not required to be investigated it is an actual advantage to have the bands sharpened by a comparatively small but adequate separation of the spectrum lines.

A feature which is of very great importance in certain branches of absorption spectrophotometry is the rapidity with which the determinations can be made. As in the analogous methods of spectrophotometry by the Hilger sector photometer, it requires a number of exposures to be made of approximate logarithmic rate of increase, but with the important difference that owing to the photographic rapidity of the system an initial exposure of 0.25 secs. is usually sufficient and the total time of exposure of the liquid to light from the source need not exceed 2.5 minutes. The light source used, which is permanently attached in correct alignment with the whole optical system, is a spark between tungsten steel electrodes. The spectrum yielded has a very great number of closely spaced lines throughout the spectrum, down to 1850 A and has been found by trial and experience to be most efficient for the purpose. A simple gauge enables the electrodes to be replaced and re-adjusted with the greatest rapidity and certainty.

The use of spectrum analysis has extended rapidly in recent years as its possibilities have become realised. Advance has been especially rapid in the direction of quantitative analysis and Adam Hilger, Ltd., have succeeded in producing an eyepiece attachment for an ordinary visual spectrometer which enables reasonably accurate quantitative estimations to be made. This eyepiece is so arranged that photometric comparison of neighbouring spectrum lines is facilitated, one of the chosen lines is moved by a device incorporated in the Insta eyepiece (as this apparatus is called), until it is continuous with the other chosen line. Means are provided whereby the brighter of the two lines can be reduced in intensity until both are equally bright, when a scale reading is obtainable. Charts are prepared showing the relationship between scale readings and percentage contents of a number of known samples. From these charts it is afterwards a simple and quick proceeding to determine the percentage content of unknowns by the scale readings obtained. Interpretation of the spectrum photographs obtained with a spectrograph is greatly facilitated by the use of the Judd Lewis spectrum comparator (Fig. 1). In this instrument two separate spectrum negatives are seen as if contiguous in the eyepiece of the instrument, thus enabling them to be compared with one another very accurately. This in itself is not new, the distinctive character of the instrument being due to the convenient way the plates are put in position, adjusted and observed. By means of this instrument use may be made of a "library" of spectrographic photographs in which certain elements are shown, thus enabling rapid diagnoses of unknown spectrum lines to be made. It is so arranged that comparison of the intensities of spectrum lines can be observed rapidly, a feature which renders it of special assistance in the practice of quantitative spectrum analysis by the ratio quantitative method, employing "Specpure" preparations.

"Specpure" preparations are specially pure chemicals originally designed to aid in quantitative spectrography but they can be of use wherever chemicals of a known high degree of purity are necessary. They are supplied as ratio powders, solid salts or ratio solutions. Ratio powders are mixtures of salts in which are several which bear a definite quantitative relationship to a chosen main element (or group of elements). Ratio solutions are solutions containing a definite proportion of one salt of very high purity, so that they can be mixed together volumetrically to synthesise substances of any desired composition. The method of use of these substances has been described by Judd Lewis ("Journ. Soc. Chem. Ind.," 1932, *51*, 271).

The analysis of gases by refractometry necessitates the use of very accurate forms of refractometer capable of detecting exceedingly minute variations of refractive index. Nevertheless, the method is adopted and has been found of great use in practice. The type of instrument usually employed is the

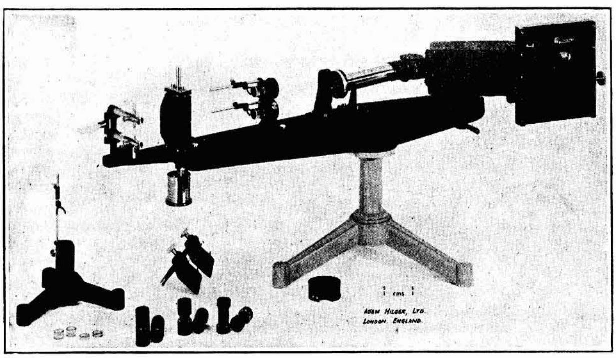


Fig. 3. The Spekker Ultra-Violet Spectrophotometer.

interference refractometer originally due to the late Lord Rayleigh. In the course of last year this instrument has been greatly improved in accordance with the principles laid down by W. E. Williams, and the new instrument, known as the Williams-Rayleigh interference refractometer, transmits a greater amount of light which permits dispersion measurements to be carried out photographically, using the refractometer in conjuncion with a suitable spectrographic apparatus. A form of the instrument fitted with a quartz optical train for use in the ultra-violet spectrum is shortly to be constructed, and will enable research to be made on the refractivities of gases in the ultra-violet.

New French Fertiliser Compound

THE Cie des Produits Chimiques et Charbons Actifs Ed. Urbain, plans to produce its new phosphate-ammonium-magnesium fertiliser at the plant of the Cie. des Produits Chimiques du Centre, in Vierzon. The permit to manufacture this product in Belgium was awarded to the Nouvelle Montagne which has begun work in Engis.

Depreciation of Chemical Plant: Financial Accounting

By S. HOWARD WITHEY, F.C.I., Senior Fellow of the International Accountants Corporation

WHEN preparing the profit and loss account showing the amount of net profit actually realised during the past year, or the extent of the loss sustained, and in drafting a balance sheet exhibiting a true and correct view of the state of affairs as at the stocktaking date, one of the most important matters which the chemical manufacturer or the engineering firm must consider and decide is that of depreciation of the various assets and sections of plant which have been employed during the period for profit-earning purposes. The amount of capital invested in furnaces, ovens, acid plant, refrigeration plant, grinding mills, mixing machinery, filter presses and other chemical plant units is very considerable indeed, and the losses arising from the inevitable shrinkage in the value of these more or less fixed assets calls for systematic treatment in the financial and costs accounts of each individual business.

Shrinkage in the value of an asset, or group of assets, may be the result of physical deterioration, or it may be a functional depreciation. The term " wear and tear " really has reference to the decrease arising from use only, while by " functional depreciation " is meant the degree of obsolescence caused by developments in the application of science, invention, or labour-saving that render equipment obsolete for the particular purpose for which it was originally acquired. In addition to these two main causes of depreciation, however, the inadequacy of the existing plant and machinery is very often a vital factor in the determination of the yearly or periodical charge against profits, for businesses are constantly reaching that stage where the productive and engineering assets are incapable of maintaining the customary or expected efficiency, necessitating the installation of new and more productive units or layouts, and a drastic scrapping of the old equipment. Evaporators and driers, pumps, blowers and exhausters, etc., are often scrapped long before they have completely lost their market value, while on the other hand, of course, the prompt execution of repairs, and the accurate matching of worn or damaged parts, may enable equipment to operate in a thoroughly satisfactory manner over a surprisingly long period.

In many works at the present time the continuity of operations depends largely on the nature and suitability of the appliances available for effecting prompt overhauls, also on the quantity of spare parts and attachments carried, so that in practice the accurate computation of depreciation involves specialised study and engineering experience.

A Charge Against Profits

Whatever might be the actual cause or causes of asset depreciation, it is of the utmost importance that it should be adequately covered by a charge against profits, the first or original cost of acquisition and installation being regarded as the cost for the period of service life, which usually means several years. To provide for depreciation on a fairly generous scale during periods of comparative trade prosperity, while ignoring depreciation in times of depression and abnormality, is not only unsound from the accounting viewpoint, but very dangerous from the financial standpoint. If the business is being conducted by the proprietor on his own account, the balance of profit should not be withdrawn for private purposes until such time as proper charges have been made for the decrease in the value of the wasting assets, and in the case of the partnership of two or more chemical manufacturers or engineers the profit balance should not be shared in accordance with the terms of the deeds or other partnership agreements unless adequate sums have been written off the book values of the productive equipment. In this connection it should be mentioned that the majority of limited liability companies—thanks to the foresight of directors and executive heads—are drastically writing down asset values before distributing profits in the form of dividends to shareholders, thereby conserving financial resources and maintaining the inherent strength of British industry as a whole.

Although the essential requirement in this important matter of depreciation is that the periodical profit and loss account should be debited with the decrease in value of all productive and wasting assets, this should be effected in as equitable a manner as possible as between one manufacturing or operating period and another. There are various methods whereby this may be achieved, the principal methods being enumerated below :—

Method 1.—An equal proportion of the first and original cost of acquiring and installing an asset or section of plant may be written off each financial year and the amount charged against the profits, so that at the end of a definite period—known or estimated to represent the effective service life—the value standing in the financial book will be reduced either to nil, or to a purely nominal figure. This is usually referred to as the " straightline " method.

Method 2.—A fixed percentage rate may be deducted each year from the gradually diminishing book value of the asset, or group of assets, the amount so deducted being transferred to the depreciation account the balance of which will appear as a charge against profits, so that at the termination of a certain number of years the debit balance of the asset account will represent something like the actual value to the business as a going concern.

Method 3.—The annual profit and loss account may be debited with such an amount that, after interest on the balance of unrecovered investment—at a definite rate per cent. per annum—has been added to the diminished capital value, as shown in the books, the debit balance at the end of the given period will be extinguished, or will represent a purely realisable or break-up value. This is known as the " annuity " method.

Method 4.—The layout, section, or group may be subjected to a new valuation on the part of a chemical trade expert, and the actual decrease in value, as compared with the book value, written off and charged against the profits in one amount.

The Straightline Method

Examples of the practical application of each of these methods are given below, the figures and cases taken being purely hypothetical for purposes of illustration only.

Example 1.—On January 1, 1933, the grinding mills and mixing machinery account kept in a firm's private ledger showed a debit balance of £350, and it is anticipated that the mills and machines will have to be replaced in five years time. Owing to the simplicity of installation, and the small risk of tramp metal damaging the mills, the cost of upkeep and maintenance is small and of about the same total cost each year. In this case one-fifth should be written off each year by the straightline method, the assets account at the end of the five years containing the following figures :—

PRIVATE LEDGER.

Dr. Grinding Mills and Mixing Machinery Account. Cr.

			£				£
1933. Jan. 1	To Balance	b/d	350	1933. Dec. 31.	By Depreciation		70
				,, ,,	,, Balance	c/d	280
			£350				£350
1934. Jan. 1.	To Balance	b/d	280	1934. Dec. 31.	By Depreciation		70
				,, ,,	,, Balance	c/d	210
			£280				£280
1935. Jan. 1.	To Balance	b/d	210	1935. Dec. 31.	By Depreciation		70
				,, ,,	,, Balance	c/d	140
			£210				£210
1936. Jan. 1.	To Balance	b/d	140	1936. Dec. 31.	By Depreciation		70
				,, ,,	,, Balance	c/d	70
			£140				£140
1937. Jan. 1.	To Balance	b/d	70	1937. Dec. 31.	By Depreciation		70
			£70				£70

No amount would appear on the assets side of the balance sheet dated December 31, 1937, in respect of the particular mills and machinery, the figures on the four preceding balance sheets being shown as follows :—

BALANCE SHEET—December 31, 1933.

Grinding Mills and Mixing Machinery :—

Balance as at December 31, 1932	£350	
Less Depreciation written off	70	
		£280

BALANCE SHEET—December 31, 1934.

Grinding Mills and Mixing Machinery :—

Balance as at December 31, 1933	£280	
Less Depreciation written off	70	
		£210

BALANCE SHEET—December 31, 1935.

Grinding Mills and Mixing Machinery :—

Balance as at December 31, 1934	£210	
Less Depreciation written off	70	
		£140

BALANCE SHEET—December 31, 1936.

Grinding Mills and Mixing Machinery :—

Balance as at December 31, 1935	£140	
Less Depreciation written off	70	
		£70

The Fixed Percentage Rate

Example 2.—The book value of condensing and cooling plant employed by a firm of fine chemical manufacturers was £490 15s. at December 31, 1932, and it is expected that the value of the units in five years time will be no more than £160. It is anticipated that higher temperatures and a greater degree of condensation will be required each year, and that the cost of repairs and maintenance will increase, so that it is desired to write off depreciation in such a manner that the combined charge for depreciation and repairs does not press too heavily in any one financial year. In this case Method 2 should be applied, 20 per cent. of the diminishing book value being written off each year, the asset account at the end of the five years appearing thus :—

Condensing and Cooling Plant Account.

Dr.		£ s. d.	Cr.		£ s. d.
1932. Dec. 31. To Balance	b/d	490 15 0	1933. Dec. 31. By 20% Depreciation		98 3 0
			,, Balance	c/d	392 12 0
		£490 15 0			£490 15 0
1933. Dec. 31. To Balance	b/d	392 12 0	1934. Dec. 31. By 20% Depreciation		78 10 5
			,, Balance	c/d	314 1 7
		£392 12 0			£392 12 0
1934. Dec. 31. To Balance	b/d	314 1 7	1935. Dec. 31. By 20% Depreciation		62 16 4
			,, Balance	c/d	251 5 3
		£314 1 7			£314 1 7
1935. Dec. 31. To Balance	b/d	251 5 3	1936. Dec. 31. By 20% Depreciation		50 5 1
			,, Balance	c/d	201 0 2
		£251 5 3			£251 5 3
1936. Dec. 31. To Balance	b/d	201 0 2	1937. Dec. 31. By 20% Depreciation		40 4 0
			,, Balance	c/d	160 16 2
		£201 0 2			£201 0 2
1937. Dec. 31. To Balance	b/d	160 16 2			

It will be observed that in this case the difference between the value as at December 31, 1932, and the value as at December 31, 1937, viz. : £329 18s. 10d., would be apportioned over the period of five years as follows :—

1933	£98	3	0
1934	78	10	5
1935	62	16	4
1936	50	5	1
1937	40	4	0
	£329	18	10

Assuming the cost for repairs and maintenance of the plant to be £20 during 1933, making, with the depreciation charge, a total of £118 3s. to be debited against the profits for that year, the margin left for repairs, etc., during the four succeeding years would be as enumerated below, without unduly burdening any one accounting period :—

1934	£39	12	7
1935	55	6	8
1936	67	17	11
1937	77	19	0

In all instances where the cost of repairs, cleaning, matching, etc., is likely to increase as time goes on, this method should be adopted in preference to the straightline method.

The Annuity Method

Example 3.—For the purpose of acquiring several pumps, blowers and exhausters, as at January 1, 1933, the directors of a company borrow the sum of £2,000 at 5 per cent. interest, and decide to write off the assets in equal annual instalments over a period of five years, after adding 5 per cent. interest each year to the balance of unrecovered investment. To ascertain the amount to be written off each year and charged against the profits, reference would have to be made to the following table which gives the *decimal part of £1 required* to extinguish £1 during periods ranging from four to ten years, after interest at 3 per cent., 4 per cent., or 5 per cent. has been added to the outstanding capital value :—

Years.	3 per cent.	4 per cent.	5 per cent.
4	0.269028	0.275490	0.282012
5	0.218354	0.224627	0.230975
6	0.184597	0.190761	0.197017
7	0.160506	0.166609	0.172819
8	0.142456	0.148527	0.154721
9	0.128433	0.134493	0.140690
10	0.117230	0.123291	0.129504

Referring to the example, the principal sum, viz. : £2,000, would be multiplied by the factor 0.230975, giving £461.95, or £461 19s. as the amount to be written off each year, the private ledger account containing the following entries :—

Pumps, Blowers and Exhausters Account.

Dr.		£ s.	Cr.		£ s.
1933. Jan. 1. To First Cost		2,000 0	1933. Dec. 31. By Depreciation		461 19
Dec. 31. To 5 per cent. Interest		100 0	,, Balance	c/d	1,638 1
		£2,100 0			£2,100 0
1934. Jan. 1. To Balance	b/d	1,638 1	1934. Dec. 31. By Depreciation		461 19
Dec. 31. To 5 per cent. Interest		81 18	,, Balance	c/d	1,258 0
		£1,719 19			£1,719 19
1935. Jan. 1. To Balance	b/d	1,258 0	1935. Dec. 31. By Depreciation		461 19
Dec. 31. To 5 per cent. Interest		62 18	,, Balance	c/d	858 19
		£1,320 18			£1,320 18
1936. Jan. 1. To Balance	b/d	858 19	1936. Dec. 31. By Depreciation		461 19
Dec. 31. To 5 per cent. Interest		42 19	,, Balance	c/d	439 19
		£901 18			£901 18
1937. Jan. 1. To Balance	b/d	439 19	1937. Dec. 31. By Depreciation		461 19
Dec. 31. To 5 per cent. Interest		22 0			
		£461 19			£461 19

In this way, a charge of £461 19s. would be made against each year's profits under the heading of depreciation, totalling £2,309 15s. for the five years, during which time interest amounting to £309 15s. would be credited to profit and loss, made up as under :—

1933	£100 0 0
1934	81 18 0
1935	62 18 0
1936	42 19 0
1937	22 0 0
	£309 15 0

Actual Decrease in Value

Example 4.—On January 1, 1932, the value of vats and tanks was shown on a firm's balance sheet at £285 10s., and upon being re-valued by an experienced valuer as at December 28, 1932, these assets were found to be worth only £150, owing to the fact that the timber had not been properly seasoned. It is decided, therefore, to charge the difference of £135 10s. against the 1932 profits, the private ledger account after the adjustment being balanced as shown below :—

Dr. Vats and Tanks Account. Cr.

1932.		£	s.	1932.		£	s.
Jan. 1.	To Balance b/d	285	10	Dec. 28.	By Transfer to Depreciation Account	135	10
				,, ,,	Balance (New Valuation) c/d	150	0
		£285	10			£285	10
Dec. 28.	To Balance b/d	150	0				

Among the advantages to be derived from a periodical re-valuation of certain troublesome assets are that claims in the matter of insurances, also appeals against excessive assessments, are likely to be more successful, while the fixing of independent figures cannot fail to be satisfactory alike to the proprietor; the partners; the directors and shareholders; and to the auditor. Moreover, a certificate of value, signed by a valuer of acknowledged repute, may serve as a banker' guarantee in the matter of an overdraft, and all capital issues—whether in the form of shares or debentures—are greatly facilitated.

Silk Dyeing Difficulties

Factors which Affect Colour and Affinity

THE expensive nature of silk yarns and fabrics renders their dyeing altogether different from that of cotton. According to Mr. C. M. Keyworth, F.I.C., who read a paper on "Silk Dyeing" at a meeting of the Manchester Section of the Socety of Dyers and Colourists held on January 20, lighter and smaller machines were used, dyeing quantities to a shade were much smaller, 5 lb. of yarn and one piece to a shade being quite common. During degumming, moreover, the silk required prolonged action of hot soap liquors, but any undue processing led to trouble which often took the form of face-marks. A silk dyer had many difficulties to contend with, even with the simplest methods of dyeing.

Silk had an extraordinary affinity for dyestuffs belonging to all the most important groups. The affinity, however, was generally very different from that of the same colours on wool or cotton. A comparatively small range of direct cotton colours was of value in silk dyeing, and a still smaller range could be after-treated on the fibre in the usual well-known ways. Many cotton colours had little affinity for silk when dyed neutral, a peculiarity shared with many acid colours. Chrome and after-chrome colours had usually quite different affinities on silk from those on wool, but silk-effect threads could be obtained. Another point causing difficulty was the enormous number of variations in affinity between different silks. Spun silk might need twice as much dyestuff as natural silk, and tussah silk needed still more to obtain the same shade. Combinations of the Naphthol AS series were now being employed to a small extent, mostly on yarn. They gave shades of excellent fastness to light, washing, and even degumming, but were not always fast to rubbing. Matching to shade was not easy owing to the comparatively poor affinity of the naphthol and the high affinity of the diazotised base for the silk. Impregnation with the naphthol could be done in a similar way as for cotton, but a protective colloid might be added if desired.

Use of Diazo Compounds

Diazo compounds had a strong affinity for silk, and, as an example, Nitrosamine Red paste B.A.S.F., had been recommended to give a yellow on silk of very good fastness to light and washing. When coupling with naphtholated silk the diazo compound combined partly with the naphthol and partly with the silk, and yellower shades were produced than with the same combination on cotton. An addition, if an excess of acetic acid, usually minimised the coupling of the diazo compound with the silk, but it was still difficult to obtain level bluish reds, clarets, or navy blues, especially on piece goods.

Bases which contained nitro groups stained the silk most strongly, but, among others, diazotised Fast Blue RR, Fast Blue BB, Fast Corinth V. and Fast Scarlet GG bases dyed silk readily. A few diazotised bases dyed the silk more strongly from a slightly acetic acid acidified bath than from an alkaline bath. This might be due to the more ready formation of a nitrosamine, as it was known that the nitrosamine from diazoparanitraniline (Nitrosamine Red) did not dye silk readily unless acidfied. These dyeings with diazotised bases were attributed by Sisley, Simmonnet and Sisley to the formation of azo dyes by coupling with the tyrosine group of the fibroin in the *o*-position to the hydroxyl group. The shades differed only slightly from those obtained from more simple substances, but the size of the fibroin molecule modified the solubility considerably, and consequently the fastness to washing was improved. The affinity of most vat colours for silk was low and this made the cost of dark shades very high. Indigosols had a high affinity for silk, and by using a sufficient quantity of acid the bath might be completely exhausted. The number of Indigosols at present on the market was still small compared with vat dyestuffs.

Sulphur Dioxide Fading

The range of Soledon colours was very incomplete, but all brands might be dyed on silk, while mordant colours were still very extensively used for yarn, mostly on alum and chrome mordants. Iron mordant was little used now except for Logwood Blacks, whilst titanium mordants gave interesting shades but were not employed to any great extent. The dyestuffs mainly used were alizarine colours, together with a few of the old natural dyestuffs.

Although the silk fibre was intrinsically very strong it would not withstand the long-continued action of boiling soap, friction, etc., without damage. The individual fibres split up into numerous fibrillæ, giving a roughened and velvety appearance variously known as face marks, chafe marks, and lousiness. The roughened threads were lighter in colour to the main body of the cloth, and showed themselves as large patches, streaks, or specks, usually only on one side of the cloth, and became much more apparent after dyeing and finishing, especially in dark shades. Severe degumming was also a common cause, as was also dyeing for long periods particularly in acid baths which enhanced mechanical friction. The silk fibre was really partially destroyed. The remedy for sulphur dioxide fading was a careful selection of dyestuffs. The dyes which affected by SO_2 were almost always reds, oranges and yellows. Strict supervision over the wrapping paper, which might also contain SO_2, was also necessary.

Chemists in the Centenaries of 1933

Personalities, Theories and Discoveries

A NOTABLE feature of the centenaries of 1933 is the number of famous chemists associated with other " thirty-threes." The outstanding name in the list is that of Joseph Priestley, the father of pneumatic chemistry, the bicentenary of whose birth is on March 13. Born in the West Riding of Yorkshire, and educated at Batley Grammar School, he showed signs of consumption in early life, despite which fact he exceeded three score years and ten. Notwithstanding an hereditary stammer he became a Nonconformist minister, but had previously been a tutor at Nantwich, and at Warrington Academy. It was from an essay of Priestley's in those early days that Bentham borrowed the famous phrase " the greatest happiness of the greatest number."

Priestley's chemical researches were made possible largely by the generosity of a wealthy Sunbury widow, Elizabeth Rayner, who was a relative of Josiah Wedgwood. Following brilliant and almost premature researches in electricity, his " Experiments and Observations on different Kinds of Air " announced, in 1772, the discovery of hydrochloric acid and nitric oxide, and the same paper contained suggestions for saturating water with carbonic acid which were the basis of the manufacture of mineral waters. In 1774 came his discovery of oxygen, one of the landmarks in the history of chemistry, and it was followed by the discovery of sulphur dioxide, silicon tetrafluoride, and several other gases.

Priestley's House Sacked

Although elected to the French Academy of Sciences, and to the St. Peterburg Academy, and winning high esteem in America, Priestley was a prophet without honour in his own country. His unorthodox religious views and his support of the French revolution inflamed popular opinion, culminating in the sack of his house at Birmingham by a hostile mob, which tried to get fire from his electrical apparatus to enable it to burn the house—" with that love for the practical application of science which is the source of Birmingham's greatness," Huxley observed. It was not to the credit of George III that when he heard the news he expressed his pleasure that Priestley was the sufferer. Disheartened, Priestley emigrated to America, and died there February 6, 1804.

One hundred years ago—on October 21, 1833—Alfred Bernhard Nöbel was born, at Stockholm. He began life as assistant to his father—a mechanician of considerable ability—and in the early 'sixties they perfected the manufacture of nitro-glycerine. It was in 1867 that the accidental escape of some nitro-glycerine from a cask into the siliceous sand of the packing led to the discovery of dynamite. In 1873 Nöbel invented gelignite. He died at San Remo on December 10, 1896, and his foundation of the famous Nöbel prizes has perpetuated his fame more thoroughly, perhaps, than his inventions.

Roscoe's Discoveries

Another celebrity born a hundred years ago (January 7, 1833) was Sir Henry Enfield Roscoe, grandson of William Roscoe, the famous historian. Roscoe studied at Heidelberg under Bunsen, and in 1857 became professor of chemistry at Owen's College, Manchester (subsequently the University). He first prepared pure metallic vanadium, and made other notable researches, but his greatest work was educational. He was connected all his life with Manchester University, and represented South Manchester in the House of Commons for ten years. His " Spectrum Analysis " appeared in 1868, and there followed his " Elementary Lessons in Chemistry," and the great " Treatise on Chemistry" (in collaboration with Schorlemmer). He died as recently as December 18, 1915. Roscoe had written on Dalton; a reminder that in the year of Roscoe's birth Dalton received a pension of £150, which was later increased to £300.

A publication of 1833 was William Pringle Green's " Fragments from Remarks of Twenty-five Years in every quarter of the Globe, on Electricity, Magnetism, Aerolites, and various other Phenomena of Nature." It was in 1833 that Sir John Herschel, chemist and astronomer, published his observations on nebulæ and star clusters, and he sailed in the same year to South Africa, to examine the southern hemisphere. Again in 1833 James Finlay Weir Johnston, the famous agricultural chemist, became reader in chemistry and mineralogy at Durham; and Thomas Clark, who discovered the soap test for hardness in water, became that year professor of chemistry at Marischal College, Aberdeen.

Basis of Photographic Invention

It was in 1833 that Karl, Baron von Reichenbach made his discovery of creosote. An epoch-making discovery that year was that of William Henry Fox Talbot, who, like Roscoe and Priestley, was politician as well as scientist, and entered Parliament as M.P. for Chippenham that year. Talbot was engaged in the summer of 1833 in obtaining drawings of the scenery on the Lake of Como, by the aid of the camera lucida, and, to quote his own somewhat flamboyant language, was " led to reflect on the inimitable beauty of the pictures of Nature's painting, which the glass lens of the camera threw upon the paper in its focus." He possessed sufficient chemical knowledge to follow up his observations, and his discovery was the basis of the invention of photography, but he delayed its publication until the notification of the invention of the Daguerreotype had been given to the world.

Incidentally it was on July 5, 1833, that Joseph Niepce died. Niepce had begun in 1814 and completed in 1829, his process for drawing by light on lithographic stone, and discovered the process of making intaglio—etched metal-plates, from which he took impressions in ink. In 1829 he entered into partnership with Daguerre.

Samuel Drew, " the Cornish metaphysician," died in 1833. He was a remarkable character who not only rose from obscurity but, what is more rare, from the status of a useless wastrel. He had been a smuggler, poacher, orchard-robber, cudgel-player, was a dunce at school, and ran away as an apprentice. From buddle boy in a tin mine he became a cobbler, and a local Methodist preacher, and finally editor, publisher and metaphysician.

A Contribution to Mineralogy

Another celebrity who died in 1833 (on April 29) was William Babington, an Irish physician and mineralogist, who was author of " New System of Mineralogy." Thomas Allan died on September 12, 1833. He was born in 1777, the son of a banker at Edinburgh. Allan, too, began his career in a bank, but forsook commerce for science, and in 1808 published his " Alphabetical List of Minerals," in three languages. He was discoverer of a new mineral (named after him "Allanite").

On March 25, 1833, Henry Charles Fleming Jenkin was born, near Dungeness. In 1859 he entered into partnership with Sir William Thomson (afterwards Lord Kelvin) and he invented the telpher system of overhead transportation, interesting himself also in sanitary reform. He was tutor of R. L. Stevenson, who wrote his biography.

Yet another celebrity born in 1833, on October 15, was Frederick Guthrie. He was educated at University School and College, and studied chemistry at Heidelberg. In 1856 he became assistant at Owen's College, Manchester, and in 1859 was assistant at Edinburgh. In 1861 he was appointed professor of chemistry and physics at the Royal College, Mauritius, and in 1869 became lecturer (later professor) at the Normal School of Science, South Kensington. He died on October 21, 1886, and was buried at Kensal Green.

In the same year as Priestley was born (1733) Richard Kirwan, the famous Irish chemist, who was a native of Co. Galway. Educated in France he was called to the Irish bar in 1766, but from 1768 to 1773 studied chemical science in London, giving up the law. In 1780 he was elected a fellow of the Royal Society, and two years later earned the Copley medal for his papers on chemical affinity. In 1787 he became president of the Royal Irish Academy, to which he contributed many scientific papers. He was also elected a member of nearly all the learned societies of Europe. It was in 1787 that there appeared his famous " Essay on Phlogiston and the Constitution of Acids," identifying Phlogiston with hydrogen. A publication responsible for a great deal of controversy, until Kirwan identified himself with the opinion of Lavoisier. In 1784 was published Kirwan's valuable "Elements of Mineralogy."

It was in 1733 that Johann Gmelin, the St. Petersburg professor of chemistry and botany, began those travels in Siberia that inspired his publications. Arsenic and cobalt were discovered that year, and caoutchouc brought to England. Chester Moor Hall invented the achromatic telescope. Stephen Hales, a clergyman, also a physiologist, and inventor of ventilating machines and machines for distilling sea-water, etc., published his "Hoemastaticks." Jean Charles de Borda, who was concerned in the establishment of the metric system, was another celebrity born that year.

Other interesting events of 1833 may now be mentioned. In 1833 Faraday discovered the identity of electricity. There appeared Mrs. R. Lee's "Memoirs of Baron Cuvier" (who had died in the previous year). James Dwight Dana, the celebrated mineralogist, graduated at Yale. Johannes Müller, founder of modern physiology, became professor of physiology and anatomy at Berlin. The famous Sir Charles Wheatstone published five papers on sound. The great John William Draper emigrated to Virginia. James Forbes, famous for investigations on heat, light, polarisation, underground temperature, the use of the thermometer for determining heights, and researches on the motion of glaciers, became that year professor of natural philosophy at Edinburgh.

What advances in chemical science will 1933 contribute to posterity for commemoration a hundred years hence?

Cleanliness in Modern Food Factories

A New Duty Outlined for the Chemist

THE importance to the public and to manufacturers of factory cleanliness in the food industry was emphasised in a paper read by Mr. E. B. Hughes, of J. Lyons and Co., Ltd., at a joint meeting of the Royal Sanitary Institute and the Food Group of the Society of Chemical industry, at the headquarters of the Institute on January 20.

Mr. Hughes said it was as important that the factory should be so arranged that cleanliness could easily be assured as that it should have all the other requisites for practical and economic production of the food it was intended to manufacture. The food manufacturer had not only the moral obligation to see that food was prepared in clean conditions, but he had other powerful inducements. Cleanliness should be considered when the factory is being planned. There should be clear, unencumbered spaces occupied only by the equipment necessary for the work; no inaccessible dirt traps or out-of-the-way corners where debris can accumulate. The walls and ceiling should be smooth and preferably hard and non-absorbent, and as free as possible from crevices and angle joints. A deal floor is unsuitable as it is easily indented, making it impossible to remove all dirt; and if scrubbed the wood becomes, in time, very soft and holds a considerable amount of moisture. Hard wood floors withstand scrubbing much better, and tiled floors are particularly suitable, as are also special compositions, cement and granite chips.

Regular Inspection

Disinfectants as a rule are not required in a food factory. Water and the usual detergents, such as soap and soda, are adequate. Moreover, if the free use of disinfectants is allowed in the factory they may be employed to mask the cause of smells the origin of which otherwise would soon be found to require investigation. There are, however, particular types of equipment which by reason of their construction and use can only be satisfactorily cleaned with the aid of disinfectants. There was much to be said for the regular inspection of food factories by trained chemists, who would report on the cleanliness of the buildings, and would test samples of the product in all its stages. The factory manager, the author suggested, might at first regard the inspecting chemist as an interfering intruder, but he would soon learn to appreciate, if not the why and wherefor of the criticism, at least the effects, and would wisely recognise that ideal cleanliness can only ensue from thorough tidiness, which itself is the greatest step towards efficiency in production.

Most manufacturers threw open their factories to visitors—customers or potential customers—and a factory must be clean to deserve the desired approval, particularly that of women visitors. Furthermore, if the factory were not clean, there would be likelihood of faulty goods or products which would not maintain their quality so well as they should.

Control of Raw Materials

Dr. T. CARNWATH, Senior Medical Officer, Ministry of Health, said that the problem of feeding the people of this country under modern conditions was a very complex one. Of necessity canned and prepared foods now entered largely into the dietary of the British people and formed an important and valuable part of the food supply of the nation. That illness of one sort or another should occasionally occur was not to be wondered at; the remarkable thing was that cases occurred so rarely. Examples of gross carelessness in the handling and manufacture of food were comparatively rare. Unfortunately, a great deal of food was prepared in this country in small, badly planned places, badly staffed and equipped. Those who had been behind the scenes in Paris or Berlin restaurants in a hot summer would realise what the human digestive juices were capable of dealing with. They should aim at reducing the period between the preparation and consumption of manufactured food, and that was the whole aim of modern food purveyors. Cleanliness in the factory was a splendid thing, but they must go a little further; they had to get back to the raw material. There the food manufacturer had to rely on health services, and it must be remembered that much of this raw material came from countries where control was extremely difficult.

Lieutenant-Colonel G. LEIGHTON, Medical Officer (Foods), Department of Health for Scotland, said that many of the outbreaks of so-called "food poisoning" were caused by people, who were carriers of infection, handling food.

Sir Weldon DALRYMPLE-CHAMPNEYS, Medical Officer, Ministry of Health, said that an extra responsibility was thrown on the manufacturer by the "sophistication" of food. It was so excellent in appearance and tasted so good that a consumer would never suspect the possibility that it might be contaminated.

Sir Isidore SALMON, M.P., who presided, said that large food factories carried out both in the letter and the spirit the science of hygiene. He wished that all small factories were just as particular. Cleanliness should not be like beauty—only skin-deep.

German Coal Tar Products

A Considerable Decline in Trade

GERMAN trade in coal tar products has declined considerably, partly because of the continued decrease in the supply of coal tar, as well as general unfavourable trade conditions. Curtailed coking activity has brought about a shortage of pitch and imports during the first eight months of 1932 have already increased to 13,252 metric tons, compared with 10,469 tons in the corresponding 1931 period. Domestic demand for road tar is far below normal, it being estimated that it will not exceed 50,000 tons for 1932, and local producers are able to cover this demand. Both imports and exports of tar have declined, in recent years the former totalling 2,456 tons and the latter 30,659 tons during the first eight months of 1932. Creosote and benzol wash oils have also recorded smaller sales. Heating and fuel oils, naphthalene, anthracene, cresol and phenol, however, are in demand and imports of some of these, especially those of cresol and phenol, have shown marked increases.

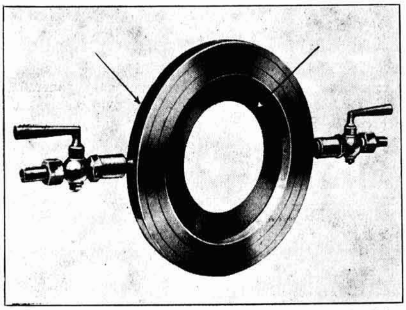
Newfoundland Cod-Liver Oil Exports

A BETTER record is shown than last year in cod-liver oil exports from Newfoundland. The Newfoundland Trade Review reports that from August 1 to November 4, shipments of 115,289 gallons were made, as compared with 99,780 gallons for the same period in 1931.

The Efficient Metering of Liquids

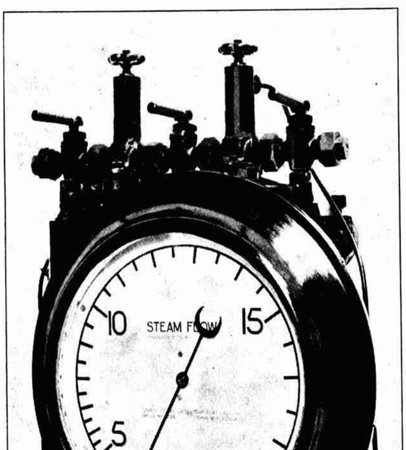
British Instruments for the Chemical and Allied Industries

THE continuous metering of liquid such as water, or aqueous solutions, as well as oil, petrol, benzene, alcohol and other organic compounds, is essential to the efficient operation of many chemical processes. For instance, the use of a feed water meter is essential to the efficient operation of the steam boiler plant, the " 1924 " type venturi indicating, recording, and integrating meter, made by George Kent and Co., Ltd., being used for the measurement of hot or cold boiler feed water, as well as turbine condensate and circulating water.



Kent " S " Type Orifice as used with " K.M." Meters for Oil.

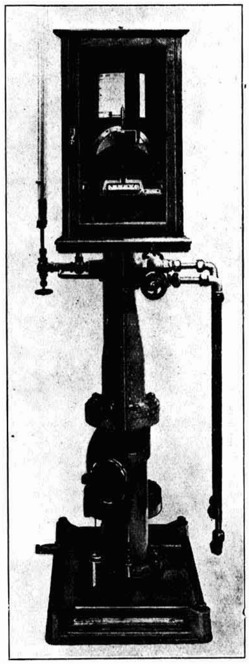
This meter is suitable for pipe lines of 2 in. diameter and upwards. The accuracy, even under the conditions of pulsating flow, is such that a normal performance is plus or minus 1 per cent. of the correct figure, down to 50 per cent. of the maximum flow, and such meters are now operating in a large number of industrial plants in Great Britain and other



Kent " K.M." Meter, Indicator type, as used for Steam, Oil and Water.

countries. As usual the venturi tube portion is bolted into the pipe line by means of flanges, the recording mechanism being placed in a convenient position and connected to the venturi tube by small diameter pipes. Indication of the flow is given by means of a pointer, a continuous record is provided by a pen on a chart, and totals are computed by an integrator or counter with a row of dials, all figures being expressed in lb. of water or some other desired unit.

Generally speaking, feed water on a boiler plant, such as condensate with cold make-up, is at more or less one uniform temperature but corrections in this respect of change in weight per unit volume are easily made from the table supplied. As the result of extensive experience in the metering of water, steam, and air during the past half century the firm are of the decided opinion the venturi tube principle, forming a local gradual contraction in the area of the pipe, is the most suitable for boiler feed water. This tube, in the Kent " 1924 " meter, is constructed of cast steel, with machined gunmetal liners to reduce erosion to a minimum. As a result the water or other liquid has to flow more rapidly at this point to maintain the volume passing, causing a difference in lateral pressure which under accurate conditions of design and construction is proportional to the square of the velocity.



Kent " 1924 " Feed Water Recorder with Damping Device.

In the " 1924 " meter this difference is measured and expressed as volume passing by means of a mercury U-tube device, connected to the vertical outlet pipes at two points, which are correctly situated in the length of the venturi tube. One limb contains a large float on the surface of the mercury, which rises and falls with pulsations in the flow, connecting to a gland spindle which actuates a link mechanism. As a result the gland spindle is caused to rotate according to a linear law in accordance with the rate of flow, this motion being damped to a convenient degree for recording purposes, if the flow is pulsating, by means of a piston and cylinder dash-pot containing oil. The gland spindle connects by a band wheel and a light aluminium rod to the integrating and recording mechanism, both driven by the clock, which is of the pendulum escapement spring-driven type. For the record a 19 in. chart is wrapped vertically round the clock, and a pen, carried by the aluminium rod, gives a continuous curve while a pointer attached to the pen carriage gives the separate indicator reading. The integrator or counter is operated by a wheel disc driven by the clock at a constant speed, and having a small tractor or driving wheel pressed against its surface. This tractor moves in a vertical direction, according to the movement of the pen, whilst being driven at a speed which depends on its distance from the centre of the rotating disc.

The practical advantages of this type of feed meter are very important, the design is simple and of great strength with no moving parts or other complications liable to break-down. Resistance in the pipe circuit is negligible, any rate of discharge can be taken, sudden fluctuations in the flow have no ill-effect, and the meter constitutes part of the actual closed pipe circuit so that no aeration of the water is given. The Kent " 1924 " indicator constructed on the same general lines, but giving an indication only of the amount of water by means of a pointer, is intended for special tests of boiler plants or industrial boilers.

For oil and similar liquids, as well as steam and compressed air, the "GM" meter is available for use with pipe lines of any diameter. Here operation is on the "orifice" principle, a monel metal fitting of circular or "chord" design being inserted in the pipe, which is of lesser cross sectional area so as to cause a constriction, in consequence of which a slight difference in pressure results between the "up-stream" and the "down-stream" side of the orifice plate. Under conditions of correct design this difference in pressure is proportional to the square of the amount of oil passing through the pipe. In these "KM" meters various standard orifice fittings are used, of which the "P" type is typical for oil. This design consists of an orifice plate fixed between the flange of the pipe, whilst fixed in the pipe line, on either side of the orifice plate, are ¼ in. pipes, with cocks, one of which is is coupled to the "up-stream" and the other to the "down-stream," both being connected to the "power unit" which actuates the indicating and recording device. The latter may be placed it any convenient position, on a wall, or may form part of a control panel. The power unit is essentially a mercury U-tube on somewhat the same lines as in the "1924" boiler feed meter, being constructed in the form of two vertical weldless steel cylinders connected at the bottom by a narrow diameter curved steel pipe. One of these cylinders has a float, riding on the surface of the mercury, which operates a gland spindle, connected by a rod and arm mechanism to the indicator and recorder, the gland being almost frictionless and quite leak-proof, while at the top there is a horizontal pipe from the orifice fitting, with a vertical valve controlled connection to each half of the U-tube below.

So far as the records are concerned the "KM" meters are supplied in a variety of forms, as indicators only, recorders only, combined indicator and recorder, combined recorder and static pressure recorder, combined recorder integrator and static pressure recorder, and combined indicator, recorder, integrator and static pressure recorder. One particular combined indicator, recorder, integrator and pressure recorder, has a clockwork driven circular chart 12 in. diameter and a pen giving a continuous curve in lb. of oil per hour, while the indication is read off by a pointer moving through an angle of 245° in conjunction with figures marked on the glass front of the instrument, the integrator or counting device being in the framework above the chart. At the same time a record of pressure is also shown on the chart.

In the case of steam a different type of orifice meter is used, a cooling attachment being provided so that the small diameter pipe circuits to the power unit are filled with condensed water instead of oil.

Solid Smokeless Fuel

Desirable Qualities of a Good Product

In the opinion of Mr. J. W. Napier, engineer and manager of the Alloa Gas Department, who addressed the Glasgow Section of the Society of Chemical Industry on January 19 on "The Gas Industry, with special reference to the Production of Solid Smokeless Fuel," there is no industry with such intimate and complete scientific research being brought to bear upon practical manufacture and the uses of products as the gas industry. In 1928 the annual expenditure of the Institution of Gas Engineers for research was £7,082, which increased to £9,052 in 1931. During the past four years the sum so expended had been £31,890.

The progress of industrial science in the direction of providing fuel for heat, domestic and industrial, had been witness to great advances, but the advance made in the practical politics of providing a clean solid fuel for the homes of the people had been slow almost to impatience. The factor of opposition, however, had not been the lack of a practical scientific process successful in result, but rather the misfortune of the need to weigh with accuracy the financial outlay. Economics demanded that success could only be attained when the balance was not wanting on the right side.

Good smokeless fuel must be of quick ignition, rapid heat radiation, low ash and moisture content, clean to handle and of a mechanical structure capable of transport and handling, as well as reasonable in price in comparison with household coal.

The conversion of coal to a smokeless fuel had two separate schools of technical practice, low temperature and high temperature. The two systems on a strictly commercial basis, however, had not yet arrived at success. Low temperature plant, with the factor of low market value of tars and oils and a necessarily high price for the fuel made, could not yet be said to have attained success. High temperature plant, intimate with gasworks practice and carried out in vertical retorts in a gasworks was in his view the process which was bound to reach success quicker and in greater measure.

Disadvantages of Low Temperature Carbonisation

The most interesting low temperature plant at present working is that at the East Greenwich works of the Metropolitan Gas Co. The main product from this process is "Metro-Coalite" containing about 10 to 12 per cent. volatile matter, 3 per cent. moisture and less than 6 per cent. ash. The yield of unstripped gas is 30 to 35 therms per ton, of a calorific value of 900 to 930 B.Th.U. per cu. ft., and this factor largely influences the commercial success of the process. The chief disadvantages of the low temperature carbonisation systems are (1) the transfer of heat and the reactions are slow, necessitating a larger plant than is required for the same throughput with high temperature systems; (2) the yield of gas is low. It has been contended that a smokeless fuel suitable for domestic use could be made by ordinary methods in use in gas works.

This statement has been proved by the production of good smokeless fuel "Dryco," by the Liverpool Gas Co. This fuel has been produced by carbonising coal, specially and carefully blended, in both horizontal and vertical retorts of the type in use in ordinary gasworks practice. The temperature of carbonisation was about 1,100° C. and was completed during 9 to 10 hours. The fuel thus produced contained 1.5 to 3.5 per cent. moisture and about 7 per cent. ash, and it was most readily ignited by means of a gas poker. It has been shown, however, that the content of volatile matter was not the determining factor in ease of ignitability.

An Economic Problem

Mr. Napier said there was not any one low temperature plant working with low costs to warrant a sufficiently cheap smokeless fuel being put on the market. As a commercial enterprise it had not commanded success and it was not now the national asset it was at one time believed. It was possible to produce a satisfactory fuel by low temperature or high temperature, and the problem was an economic one. The gas industry, with its established position to-day of capital sunk in carbonisation plant, its processes for the recovery of by-products and its sales organisation for gas and solid fuel surely entitled it to the premier position.

It was to the national advantage to make use of the plant already in existence. The vertical retort now in almost general use was capable with small modification in working practice of making a smokeless fuel for domestic use. A careful selection of coals was necessary. He believed it was the duty of the gas industry, in order to prevent the establishment of another coal carbonisation industry, to proceed with some haste and to concentrate practical effort in the production of a smokeless fuel at an economic price. The output of gas in the future would vastly increase, and there would be urgent need to find a market for the solid fuel. He urged gas engineers to experiment on a large scale with plant already at their disposal.

Cinchona Cultivation in Guatemala

Cinchona cultivation in Guatemala on a commercial scale is the aim of the local government which has instituted analyses of cinchona obtained in several regions of the country. The yield of quinine sulphate ran as high as 5.56 per cent.

Professor Armstrong's Tribute to Sir Edward Frankland

Proposed Frankland Society for Lancaster

AN attempt is being made at Lancaster to perpetuate the memory of the late Sir Edward Frankland, the famous chemist, and through the enthusiasm of Mr. W. French preliminary steps are being taken to found a society for this purpose. On January 18, the anniversary of Frankland's birth in 1825, a meeting was held in the lecture theatre of the Storey Institute, Lancaster, presided over by Mr. W. French, when the speaker was Professor H. E. Armstrong, the oldest British chemist who studied and worked with Frankland many years ago. The chairman said that he had received a number of encouraging letters from people who were interested in the project he had in mind, and had expressed their willingness to become vice-presidents. Professor Frankland had written expressing gratification that his father's memory was to be kept alive by the formation of a society.

Professor H. E. ARMSTRONG said that he felt it was a most admirable thing to make such a man as Frankland a local hero. Frankland went to Lancaster at a very early age, and remained there until 1845, attending a private school and afterwards the Grammar School. He later worked with him as he had done with many others but he never knew anyone with greater experimental ability than he had. He wished to point out that during that time when Frankland was imbibing a certain amount of chemistry, he was also working on his own account in several other ways. He was a keen reader and botanist. Therefore, in founding that organisation, he hoped they would not merely think of Frankland as a chemist but a man of widely cultured attainments. When, in 1851, he came to Manchester to become professor of chemistry at Owens College, his salary was only about £150 a year. He built up a considerable consultative practice. The year 1851 would, sooner or later, come to be recognised as an important year in English history; it was the year of the Great Exhibition when we showed to the world the extraordinary way we had developed the engineering and textile industries.

In the summer of 1866, Frankland suggested to him that he should join in the development of methods of water analysis, particularly in association with sewage contamination. In 1868, he was appointed a member of the commission charged with the duty of finding a solution of the pollution of the rivers and drinking water of the country, and the work he did in that connection would give Frankland his reputation in the future. He gave this country a pure water supply. Until then, no water was safe unless they got it straight from the hills. For that reason, if no other, they could not confine their society to Lancaster alone. They had too many associations and clubs in this country, and he desired a more intimate term used for the organisation they were founding. He thought they should aim at a brotherhood, welcoming all sorts and conditions of men, because in helping one another, they would each in turn benefit.

Reproduced by courtesy of the Lancaster Observer

Professor H. E. Armstrong, founder-president of the new society to be formed at Lancaster in memory of Sir Edward Frankland, with other supporters of the proposal at last week's meeting

Professor Armstrong went on to say that he desired to see a step taken which would rank in importance with that taken in 1868, when the rivers commission was established and through which they obtained a pure water supply. Milk was the one complete food we needed, and its condition to-day was very much like that of water when Frankland began his work. Very little of the milk of this country to-day was safe, in the sense of being free from bacteriological impurities of an undesirable character, to put it at its lowest. As they knew, a great deal of the milk was said to carry the organism responsible for tubercular disease. Farmers, generally, were doing their utmost to produce good milk, but not all were succeeding. He urged that the time had come when they should take into account their milk supply in the way in which Frankland took into account the water supply, and no monument to his memory would be more fitting.

A vote of thanks was proposed to Professor Armstrong by Mr. I. Helme, which was seconded by Dr. Shackleton Bailey. Mr. French intimated that Professor Armstrong had promised to become president of the new society.

Pease and Partners, Ltd.

Scheme of Arrangement Sanctioned

IN the Chancery Division on January 23, Mr. Justice Maugham was asked to sanction a scheme of arrangement between Pease and Partners, Ltd., colliery owners and ironmasters, and their 5 per cent debenture stock holders, and to confirm a reduction of the company's capital from £3,000,000 to £1,500,000.

Mr. WILFRED GREENE, K.C., for the company, said the depression in the coal and heavy industries had involved a large loss of capital, and made it necessary for the company to meet its creditors. The debts covered by the scheme were three issues of 5 per cent. second debenture stock. The liabilities to unsecured creditors affected by the scheme amounted to £1,680,000, of which £1,378,000 was due to the company's bankers. There was overwhelming majorities in favour of the scheme, which cancelled 10s. per share of the B1 shares. The resultant 10s. shares were sub-divided into shilling shares, and nine of these were surrendered for the benefit of creditors. Regarding the debenture stock the scheme provided for a 30 per cent. surrender, and the issue of 10s. shares to the holders. The unsecured creditors were to receive credit notes for 70 per cent. of the amount of their debts, and an allottment of 10s. ordinary shares for the remaining 30 per cent. A proportion of the available profits from 1933 to 1938 was to be applied in redemption of the credit notes.

Mr. JUSTICE MAUGHAM said small shareholders living where the company carried on business had written to him explaining that the result of this scheme was a very serious matter for them. He asked Mr. Greene to explain how this was the best thing that could be done.

Mr. Greene said if the scheme did not go through the creditors would be able to take the assets and, on a forced sale, there would not be a penny left for anybody. It was only by means of this scheme and the concessions made by the company's creditors that the company would remain as a going concern. The industrial depression had hit this company so hard that for the last five years it had lost between £200,000 and £300,000 a year. That had been reduced last year to £148,000. "Nothing could be more unfortunate than that small shareholders should lose their savings, but the position would be much worse for them if it were not for this scheme," said Mr. Greene. "In fact, is is a case of this scheme or nothing."

Mr. JUSTICE MAUGHAM, sanctioning the scheme and confirming the reduction of capital, said he had scrutinised the details with great care in the interests of those people in a humble position in life, as well as in the interests of the larger shareholders and others concerned. Unless the scheme went through the position of the company would be perfectly hopeless, and not a penny would be forthcoming for the ordinary shareholders.

Indian Shellac Industry

Scheme to Assist Consumption and Improve Quality

TO increase the consumption of shellac and improve the condition of the industry, investigations and research work have recently been given serious attention. This year a subcommittee of the Imperial Institute assisted with various technical shellac problems of consumers in order to increase consumption. The British Electrical Research Association is not unsympathetic and is assisting in the promotion of research on the utilisation of shellac as well as in the improvement and standardisation of buying specifications in each case the circumstances being such as to call for speedy and concerted action. In relation to the buying specification, the British National Committee of the International Electro-technical Commission has circulated proposals to all countries interested for opinion and necessary action, and, next Spring, there will be a further meeting of the Commission to reach final decisions. Pure shellac, free from rosin and orpiment, is the over-riding stipulation; if adulterants are required, consumers do not seek prior assistance in applying them, and the attitude required, on the part of Calcutta shippers, is rigid adherence to consumers' requirements.

The Late Dr. John Thomas

Death of a Pioneer in the Dyestuffs Industry

BY the death of Dr. John Thomas at the early age of 46, which as reported in THE CHEMICAL AGE last week, occurred at his home at Wilmslow, Cheshire, on January 18, the British dyestuffs industry loses one who will be remembered as among its most honoured pioneers. His energy and enthusiasm were known to all, to many also the charm of manner which captured the loyal and whole-hearted support of his colleagues in the arduous early organisation of the manufacture of complicated anthraquinone vat dyes leading to the marketing of such outstanding achievements as the Duranol colours and Caledon jade green.

The late Dr. J. Thomas

Dr. Thomas was born at Harlech in 1886 and educated at the Barmouth County School, leaving school at the age of twelve. Through the interest of his employer and former schoolmaster he sat for a scholarship which took him to the secondary school, whence he went to Aberystwyth University College. Subsequently he went to Trinity College, Cambridge, with an 1851 Research Scholarship and gained a post as graduate researcher in addition to which he took the Gordon Wigan Prize in chemistry, a university award. During this period he published several papers in the Journal of the Chemical Society. The degree of Doctor of Science was awarded to him later by the University of Wales for his researches on explosives.

In 1911 he entered the National Physical Laboratory at Teddington as a research chemist in the aeronautical section. This appointment he left in 1912 when he joined the chemical staff of the Nobel's Explosives Co., Ardeer. His investigations during the next few years in the field of explosives outside the accepted ranges of stability earned him as already stated academic recognition that is rarely given to an industrial investigator.

Dr. Thomas left this position in 1918, when he entered on the final stage of his career and became associated with the development of the British dyestuffs industry as chief chemist to the Solway Dyes Co. Two years later when the company was reconstituted as Scottish Dyes, Ltd., he became director, in 1923 managing director, and eventually joint managing director of the Dyestuffs Group of Imperial Chemical Industries, Ltd. The details of Dr. Thomas's part in the development of Scottish Dyes, Ltd., need no recapitulation. His contribution to the discovery of Caledon jade green and of Caledon Blue R.C. alone entitles him to be considered one of the great discoveries of the industry. Dr. Thomas holds an honoured place among the names of those responsible for the re-establishment of the British dyestuffs industry.

Sicilian Essential Oils

Disposal of Bergamot Oils

IT is reported from Sicily that the production of lemon oil during the last year was from 55 per cent. to 60 per cent. below the 1930-31 output. Despite last season's lower production, a fair sized stock of lemon oil still remains available because of the heavy carry-over last December. Earlier estimates of an abundant crop of lemons this season are confirmed and the export demand for the fresh fruit is unusually good. The experiment in monopolistic marketing of bergamot oil has proved a failure. In order that the accumulated stocks of 600,000 Sicilian pounds of oil of the Consortium shall not weigh on the market upon its liquidation and prejudice the sale of oil of the new crop, the stocks will be taken over by the government and sold locally through the liquidation committee of the Consortium for purposes other than perfumery. It is stated that the oil of the Consortium so treated as to make its use as a perfume impossible, will be marketed chiefly for use in the manufacture of disinfectants and ship paints.

Letters to the Editor

Evils of Laboratory Cramming

SIR,—A much considered and discussed point in chemical training is the present day speed with which students are forced to acquire, as against assimilate, technical knowledge. With ever widening limits and increasing scope, lectures tend to become longer and more frequent with, perhaps, a hurried demonstration, whilst the time devoted to practical laboratory work is severely curtailed, hurried, and, generally speaking, highly unsatisfactory. It would be interesting at this point were it possible to place on record the percentage of experiments or problems, set in the normal course, which are thoroughly and properly completed. It is suggested that the proportion would be surprisingly low. The pupil who mentions the fact of an unfinished experiment is usually countered with a remark of this nature:—" Oh yes, I'm afraid there won't be time to finish that off, but anyway, you've got the idea of the thing haven't you." And so the next experiment is presented to the boy, to meet but a similar fate.

The evils consequent upon these causes are obvious, but what is not so obvious is that they serve to mask a trouble which is very dire and is the source of much bother to students of chemistry during graduation and in their subsequent careers. Lack of skill and cleanliness in general manipulation is, to a large extent, due to the present methods of " cramming " 'during the early stages of the pupils learning. The writer, having occasion to visit the laboratories of a prominent public school, was appalled at the disgusting state of the boys' benches after the hurried operation of one or two simple chemical experiments.

At the end of the one hour class a horde of laboratory boys made an heroic onslaught on the test-tube and pool strewn benches, cleared away and mopped up everything, replacing bottles on reagent shelves and put out a further supply of gear for the use of the fresh batch of innocents then arriving. A short study of several such classes, of varying stages of knowledge, soon convinced one that here was a basic fault. Greatly daring, the subject was mentioned to the senior science master—a young man of the new school. His reply was illuminating. " I know," he said, " that the boys haven't much idea of neatness and clean working, but our time is so short that we cannot help it." A suggestion that if the boys were to prepare their own apparatus, etc., some idea of manipulation and cleanliness of working would be imbibed, evoked the reply: " I quite agree! But again, we have so little time, and we have ample laboratory staff, so why not use it? Anyway, the boys get a sense of chemical order, etc., *knocked into them at the University.*

What a statement to come from one who has charge, as it were, of the very fount of chemical knowledge—avoiding a primary duty and foisting it upon the unwilling shoulders of our university professors! And do the boys get this essential sense of clean and neat working at any university? One fears not—ask any chemist or scientist of the old school, or better, visit the seats of learning!

The correct sense of clean manipulation is acquired by the great majority after graduation, when the stringent conditions of a professional career force them to pay attention to these matters, which thus become a conscious effort when, had earlier training been correct, instinct would have sufficed. Surely then, it behoves the science tutors of our young to see to it that these necessary arts are implanted at the earliest stage possible, even if the speed and volume of that early training is retarded a little, for there is always the happy thought that later, when speed may really be assimilated by the pupil, the habits formed will hold good and help considerably, and the edifice of scientific learning have at least one sound brick in its foundations.—Yours faithfully,

" AB INITIO."

London, N.W.

Santonin Production in India

ACCORDING to the sole concessionaire for minor forest products in Kashmir, santonin is being produced in his factory in Baramula, Kashmir, to the extent of about 27 cwt. annually. It is also stated that this santonin is up to British Pharmacopoeia standards.

Ammonium Phosphate

New Manufacturing Process in Norway

ACCORDING to a recent Norwegian patent (No. 47,380) the Norsk-Hydro is now exploiting the waste hydrogen and chlorine gases resulting from alkali chloride electrolysis. The hydrogen is converted into synthetic ammonia which is subsequently worked up to ammonium phosphate with the aid of phosphoric acid obtained by reaction of the waste chlorine with calcium phosphate and carbon monoxide. Phosphorus oxychloride is obtained by this reaction, which is decomposed by water with formation of phosphoric acid. It is interesting to note that the carbon dioxide produced in this series of reactions is reconverted into carbon monoxide by passage over red-hot carbon.

The Institute of Chemistry

January Examination Results

IN the January examination in general chemistry held by the Institute of Chemistry for the Associateship of the Institute the following candidates were included in the pass list:—

A. P. Backshell, University College, London, and Central Technical College, Birmingham; G. C. Bailey, B.Sc. (Lond.), West Ham Municipal College, and Birkbeck College, London; E. W. Basham, University College, London; R. J. S. Broscomb, B.Sc. (Lond.), Central Technical College, Birmingham; T. St. J. Eve, Central Technical College, Liverpool; S. C. Mitchell, B.Sc. (Lond.), Sir John Cass Technical Institute, London; G. H. Moore, Merchant Venturers' Technical College, Bristol; J. S. Ramskill, Widnes Municipal Technical College; R. J. Shennan, Polytechnic, Regent St., London; J. H. F. Smith, Polytechnic, Regent Street, London; C. T. Webster, Chelsea Polytechnic, London; and E. White, Polytechnic, Regent Street, London.

New Uses for Aluminium

Result of International Aluminium Competition

IT will be recalled that the world producers of aluminium decided to renew in 1932 the international competition, open to technical workers in every part of the world, originated with the object of awarding prizes for the best suggestions made relative to the use of aluminium and its alloys. The competition jury who met in December of last year have now allocated the 20,000 Swiss francs voted for the prize-money, as follows:—4,000 fr. to Dr. Eckert, of Grevenbroich (Germany), for his researches on the protection of aluminium and its alloys by the M.B.V. process; 4,000 fr. to Mr. Philippe, of Paris, for his memorandum on the use of aluminium alloys in gas or oil-fired central heating plant; 3,000 fr. to Mr. Y. Hirakawa, of Yawata (Japan), for his article on aluminium tuyères for blast furnaces; 3,000 fr. to Mr. Th. Schweizer, of Zurich, for his memorandum on the use of aluminium for grain silos; 2,000 fr. to Mr. Py, of Paris, for an improved model of an aluminium alloy bicycle; 2,000 fr. to Mr. Steinborn, of Rodange (Luxemburg), for his study of the possibilities of the use of aluminium and its alloys in blast furnaces and steel works; and 2,000 fr. to Mr. H. Tatu, of Lyons, for his memorandum on the use of aluminium in dyeing and cleaning.

The international aluminium competition for 1932 met with a better response than that of 1931, in the technical circles of most countries. More than 1,000 persons addressed inquiries to the Bureau International de l'Aluminium as to the details of the competition and 405 memoranda were received, which in the great majority of cases were based on serious investigations and showed an expert knowledge of the light metals.

Fruit Canning in South Africa

A NEW canning factory has been opened officially at Bellville, near Cape Town, and in a normal working day this has a capacity of 30,000 cans. A working arrangement between canners and growers has been arrived at, and it has been agreed that at first only apricots, pears and peaches are to be dealt with, but as the factory increases the scope of its operations many other sorts of fruit will be treated.

News from the Allied Industries

Explosives

THE DIRECTORS OF CAPE EXPLOSIVE WORKS, LTD., after a careful consideration of all the factors involved, have decided to abandon the proposal to liquidate the company and repay the 5½ per cent. Debenture stock. The company is controlled by African Explosives and Industries, Ltd., which, in turn, is jointly controlled by Imperial Chemical Industries, Ltd., and De Beers Consolidated Mines, Ltd.

Non-Ferrous Metals

THE WORLD ZINC PRODUCTION during 1932 is stated by the Metal Co., of Frankfort, to have been 780,108 tons—a decrease of 230,090 tons compared with 1931. European production dropped by 105,395 tons, to 398,447 tons, American output by 114,767 tons, to 301,352 tons, and Australian production by 2.691 tons, to 50,309 tons. Asia's production remained practically unchanged, amounting to 30,000 tons, as against 30,200 tons in 1931. Figures concerning the African production are not available. The German output was 41,955 tons, as against 45,313 tons in the previous year.

Paint and Varnish

BLUNDELL, SPENCE AND CO., paint and varnish manufacturers, of Hull and London, report a further recovery during the year ended October last, the net profit having risen from £16,602 to £26,627. For each of the two years 1929-30 and 1930-31 only the preferred dividend was paid, but the directors resume payments on the ordinary capital with a 3 per cent. distribution. Moreover, this time £4,876 is placed to general reserve, raising that fund to £50,487 and the carry forward is increased from £7,648 to £10,072. Subsidiary concerns have recently been established in Chile and Australia. The sum of £9,715 has been spent during the year on maintenance, repairs and additions.

Matches

CREDITORS of the International Match Corporation are to meet on February 8 to consider the settlement with the Swedish banks providing for the return of about £5,000,000 of German bonds to the company.

Rubber

IMPORTANT DEVELOPMENTS in connection with the direct use of rubber latex have induced the Rubber Growers' Association to issue a revised and enlarged edition of "Rubber Latex," by H. P. Stevens, F.I.C., and W. H. Stevens, A.I.C. The book deals with the properties, composition, coagulation, concentration, manipulation, and compounding of latex and latex pastes and their stabilisation for industrial purposes. The vulcanisation of latex and its products, dipping and electro-deposition and the marketing and applications of latex are also discussed. The secretary of the Rubber Growers' Association, at 2, Idol-lane, Eastcheap, E.C.3, will be pleased to send a copy of the book to those interested in this subject.

RESTRICTION OF OUTPUT is again the subject of keen discussion in the rubber market. The hope is entertained that the low price of the commodity will force the Dutch authorities to find a way to overcome the difficulties which, they have maintained, exist in exercising control over their native producers. At the same time, although the reduced price makes it still more unprofitable to the estate owners to produce and may cause further suspensions of tapping, it is considered by many that this process is far too slow to bring about a balanced position between production and consumption and reduce existing stocks to normal proportions within anything like a reasonable period. It is therefore urged that official control is essential, and that this can be best effected by regulation of exports from producing countries.

What is Infringement?

Adjourned Motion Against Canterbury Man

IN the Chancery Division on Friday, Mr. Justice Bennett had before him a motion by Irving's Yeast Vite, Ltd., against Frederick Alexander Horsenail, of Canterbury, for an interim injunction to restrain infringement of the trade mark "Yeast Vite" and from passing off a pharmaceutical preparation not made by the plaintiff company as and for "Yeast Vite."

The defendant did not appear but had written to the plaintiff company's solicitors that he would consent to a perpetual injunction.

Mr. Kenneth Swan, for the plaintiffs, said the alleged infringement involved the use of the trade mark on or in connection with the defendants goods and the alleged passing off, the defendant having published printed matter to the effect that his goods and "Yeast Vite" tablets were made according to the same formula.

Mr. Swan read evidence that the defendant offered for sale bottles bearing the label "Yeast tablets, a substitute for Yeast Vite," and that an analysis showed that the defendants' yeast tablets were deficient in certain ingredients contained in the "Yeast Vite" tablets and therefore the formula was not the same.

His lordship asked if the label referred to was an infringement, as the defendant did not seem to have used the trade mark to describe his goods.

Mr. Swan said he could only describe his goods by invoking the plaintiff company's trade mark. The defendant was using the mark "Yeast Vite" for the purpose of catching the eye of the public. He had no right to use the mark at all or to sell his goods by reference to the advertised article, instead of on their merits.

His lordship said he would be prepared to grant an interim injunction to restrain passing off but as to infringement he was not satisfied on the point.

Mr. Swan said he would look up the legal authorities.

His lordship said he would like to see if there was anything more to be said on the law, and he adjourned the motion for a week.

New Applications for Dry Ice

Ideal Diluent for Fumigation Purposes

SOLID carbon dioxide has only been available in commercial quantities for a few years but has already proved to be of value in the chemical and allied industries. Of more direct interest to the chemical manufacturer are its applications to the production of azo dyes, explosives, paper, and sugar. Interest has also been aroused by its possibilities to solvent recovery processes as outlined by Brégeat (Ger. Pat. No. 520,076). In the cold storage industries, the introduction of "dry ice" represents a decisive improvement over ordinary wet ice. Apart from the saving in space represented by the fact that it possesses, weight for weight, ten times the cooling action of frozen water, it does not involve any risk of disintegration of frozen meat and fish, such as occurs by penetration of melted water, while the intensely cold refrigerant acts at the same time as a preservative. Special containers have now been designed for the transport of butter in dry ice, which has also proved an excellent accessory to the preservation of beer in store.

An interesting development of "dry ice" application is in connection with fire prevention, a special plant having been installed at the Barking Power Station. A portable dry ice extinguisher has also been designed by the Total-Gesellschaft, of Berlin. Mention may also be made of the service which can be rendered by "dry ice" in the extermination of insect pests. Mixed with ethylene oxide (according to American Department of Agriculture) it has been found to kill the insects present in grain before transference to grain elevators, whilst the Deutsche Gold and Silver Scheide-anstalt propose the application of a mixture of dry ice and hydrocyanic acid in tablet form for fumigation purposes, the danger to the operator being thereby much lessened.

A REFINING and recovery factory owned by the Titanium Products Pty. (Lts.), at Brooklyn, near Melbourne, is nearly finished and production of titanium oxide will soon be started. The pigment will be extracted from ilmanite deposits.

Inventions in the Chemical Industry

Specifications Accepted and Applications for Patents

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

Separation of Fatty Acids

LIQUID fatty acids are separated from the solid ones in neutral fats or fatty acid mixtures by saponifying completely with a mixture of lime and soda or other alkalies forming an insoluble soap from the solid acids and a soluble one from the liquid acids, and filtering, centrifuging, or otherwise separating the soaps. Or the fat, etc., may be first saponified completely to the soluble or the insoluble soap, and the soap partially transformed by treatment with the other alkali. Preferably the proportion of lime or baryta to soda or potash corresponds to the proportion of solid to liquid fatty acids. In an example, 200 kg. of bone fat containing 45 parts of olein to 55 parts of stearin, is partially saponified in presence of sufficient water by 15 kg. of calcium hydrate of 90 per cent. purity; 29 litres of 40 per cent. soda lye are then added and the saponification completed. The mass is left in cold water for a time, and then centrifuged or filter-pressed. The separated soaps are used as such or are decomposed by sulphuric or other acid to isolate the acids. (See Specification No. 369,066, of E. Schlenker.)

Stabilising Petrol

CRACKED hydrocarbon condensate is degummed and stabilised by heating it to 700 to 800° F. but below recracking temperatures under a pressure of about 70 atmospheres for about 30 minutes. The optimum temperature ranges are 790 to 830° F. for condensates obtained by liquid phase cracking, 770 to 810 for vapour phase products, and 735 to 795° F. for drips from plant handling cracking still gases. The condensate may be divided into fractions which are treated at different temperatures and the treatment may be carried out in the presence of hydrogen as pressure agent. (See Specification No. 370,672 of Gulf Refining Co.)

Applications for Patents

MANUFACTURE OF ALCOHOLS. Air Reduction Co., Inc. Jan. 21. (United States, Feb. 8, '32.) 2026.

HEAT TREATMENT OF EASILY-OXIDISABLE METALS. Aluminium, Ltd. Jan. 20. (United States, March 2, '32.) 1977.

WORKING ALUMINIUM BASE ALLOYS. Aluminium, Ltd. Jan. 20. (United States, March 30, '32.) 1978.

CHEMICAL CLEANING OF ARTICLES. American Chemical Paint Co. Jan. 16. 1459.

CHEMICAL CLEANING COMPOSITIONS. American Chemical Paint Co. Jan. 16. 1460.

METHOD OF PREPARING CARBON. American Dyewood Co. Jan. 20. (United States, Jan. 25, '32.) 1892.

PURIFICATIONS, ETC., OF SOLUTIONS. G. Austerwell and C. Jeanprost. Jan. 19. (June 2, '32). (Germany, Jan. 20, '32.) 1812.

MANUFACTURE OF DERIVATIVES OF 8-AMINO-QUINOLINE, ETC. C. F. Boehringer and Soehne Ges. Jan. 16. (Germany, Jan. 16, '32.) 1440.

TREATMENT OF NATURAL PRODUCTS CONTAINING VITAMINS. British Drug Houses, Ltd., F. H. Carr and W. Jewell. Jan. 17. 1541.

MAKING KETENE. Carbide and Carbon Chemicals Corporation. Jan. 20. (United States, Feb. 5, '32.) 1970.

CRUCIBLE FURNACES. W. M. Carr. Jan. 21. 2058.

CORROSION-RESISTING IRON ALLOYS. Compagnie des Forges de Chatillon Commentry et Neuves-Maisons. Jan. 19. (France, Dec. 29, '32.) 1807.

MANUFACTURE OF WEATHER-PROOF LUMINOUS SUBSTANCES. I. G. Farbenindustrie. Jan. 16. (Germany, Jan. 14, '32.) 1418.

MANUFACTURE OF DYES, ETC. I. G. Farbenindustrie. Jan. 17. (Germany, Jan. 18, '32.) 1542.

MANUFACTURE OF WATER SOLUBLE AZO DYESTUFFS ON THE FIBRE. I. G. Farbenindustrie. Jan. 18. (Germany, Jan. 18, '32.) 1676.

MANUFACTURE OF CHROMIC HYDROXIDE, ETC. I. G. Farbenindustrie. Jan. 19. (Germany, Jan. 20, '32.) 1817.

SENSITISING PHOTOGRAPHIC SILVER-HALIDE EMULSIONS.. I. G. Farbenindustrie. Jan. 19. (Germany, Jan. 19, '32.) 1830.

TREATMENT OF TEXTILE MATERIALS. Imperial Chemical Industries, Ltd. Jan. 17. 1562.

INTERMEDIATES FOR DYESTUFFS. Imperial Chemical Industries, Ltd., F. Lodge and N. H. Haddock. Jan. 20. 1922.

CONCENTRATION OF LIQUORS. A. R. Jahn. Jan. 19. 1841.

MANUFACTURE OF MOTOR FUEL. J. Y. Johnson (*I. G. Farbenindustrie*). Jan. 19. 1800.

MANUFACTURE OF IRON HAVING GOOD MAGNETIC STABILITY. J. Y. Johnson (*I. G. Farbenindustrie*). Jan. 21. 2019.

MANUFACTURE OF PURE SULPHUR. J. Y. Johnson (*I. G. Farbenindustrie*). Jan. 21. 2020.

PRODUCTION OF MONOBASIC ALUMINIUM SULPHITE. T. Goldschmidt Akt.-Ges. Jan. 20. (Germany, Jan. 25, '32.) 1924; Jan. 20. (Germany, Feb. 22, '32.) 1925 (cognate with 1924).

MANUFACTURE OF HIGH MOLECULAR SULPHIDES OF THE ALIPHATIC SERIES. Henkel et Cie Ges. Jan. 16. (Germany, Feb. 19, '32.) 1412. Jan. 16. (Germany, March 11, '32.) 1413 (cognate with 1412.)

MANUFACTURE OF N-ALLYL- AND N, N[1]-DIALLYL-C, C-DISUBSTITUTED BARBITURIC ACIDS. F. Hoffmann-La Roche and Co. Akt.-Ges. Jan. 20. (Germany, Feb. 29, '32.) 1913.

PREPARATION OF TITANIUM AND IRON COMPOUNDS. W. B. Llewellyn. Jan. 18. 1608.

ELECTRICALLY PRECIPITATING SUSPENDED PARTICLES FROM A GAS. Lodge-Cottrell, Ltd. (*Research Corporation of New York.*) Jan. 18. 1703.

PRECIPITATING ZIRCONIUM, ETC., ON A CORE OF HIGHLY REFRACTORY MATERIAL. Naamlooze Vennootschap Philips' Gloeilampenfabrieken. Jan. 17. (Germany, Feb. 3, '32.) 1556.

TREATMENT OF ALUMINOUS MATERIALS. G. Osborne and H. Spence. Jan. 19. 1740.

MAKING STABLE SOLUTIONS OF SODIUM SALT OF DIAMINODIHYDROXY-ARSENO-BENZENE METHYLENESULPHINIC ACID. B. Reuter. Jan. 21. 2061.

SEPARATING DI-ACETYLENE FROM GASES. Ruhrchemie Akt.-Ges. Jan. 17. (Germany, Feb. 5, '32.) 1580.

PRODUCTION OF CATALYSTS. "S. I. R. I." Soc. Italiana Ricerche Industriali. Jan. 16. (Italy, Feb. 23, '32.) 1417.

MANUFACTURE OF SULPHONIC ACIDS OF THE TERPENE SERIES. Soc. of Chemical Industry in Basle. Jan. 20. (Switzerland, Jan. 21, '32). 1944.

WORKING ALUMINIUM BASE METALS. A. H. Stevens (*Aluminium, Ltd.*). Jan. 21. 2067.

FORMATION OF METAL ALLOYS. A. H. Stevens (*American Smelting and Refining Co.*). Jan. 20. 1975.

STAINLESS SILVER ALLOY. T. Tanabe. Jan. 21. 2034.

PROCESS OF PRODUCING FORMALDEHYDE. C. Zanleoni and Industrie Chimiche Barzahi Société Anonyme. Jan. 16. 1407.

Specifications Accepted with Dates of Application

PREPARATION OF COMPOSITIONS CONTAINING SYNTHETIC RESINS AND SOLUBLE ALGINATES. V. Lefebure. April 2, 1931. 386,328.

MANUFACTURE AND PRODUCTION OF POTASSIUM BICARBONATE. J. Y. Johnson (*I. G. Farbenindustrie*). Aug. 24, 1931. 386,351.

DYEING WITH VAT DYESTUFFS. Bleachers' Association, Ltd., C. S. Parker, C. L. Wall, and F. Farrington. Sept. 19, 1931. 386,365.

MANUFACTURE AND PRODUCTION OF VAT DYESTUFFS OF THE 1.2-BENZANTHRAQUINONE SERIES. J. Y. Johnson (*I. G. Farbenindustrie*). Dec. 9, 1931. 386,411.

PROCESS FOR CONVERTING POTASSIUM CHLORIDE OR CRUDE SALTS AND MIXTURES CONTAINING POTASSIUM CHLORIDE INTO STORABLE AND READILY DISTRIBUTABLE FORM. Kali-Forschungs-Anstalt Ges. Oct. 6, 1931. 386,466.

MANUFACTURE OF METALLIC COMPOSITIONS. Hawshaw Chemical Co. March 10, 1932. 386,499.

METHOD OF EXTRUDING METAL SECTIONS WITH PROGRESSIVELY DIMINISHING CROSS-SECTION. A. L. Mond (*I. G. Farbenindustrie*). May 20, 1932. 386,518.

PROCESS FOR WORKING UP FILM WASTE, CELLULOID, AND OTHER PRODUCTS CONTAINING NITROCELLULOSE. F. K. Jahn. July 20, 1931. 386,530.

MANUFACTURE OF BISMUTH SALTS OF ARSENO-COMPOUNDS. I. G. Farbenindustrie. June 11, 1931. 386,537.

CENTRIFUGING PROCESS FOR SEPARATING THE MOTHER LIQUOR FROM CRYSTALS OF CRYSTALLINE SYRUP. Raffinerie Tirlemontoise Soc. Anon. July 9, 1931. 386,561.

PROCESS FOR THE MANUFACTURE OF HEAVY METAL COMPOUNDS OF THIO-SUBSTITUTED CARBOHYDRATES. Schering-Kahlbaum Akt.-Ges. Aug. 3, 1931. 386,562.

CARBON DIOXIDE CONTAINERS. Carbon Dioxide Co., Ltd., and C. E. Paul. July 12, 1932. 386,565.

MANUFACTURE OF STABLE SALTS OF DIALKYL-AMINOARYLPHOSPHINOUS ACIDS. I. G. Farbenindustrie. July 24, 1931. 386,575.

Weekly Prices of British Chemical Products

Review of Current Market Conditions

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

THERE has been a fairly satisfactory demand for chemical products in the London market during the past week, with the market firm in practically every section. There are very few changes to report in prices generally. Whilst deliveries against existing commitments in the Manchester area are maintained at least up to their recent level, there has been little indication on the chemical market during the past week of new business opening out appreciably, and sellers in most instances report the bulk of current transactions to relate to near deliveries. In the meantime, however, values generally are steady to firm, and sign of actual weakness is confined to one or two sections. Business in the Scottish market has been normal during the week and there are no important changes to report.

General Chemicals

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

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

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

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

ACID, CITRIC.—LONDON: 10d. less 5%. MNACHESTER: 9¾d.

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

ACID, FORMIC.—LONDON: £52 per ton.

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

ACID, LACTIC.—LANCASHIRE: Dark tech., 50% by vol., £24 10s per ton; 50% by weight, £28 10s.; 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 £20 per ton makers' works, according to district and quality. SCOTLAND: 80°, £23 ex station full truck loads.

ACID, OXALIC.—LONDON: 48s. to 57s. 6d. per cwt. according to packages and position. SCOTLAND: 98/100%, £49 to £52 ex store. MANCHESTER: £50 ex store.

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

ACID, TARTARIC.—10½d. per lb. SCOTLAND: B.P. crystals, 10½d., carriage paid. MANCHESTER: 10½d.

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

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

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

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

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

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

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

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

ANTIMONY OXIDE.—SCOTLAND: Spot, £22 per ton, c.i.f. U.K. ports.

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

ARSENIC.—LONDON: £22 14s. c.i.f. main U.K. ports for imported material; Cornish, nominal, £23 f.o.r. mines. SCOTLAND: White powdered £27 ex wharf; spot, £27 10s. ex store. MANCHESTER: White powdered Cornish, £24 10s. at mines.

ARSENIC SULPHIDE.—Yellow 1s. 6d. to 1s. 8d. per lb.

BARIUM CHLORIDE.—£11 per ton.

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

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

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

CADMIUM SULPHIDE.—3s. 1d. to 3s. 5d. per lb.

CALCIUM CHLORIDE.—Solid 70/75% spot £5 5s. to £5 15s. per ton d/d station in drums.

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

CARBON BLACK.—3¾d. to 5¼d. per lb., ex wharf.

CARBON TETRACHLORIDE.—£40 to £45 per ton, drums extra.

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

CHROMETAN.—Crystals 3¾d. per lb. Liquor £19 10s. per ton d/d.

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

CREAM OF TARTAR.—LONDON: £4 5s. per cwt.

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

LAMPBLACK.—£46 to £50 per ton.

LEAD ACETATE.—LONDON: White, £34 per ton. Brown, £1 per ton less. SCOTLAND: White crystals, £34 to £36 c.i.f. U.K. ports. Brown, £1 per ton less. MANCHESTER: White, £32 10s.; Brown, £31.

LEAD NITRATE.—£28 per ton.

LEAD, RED.—SCOTLAND: £28 10s. per ton d/d buyer's works.

LEAD, WHITE.—SCOTLAND: £40 per ton carriage paid.

LITHOPONE.—30%, £18 to £19 per ton.

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

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

NICKEL AMMONIUM SULPHATE.—£54 per ton d/d.

NICKEL SULPHATE.—£54 per ton d/d.

PHENOL.—10d. to 11d. per lb. nominal.

POTASH, CAUSTIC.—LONDON: £42. MANCHESTER: £41.

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

POTASSIUM CHLORATE.—3¾d. per lb. ex wharf London in 1-cwt. kegs. LONDON: £37 to £40 per ton. SCOTLAND: 99¾/100% powder, £34. MANCHESTER: £37.

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

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

POTASSIUM PERMANGANATE.—LONDON: 8¼d. per lb. SCOTLAND: B.P. crystals, 8½d. MANCHESTER: Commercial, 8¼d. B.P., 8¾d.

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

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

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

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

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

SODIUM ACETATE.—£22 per ton. LONDON: £23 to £24.

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

SODIUM BICHROMATE.—Crystals cake and powder 4d. per lb. net d/d U.K. discount according to quantity. Anhydrous 5d. per lb. LONDON: 4d. per lb. with discounts for quantities. SCOTLAND: 4d. delivered buyer's premises with concession for contracts. MANCHESTER: 4d. less 1 to 3½% contracts, 4d. spot lots.

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

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

SODIUM CHLORATE.—£32 per ton.

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

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

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

SODIUM PERBORATE.—LONDON : 10d. per lb.
SODIUM PHOSPHATE.—£13 per ton.
SODIUM PRUSSIATE.—LONDON : 5d. to 5½d. per lb. SCOTLAND : 5d. to 5¾d. ex store. MANCHESTER : 5d. to 6d.
SODIUM SILICATE.—140° Tw. Spot £8 5s. per ton d/d station returnable drums.
SODIUM SULPHATE (GLAUBER SALTS).—£4 2s. 6d. per ton d/d. SCOTLAND : English material £3 15s.
SODIUM SULPHATE (SALT CAKE).—Unground Spot £3 15s. per ton d/d station in bulk. SCOTLAND : Ground quality, £3 5s. per ton d/d. MANCHESTER : £3 2s. 6d.
SODIUM SULPHIDE.—Solid 60/62% Spot, £10 15s. per ton d/d in drums; crystals 30/32%, £8 per ton d/d in casks. SCOTLAND : For home consumption, Solid 60/62%, £10 5s.; broken 60/62%, £11 5s.; crystals, 30/32%, £8 2s. 6d. d/d buyer's works on contract, min. 4-ton lots. Spot solid 5s. per ton extra. Crystals, 2s. 6d. per ton extra. MANCHESTER : Concentrated solid, 60/62%, £11 10s.; commercial, £8.
SODIUM SULPHITE.—Pea crystals spot, £13 10s. per ton d/d station in kegs. Commercial spot £9 10s. d/d station in bags.
SULPHATE OF COPPER.—MANCHESTER : £15 10s. to £16 per ton f.o.b.
SULPHUR.—£12 per ton. SCOTLAND : Flowers, £12 10s.; roll, £12; rock, £9. Ground American, £12 ex store.
SULPHUR CHLORIDE.—5d. to 7d. per lb., according to quality.
SULPHUR PRECIP.—B.P. £55 to £60 per ton according to quantity. Commercial, £50 to £55.
VERMILION.—Pale or deep, 4s. 6d. to 4s. 11d. per lb.
ZINC CHLORIDE.—SCOTLAND : British material, 98%, £18 10s. per ton f.o.b. U.K. ports.
ZINC SULPHATE.—LONDON and SCOTLAND : £12 per ton.
ZINC SULPHIDE.—1s. 1d. to 1s. 2d. per lb.

Pharmaceutical and Fine Chemicals

ACID, ACETYL SALICYLIC.—2s. 9d. to 2s. 11d. per lb.
ACID, SALICYLIC, TECHNICAL.—1s. 2d. to 1s. 4d. per lb.
AMIDOPYRIN.—20s. per lb.
BISMUTH.—Carbonate, 6s. 10d. per lb.; citrate, 9s. 3d. per lb.; nitrate (cryst.), 4s. 7d. per lb.; oxide, 10s. 6d. per lb.; salicylate, 7s. 7d. per lb.; subchloride, 10s. 3d. per lb.; subgallate, 7s. 3d. per lb.; subnitrate, 5s. 11d. per lb.
IODINE RESUB., B.P.—15s. 2d. to 19s. 3d. per lb.
IODOFORM.—B.P., cryst., precip., powder, 18s. 2d. to 22s. 6d. per lb.
PHENACETIN.—4s. 6d. to 4s. 9d. per lb. LONDON : 4s. 9¾d. per lb.
PHENOLPHTHALEN.—4s. 8d. to 5s. 8d. per lb.
POTASS. BITARTRATE 99/100% (cream of tartar).—£4 5s. per cwt.
POTASS. IODIDE, B.P.—13s. 5d. to 15s. 11d. per lb.
SODIUM IODIDE, B.P.—14s. 5d. to 17s. 6d. per lb.
SODIUM SALICYLIC.—Powder, 2s. to 2s. 8d. per lb.; crystal, 2s. 1d. to 2s. 2d. LONDON : Powder, 2s. 1d. to 2s. 8d., including packing and delivery; crystals, 1s. extra.
VANILLIN.—Ex clove oil, 16s. to 18s. per lb.; ex guaiacol, 14s. 3d. to 16s. 3d.

Essential Oils

BERGAMOT.—8s. per lb.
CAMPHOR.—Brown or white, 90s. per cwt.
CASSIA, 80/85%.—4s. 3d. per lb.
CITRONELLA.—Ceylon 2s. 4d. per lb.
CLOVE.—90/92% English, 4s. 10d. per lb.
EUCALYPTUS.—Australian B.P. 70/75%, 1s. per lb.
LAVENDER.—Mont Blanc 38/40%, 11s. 3d. per lb.
LEMON.—5s. 6d. per lb.
PEPPERMINT.—Wayne County, 14s. per lb.
PETITGRAIN.—6s. 3d. per lb.

Intermediates and Dyes

IN the following list of Intermediates delivered prices include packages except where otherwise stated :—
ACID, BENZOIC, 1914 B.P. (ex Toluol).—1s. 9½d. per lb.
ACID, GAMMA.—Spot, 4s. per lb. 100% d/d buyer's works.
ACID, H.—Spot, 2s. 4½d. per lb. 100% d/d buyer's works.
ACID, NEVILLE AND WINTHER.—Spot, 3s. per lb. 100% d/d buyer's works.
ACID, SULPHANILIC.—Spot, 8d. per lb. 100% d/d buyer's works.
ANILINE OIL.—Spot, 8d. per lb., drums extra, d/d buyer's works.
ANILINE SALTS.—Spot, 8d. per lb. d/d buyer's works, casks free.
BENZALDEHYDE.—Spot, 1s. 8d. per lb., packages extra.
BENZIDINE BASE.—Spot, 2s. 5d. per lb. 100% d/d buyer's works.
o-CRESOL 30/31° C.—£2 6s. 5d. per cwt., in 1-ton lots.
m-CRESOL 98/100%.—2s. 3d. per lb., in ton lots.
p-CRESOL 34.5° C.—1s. 9d. per lb., in ton lots.
DICHLORANILINE.—2s. per lb.
DIMETHYLANILINE.—Spot, 1s. 6d. per lb., package extra.
DINITROBENZENE.—8½d. per lb.
DINITROTOLUENE.—48/50° C., 8½d. per lb.; 66/68° C., 9d. per lb.
DIPHENYLAMINE.—Spot, 2s. per lb., d/d buyer's works.
α-NAPHTHOL.—Spot, 2s. 4d. per lb., d/d buyer's works.
β-NAPHTHOL.—Spot, £78 15s. per ton in paper bags, £19 15s. in
α-NAPHTHYLAMINE.—Spot, 11½d. per lb., d/d buyer's works.
β-NAPHTHYLAMINE.—Spot, 2s. 9d. per lb. d/d buyer's works.
o-NITRANILINE.—5s. 10d. per lb.
m-NITRANILINE.—Spot, 2s. 7d. per lb. d/d buyer's works.
p-NITRANILINE.—Spot, 1s. 8d. per lb. d/d buyer's works.
NITROBENZENE.—Spot, 4½d. per lb.; 5-cwt. lots, drums extra.
NITRONAPHTHALENE.—9d. per lb.
SODIUM NAPHTHIONATE.—Spot, 1s. 9d. per lb.
o-TOLUIDINE.—Spot, 9½d. per lb., drums extra, d/d buyer's works.
p-TOLUIDINE.—Spot, 1s. 11d. per lb., d/d buyer's works.
m-XYLIDINE ACETATE.—3s. 6d. per lb., 100%.

Coal Tar Products

ACID, CARBOLIC (CRYSTALS).—9d. to 10d. per lb. Crude, 60's, 1s. 11d. to 2s. per gal.; 2% water, 2s. MANCHESTER : Crystals, 9½d.; crude, 2s. 4d. SCOTLAND : Sixties, 1s. 7d. to 1s. 8d.
ACID, CRESYLIC.—99/100, 1s. 7d. to 1s. 8d. per gal.; B.P., 1s. 9d. to 1s. 11d.; Refined, 1s. 7d. to 1s. 9d.; Pale, 98%, 1s. 5d. to 1s. 7d.; Dark, 1s. 2d. to 1s. 3d. London: 98/100%, 1s. 3d. Dark 95/97%, 11d. SCOTLAND : Pale 99/100%, 1s. 3d. to 1s. 4d.; 97/99%, 1s. to 1s. 1d.; dark 97/99%, 11d. to 1s.; high boiling acid, 2s. 6d. to 3s.
ANTHRACENE OIL.—Strained, 4¾d. per gal.
BENZOL.—At works, crude, 10d. to 11d. per gal.; standard motor, 1s. 6½d. to 1s. 7d.; 90%, 1s. 7d. to 1s. 8d.; pure, 1s. 10d. to 1s. 11d. LONDON : Motor, 1s. 7½d. SCOTLAND : Motor, 1s. 6½d. to 1s. 7½d.; 90%, 2s. 0½d. to 2s. 1½d.
CREOSOTE.—Standard for export, 4¾d. to 5d. nett per gal. f.o.b. for Home, 3¾d. d/d. LONDON : 3d. to 3½d. f.o.r. North; 4d. to 4½d. London. MANCHESTER : 2½d. to 3¾d. SCOTLAND : Specification oils, 3¾d to 4¼d.; washed oil, 4d. to 4½d.; light, 3¾d. to 4½d.; heavy, 4½d. to 5d.
NAPHTHA.—Solvent, 90/160, 1s. 4d. to 1s. 6d. per gal.; 95/160, 1s. 7d. to 1s. 8d.; 90/160, 1s. 1d. to 1s. 2d. LONDON : Solvent, 1s. 3½d. to 1s. 4d.; heavy, 11d. to 1s. 0½d. f.o.r. SCOTLAND : 90/100, 1s. 3d. to 1s. 3½d.; 903192, 11d. to 1s. 2d.
NAPHTHALENE.—Crude, Hot-Pressed, £6 1s. 3d. per ton. Flaker, £10 per ton. Purified crystals, £9 10s. per ton in bags. LONDON : Fire lighter quality, £3 to £3 10s.; 74/76 quality, £4 to £4 10s.; 76/78 quality, £5 10s. to £6. SCOTLAND : 40s. to 50s.; whizzed, 65s. to 70s.
PITCH.—Medium soft, £4 17s. 6d. to £5 per ton. MANCHESTER : £4 15s. to £5 f.o.b. LONDON : £4 1s0. to £4 12s. 6d. f.o.b. East Coast port.
PYRIDINE.—90/140, 3s. 9d. per gal.; 90/160, 4s. to 4s. 6d.; 90/180, 2s. to 2s. 6d. SCOTLAND : 90/160%, 4s. to 5s.; 90/220%, 3s. to 4s.
REFINED COAL TAR.—SCOTLAND : 4¾d. to 5s. per gal.
XYLOL.—1s. 10d. to 2s. per gal.; Pure, 1s. 11d. to 2s. 2d.
TOLUOL, 90%.—1s. 10d. to 2s. 1d. per gal.; Pure, 2s. 3d. to 2s. 5d.

Wood Distillation Products

ACETATE OF LIME.—Brown, £8 10s. to £8 15s. per ton. Grey £10 10s. to £12. Liquor, brown, 30° Tw., 6d. per gal. MANCHESTER : Brown, £1; grey, £12.
ACETIC ACID, TECHNICAL ,40%.—£16 10s. to £18 per ton.
AMYL ACETATE, TECHNICAL.—95s. to 110s. per cwt.
CHARCOAL.—£6 to £11 per ton.
WOOD CREOSOTE.—6d. to 2s. per gal., unrefined.
WOOD NAPHTHA, MISCIBLE.—2s. 7d. to 4s. per gal. Solvent, 3s. 9d. to 4s. 9d. per gal.
WOOD TAR.—£2 to £6 per ton.

Nitrogen Fertilisers

SULPHATE OF AMMONIA.—The export market continues quiet and the price remains at £5 12s. 6d. per ton for February shipment and £5 15s. per ton for March shipment, for neutral quality, basis 20.6% nitrogen, f.o.b. U.K. port in single bags. Home prices remain unchanged. On account of the dry weather, some farmers are purchasing for prompt delivery of the dry weather, some farmers are purchasing for prompt delivery.
NITRATE OF SODA.—Prices remain unchanged at £8 14s. per ton for January and £8 16s. per ton for February/June, delivered in 6-ton lots to farmers' nearest stations.
NITRO-CHALK.—Price remains unchanged at £7 5s. per ton for delivery up to June next in 6-ton lots.

Latest Oil Prices

LONDON, January 25.—LINSEED OIL was steady. Spot, small quantities, £19 10s.; Feb., £16 10s.; Feb.-April, £17 2s. 6d.; May-Aug., £18 7s. 6d.; Sept.-Dec., £19 7s. 6d., naked. RAPE OIL was inactive. Crude extracted, £29; technical refined, £31, naked, ex wharf. COTTON OIL was dull. Egyptian crude, £23; refined common edible, £26; deodorised, £28, naked, ex mill. TURPENTINE was steady. American, spot, 65s. 9d. per cwt.
HULL.—LINSEED OIL, spot, £17 17s. 6d. per ton; Jan., £17 5s.; Feb.-April, £17 10s.; May-Aug., £18 10s. COTTON OIL, Egyptian, crude, spot, £23; edible, refined, spot, £25 10s.; technical, spot, £25 10s.; deodorised, £26 10s., naked. PALM KERNEL OIL, crude, f.m.q., spot, £21, naked. GROUNDNUT OIL not quoted. RAPE OIL, crushed/extracted, spot, £28 10s.; refined, £30. SOYA OIL, crushed/extracted, spot, £22; deodorised, £25 per ton. COD OIL, Jan., 18s. per cwt.; Feb., 18s. 6d. CASTOR OIL, pharmaceutical, spot, 40s. 6d.; first, 35s. 6d.; second, 32s. 6d., per cwt. TURPENTINE, American, on the spot, 67s. 3d. per cwt.

From Week to Week

LORD MIDDLETON, M.C., has joined the board of the British Coal Refining Processes, Ltd.

TWO OF THREE MEN who were scalded on January 20 by an escape of steam at the dye works of Grimshaw Brothers, at Clayton, Manchester, died in hospital on January 21.

THE VICE-CHANCELLOR of Cambridge University gives notice that the Sir William Dunn Readership in Biochemistry has become vacant by the resignation of Mr. J. B. S. Haldane, M.A., Trinity College.

STURTEVANT ENGINEERING CO., LTD., has recently received an order for the supply of two electrostatic precipitation plants for the removal of dust from gases, the volume handled totalling 14,500,000 cu. ft. per hour.

HEAVY CHEMICALS, including dyes, in Italy, it is stated, are slack, but fertilisers are improving. Superphosphate production continued to decline, but the tanning industry is well occupied. The paper industry is still slow.

AN ACCIDENTAL TRANSPOSITION occurred in the page of illustrations of welded tanks in THE CHEMICAL AGE of January 14 (page 29). The description (other than the Fig. number) under Fig. 5 should have appeared under Fig. 6, and vice versa.

CONSIDERABLE UNEASINESS IS FELT in official agricultural circles in Italy over the marked decline in fertiliser consumption during the last two years. The highest figures were reached in 1929, since which year the consumption of both superphosphates and nitrogenous fertilisers has greatly decreased.

SIR WILLIAM CLARE LEES, a managing director of the Bleachers' Association, has accepted nomination as the new president of the Textile Institute in succession to Mr. George Garnett, of Bradford. The election will take place at the annual meeting on May 17. The annual conference of the Institute this year is being held at Harrogate, during Whit Week, June 7 to 10.

THE USES OF THE SULPHONATED FATTY ALCOHOLS in dyeing and finishing was the subject of a lecture given by Mr. M. Briscoe, of Ronsheim and Moore, at Nottingham University College, Shakespeare Street, on January 19. The lecture was under the auspices of the Dyeing Advisory Committee. The lecturer outlined the endeavour of chemists to produce a detergent having more stable properties than those of soap, particularly for use in the textile industries.

AN EXPLOSION on January 23 at the Ormesby Ironworks of Cochrane and Company, Limited, Middlesbrough, resulted in injuries to 11 men, but only two of those hurt were detained at the hospital. According to an official statement issued by the firm, "there was an accumulation of gas in one of the drying stoves, and when the man who looks after it went to light the stove, it flashed back through the door, and the flames caught some of the men who were standing in the labour market nearby."

THE RAPIDLY GROWING IMPORTANCE of Palestine as a market for British goods is emphasised by the news that Sir Harry McGowan, chairman of Imperial Chemical Industries, Ltd., intends to visit the country towards the end of February, on his way home from India. The purpose of this visit is primarily to enable Sir Harry to see for himself the progress which is being made by I.C.I. (Levant), Ltd. During his stay in Palestine, Sir Harry is expected to visit Haifa, Tel-Aviv, and Jerusalem.

A CONTRACT HAS BEEN SIGNED between the Portuguese Government and Yarrow and Co., Ltd., Scotstoun, for a torpedo boat destroyer similar to the four torpedo boat destroyers already under construction by this firm for Portugal. The hull of this fifth destroyer will be built in Lisbon, but the machinery and boilers will be manufactured by Messrs. Yarrow in Glasgow, and the steel material for the hull will be supplied by the Steel Company of Scotland and shipped to Portugal.

A MEETING TO PROTEST against a recent statement by Lord Lee of Fareham concerning radium products was held under the auspices of Radium Springs Sanatorium, Ltd., in London, on January 18. A resolution was passed bringing to the notice of the Minister of Health the opinion that the application of mild radium treatment should not be confused with the application of radium as a metal, and asking that the Radium Commission should find and make public which forms of radium treatment should be controlled by skilled medical practitioners.

AT A MEETING of the West Yorkshire Society of Architects, on January 19, Mr. S. S. Woolf lectured on modern painting materials, demonstrating the superiority of a synthetic vehicle over linseed oil in point of durability, quick dust-proof drying and elasticity. The demand for more durable finishing materials had given rise to the development of synthetic finishes. A few years ago cellulose lacquers revolutionised the method of finishing in many industries, but the method of spray application necessary had restricted their use in the decoration of buildings.

THE DOMINION BUREAU OF STATISTICS at Ottawa reports that manufactures of cement products by the 157 plants operating in 1931 were valued at £730,000.

THE FRENCH ZONE IN MOROCCO exported during 1932 987,317 tons of phosphates, against 900,731 tons in 1931, an increase of 9.5 per cent.

THE ASSOCIATES PRIZE of the Coke Oven Managers' Association for the current year has been awarded to Mr. W. M. Hyslop for his paper "The Determination of Phosphorus in Coal and Coke Ash."

MR. ALFRED JOHN BLYTH SHICKLE, of 3 Lily Bank, Hereford Street, Sale, a director of Dunn Brothers (Successors), Ltd., chemical merchants, Manchester, left £1,154 (net personalty £1,115).

THE MARRIAGE TOOK PLACE in Edinburgh, on January 21, of Mr. Hugh Thurston Cohen, son of Professor J. B. Cohen, D.Sc., F.R.S., and Mrs. Cohen, of Coniston, Lancashire, to Margaret Scott Grey, daughter of Mr. and Mrs. J. W. Napier, Mansfield, Alloa.

A FIRE BROKE OUT on January 18 at the oil refineries of Samuel Banner and Co., Sandhills Lane, Liverpool. It originated in the still, where a barrel containing about fify gallons of oil burst into flames. The fire was soon put out and the damage was comparatively slight.

THE HARRISON MEMORIAL PRIZE SELECTION COMMITTEE at a meeting on January 13, unanimously agreed to award the Harrison Memorial Prize for 1932 to Dr. Harry J. Emeléus. The presentation will be made on March 20, at the annual general meeting of the Chemical Society.

WHEN A RETURN OF THE ARRIVALS OF SHIPPING for December was placed before the Falmouth Harbour Board on January 20, Mr. E. A. Maunder pointed out that although only one vessel called for oil fuel during the month there were full facilities at the docks for supplying such fuel and he did not want it to be understood that only one vessel per month was dealt with.

A REPRESENTATION HAS BEEN MADE to the Board of Trade in favour of exempting carbolic acid (synthetic) from the key industry duty imposed by the Safeguarding of Industries Act, 1921, as amended by the Finance Act, 1926. Any communication should be addressed to the Principal Assistant Secretary, Industries and Manufactures Department, Board of Trade, before February 23.

AT A MEETING AT BIRMINGHAM UNIVERSITY on January 19, of the Co-ordinating Committee, representing the Staffordshire Iron and Steel Institute, the Birmingham Metallurgical Society and the Birmingham local section of the Institute of Metals, Mr. J. G. A. Skerl, of the Department of Allied Science at Sheffield, read a paper on "The Foundry Sands of the Midlands." The chair was taken by Mr. A. A. Jude, president of the Birmingham Metallurgical Society.

MR. J. ARTHUR REAVELL read a paper on "Modern Chemical Plant," at a meeting of the Nottingham section of the Society of Chemical Industry on January 19 at Derby, in which he dealt with the direct application of electricity in chemical processes, particularly for the treatment of varnish and oils in varnish making; and the direct application of electric heating elements to raise oils and varnishes to high temperatures whilst maintaining relatively low temperature differences between the electrical elements and the oils or varnishes.

A NOTE OF OPTIMISM marked the speeches at the annual luncheon last week of the Widnes Chamber of Commerce. Dr. G. C. Clayton, M.P. for Wirral, who, as deputy president of the Chamber, presided in the absence through illness of Sir Max Muspratt, gave a heartening review of the conditions in local works and particularly referred to the expansion of the activities of the I.C.I. in Widnes. The electrolytic process was now well established; they had doubled the formic acid plant in the last year; and they were increasing the sulphuric acid and hydrochloric acid business. Any expansion of trade generally would be felt immediately in those works.

THE IMPORT DUTIES ADVISORY COMMITTEE has received applications for drawback under Section 9 of the Finance Act, 1932, in the case of paints and other commodities, in respect of the imported linseed and linseed oil used in their manufacture and in the case of linseed oil in respect of imported linseed; phenacetin, in respect of the para-phenetidine used in its manufacture; stainlss steel sheets or of the billets or slabs of stainless steel used in their manufacture; chewing gum, in respect of the gutta percha compound (chewing gum base) used in its manufacture; and stencil paper, in respect of the hand-made Tengujo paper, known as dental tissue, used in its manufacture. Representations should be addressed in writing to the Secretary, Import Duties Advisory Committee, Caxton House (West Block), Tothill Street, London, S.W.1, not later than February 6.

Obituary

LADY SMITH, widow of the late Sir George Smith, associated with Bickford Smith and Co. (now absorbed by I.C.I.), at Lynn Allen, Truro, on January 21. Aged 84.

HUGH KERR, J.P., managing director of the Eldin Chemical Co., Ltd., at Loanhead. Aged 74.

Commercial Intelligence

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

Mortgages and Charges

[NOTE.—The Companies Consolidation Act of 1908 provides that every Mortgage or Charge, as described therein, shall be registered within 21 days after its creation, otherwise it shall be void against the liquidator and any creditor. The Act also provides that every Company shall, in making its Annual Summary, specify the total amount of debts due from the Company in respect of all Mortgages or Charges. The following Mortgages and Charges have been so registered. In each case the total debt, as specified in the last available Annual Summary, is also given—marked with an *—followed by the date of the Summary, but such total may have been reduced.]

Satisfactions

LEEDS FIRECLAY CO., LTD. (M.S., 28/1/33.) Satisfaction registered January 12, of debenture registered October 3, 1925.

MONSANTO CHEMICAL WORKS, LTD. (late Graesser-Monsanto Chemical Works, Ltd.), London, S.W. (M.S., 28/1/33.) Satisfaction registered January 12, of debenture registered November 20, 1928.

County Court Judgment

[NOTE.—The publication of extracts from the "Registry of County Court Judgments" does not imply inability to pay on the part of the persons named. Many of the judgments may have been settled between the parties or paid. Registered judgments are not necessarily for debts. They may be for damages or otherwise, and the result of bona-fide contested actions. But the Registry makes no distinction of the cases. Judgments are not returned to the Registry if satisfied in the Court books within twenty-one days. When a debtor has made arrangements with his creditors we do not report subsequent County Court judgments against him.]

AMOID MANUFACTURING CO., LTD., Farley Park, Farley Lane, Hucknall, Nottingham, manufacturing chemists. (C.C., 28/1/33.) £19 8s. 10d. November 23.

London Gazette, &c.

Company Winding Up Voluntarily

NEW G. & S. PROCESSES SYNDICATE, LTD. (C.W.U.V., 28/1/33.) By special resolution, and for the purpose of reconstruction, January 12. Mr. Douglas Haslett, of King William Street House, London, E.C.4, appointed liquidator.

Company Winding Up

SCOTTISH COAL PRODUCTS, LTD. (C.W.U., 28/1/33.) Statutory meetings at Bankruptcy Buildings (Court No. 2), Carey Street, Lincoln's Inn, London, W.C.2, February 1: creditors at 11.30 a.m.; contributories at 12 noon.

New Chemical Trade Marks

Opposition to the registration of the following trade marks can be lodged up to February 11, 1933.

Erka. 532,182. Class 1. Potash for use in manufactures. Kali-Chemie Aktiengesellschaft (a Corporation organised under the laws of Germany), 10 Reichstagsufer, Berlin, N.W.7., Germany. May 27, 1932. (By consent.)

Magnite. 535,657. Class 1. Dry mineral colouring matters (not being paints), all being for incorporation in, or for use in the manufacture of, cement, plaster, clay, flooring compositions, linoleum, indiarubber, synthetic resin compounds or of similar materials. Joseph Freeman Sons and Co., Ltd., Cementone Works, Garratt Lane, Wandsworth, London, S.W.18. October 12, 1932. (By consent.)

Company News

South Metropolitan Gas Co.—Subject to audit, the directors recommend a final dividend for the past year on the ordinary shares at the rate of 6 per cent. per annum, less the interim dividend of 2½ per cent. paid in September last.

Blundell, Spence & Co.—The profit for the year to October 31 last was £26,627, of which £2,844 provided for income-tax and £4,876 was placed to general reserve. A dividend on the ordinary shares of 3 per cent. is payable on February 14 and the amount carried forward is £10,071.

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).

Finland.—A firm of commission agents in Helsingfors desires to secure the representation for Finland of a United Kingdom manufacturer of celluloid. (Ref. 140.)

Spain.—A firm of textile manufacturers established at Barcelona wishes to obtain the sole representation of a United Kingdom manufacturer of perfumery. Agency would cover the whole of Spain. (Ref. No. 143.)

Switzerland.—A firm established at Bienne wishes to obtain the representation of United Kingdom manufacturers of industrial chemicals and articles for electro-plating, on a commission basis. Correspondence may be in English. (Ref. No. 145.)

South Africa.—H.M. Trade Commissioner at Johannesburg reports that the City Council of Pretoria is calling for tenders, to be presented in Pretoria, for the supply, delivery and erection of chemical treatment plant, chemical mixing plant, flocculating plant, filtration plant and chlorinating plant. (Ref. G.X. 12220.)

Egypt.—The Commercial Secretary to the Residency, Egypt, reports that the Egyptian Ministry of Interior is calling for tenders, to be presented in Cairo by March 30, 1933, for the supply of oils, caustic potash and potassium carbonate required by the Prisons Administration for the manufacture of soap. (Ref. B.X. 7491.)

British India.—The Director-General, India Store Department, Belvedere Road, Lambeth, S.E.1, invites tenders for:—Schedule 1, sodii salicylas B.P., etc.; schedule 2, essential oils, etc.; schedule 3, bismuthi subnitras, carbonas, and salicylas B.P.; schedule 4, iodum and iodoformum B.P.; schedule 5, satoninum B.P.; schedule 6, lint, plain; schedule 7, cresol saponified; schedule 8, india-rubber goods: ice bags, air beds, hot-water bottles, etc.; schedule 9, bottles, green, amber and blue. Samples required with tender for schedules 7, 8 and 9. Tenders due February 10, 1933. Forms of tender obtainable from the above at a fee (which will not be returned) of 5s. for each schedule.

Forthcoming Events

Feb. 1.—Society of Public Analysts. 8 p.m. Election of Members, followed by Joint Meeting with the Food Group of the Society of Chemical Industry. "The Changes taking place during the Storage of Fruits." (Discussion). 8 p.m. 1 Wimpole Street, London.

Feb. 1.—Electroplaters' and Depositors' Technical Society. Third Annual Dinner. Comedy Restaurant, London.

Feb. 1.—Institution of the Rubber Industry (West of England Section). "The Influence of Service Conditions on Tyre Failure." T. L. Garner. Town Hall, Trowbridge.

Feb. 2.—Institute of Metals (Birmingham Section). "Refractories in Metallurgical Industries." A. T. Green. 7 p.m. University, Edmund Street, Birmingham.

Feb. 2.—Institution of the Rubber Industry (Midland Section). "Fallacies." H. L. Kenward. Grand Hotel, Birmingham.

Feb. 2.—The Chemical Society. Ordinary Scientific Meeting. 8 p.m.

Feb. 2.—Society of Dyers and Colourists (West Riding Section.) "Structure of the Wool Fibre in Relation to Dyeing Processes." Dr. J. B. Speakman.

Feb. 2.—Business Research and Management Association of Great Britain. "Management Training for Executives." Oliver Sheldon. 6.45 p.m. Anderton's Hotel, Fleet Street, London.

Feb. 2.—Manchester College of Technology Students' Chemical Society. "Some Aspects of Racemisation." Professor Alexander McKenzie. 5 p.m. Large Chemical Lecture Theatre, Manchester College of Technology.

Feb. 2.—Society of Chemical Industry (Birmingham and Midland Section). "The Properties of Molecules as Learned from Surface Films." N. K. Adam. 7.30 p.m. University Buildings, Edmund Street.

Feb. 2.—Institute of Fuel. Joint meeting with the Bristol Section of the Society of Chemical Industry. "The Elimination of Dust and Sulphur from Boiler Flue Gases." H. E. Wallsom. University, Bristol.

Feb. 3.—Societey of Chemical Industry (Plastics Group). Joint meeting with the Manchester Section of the Society of Chemical Industry, and the Institution of the Rubber Industry. "Synthetic Resins and their Uses" W. H. Nuttall. 7 p.m. 17 Albert Square, Manchester.

Feb. 3.—The Physical Society. 5 p.m. Imperial College of Science, South Kensington, London.

Feb. 3.—The West Cumberland Society of Chemists and Engineers. "Coal Cleaning." E. M. Myers. 7 p.m. Workington.

Feb. 3.—Society of Dyers and Colourists (Scottish Section). "The Appeal of Science to the Community." Professor A. Findlay.

Feb. 4.—Midland Chemists' Annual Dinner and Dance. 7 p.m. Midland Hotel, Birmingham.

New Companies Registered

A. R. Robertson and Co., Ltd., 21 York Place, Edinburgh.—Registered as a private company, in Edinburgh, on January 7. Nominal capital £1,000 in £1 shares. Objects: To acquire the business of merchants and agents, now carried on in Glasgow and Edinburgh as "A. R. Robertson and Company," and to carry on the business of agents for belting, leather goods, chemicals, machinery, engines, etc. Directors: James Corrie, and John S. Purves.

Carroll and Prichard, Ltd., 23 Hanbury Road, Bargoed, Glam.—Registered January 23. Nominal capital £500 in £1 shares. Manufacturers of and dealers in chemicals, gases, drugs, medicines, disinfectants, oils, colours, pigments, varnishes, etc. Directors: W. H. Carroll and T. H. Prichard.

Cuprinol, Ltd.—Registered on January 20. Nominal capital £10,000 in £1 shares. Objects: To acquire from A/S Kymsia, goodwill, trademarks, processes, methods, inventions, patent rights, and other assets, to enter into agreements with A/S Kymsia and the National Smelting Co., Ltd., and to carry on the business of chemical manufacturers, tar distillers, manufacturers of metal salts in compounds, producers of or dealers in all kinds of chemicals, etc. A subscriber is: E. Rudland, 2 Bond Court, Walbrook, London, E.C.4.

H. Ralph & Co., Ltd., 7 The Butts, Coventry. Registered as a "private" company, on December 24. Nominal capital £5,000 in £1 shares. Manufacturers of and dealers in varnishes, paints, enamels, japans, distempers, fine colours and chemicals, colour grinders, sign writers, decorators, builders, motor and carriage manufacturers, etc. Directors: H. Ralph and Mrs. P. Ralph.

Kemico-Fuel Products, Ltd. Registered January 9. Nominal capital £1,000 in £1 shares. To acquire any patents, brevets d'invention, licences or concessions; to carry out research work in chemistry, metallurgy, mineralogy or any other science; to carry on the business of chemists, druggists, oil and colour men, etc. A subscriber: C. C. Failes, 1 Baylie Street, Stourbridge.

Lennard & Co. (Shoreham-by-Sea), Ltd., Chemical Works, Lower Brighton Road, Shoreham-by-Sea. Registered as a "private" company on December 23. Nominal capital £40,000 in £1 shares. Objects: To acquire the business of Forbes, Abbot and Lennard, Ltd., as tar distillers and chemical manufacturers carried on by that company at The Chemical Works, Shoreham-by-Sea, Sussex. Directors: W. L. A. Lennard, F. L. F. Lennard, F. Kilpatrick-Salterns and J. R. Lane.

Liptons Germicide Co., Ltd.—Registered on January 20. Nominal capital £600 in £1 shares. Manufacturing experimental and general chemists and warehousemen, manufacturers, importers, exporters and refiners of and dealers in germicide, essences, coal tar products, etc. Directors: Leslie Lipton, 1 St. Georges Road, Golders Green, London, N.W.11; Edward Fisher, and John H. Lambert.

Plastic Products, Ltd. Registered as a private company, on January 12. Nominal capital £100 in £1 shares. Objects: To acquire certain letters patent for inventions and rights of inventions and processes relating to the manufacture of plastic and/or colloid products, materials and compositions, etc. Directors: Harold Talbot, 26 Ravenscroft Avenue, Golders Green, London, N.W.11, and Victor E. Yarsley.

Rare Earth Concentrates, Ltd. Registered as a "private" company on January 9. Nominal capital £5,000 in £1 shares. Manufacturers of and dealers in titanium, thorium, zirconium and kindred metals, copper, zinc, spelter and antimony smelters and refiners, manufacturers of and dealers in chemicals and chemical substances, paints and colours, etc. Directors: Sir John P. Hewett, Sir Hugo Hirst, Bt., and Major D. J. Burke, O.B.E. Solicitors: Kenneth Brown, Baker, Baker, Essex House, Essex Street, Strand, London.