The Chemical Age

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Notes and Comments

Training for Industrial Life

THE British Association, as befits an organisation numbering among its membership practically all our senior educationists, spent no little time discussing education in all its forms, and in particular technical education. Mr. Rintoul, whose position in the chemical industry gives him special authority on the subject, discussed the training of industrial chemists. It is with temerity that we venture to criticise Mr. Rintoul's dicta, and our object in doing so is not to suggest that they are wrong—far be that from us—but to suggest that they may have limited application. Many of his ideas will be discouraging to the ambitious who suffer from lack of means. Briefly, Mr. Rintoul suggests that all industrial chemists should spend five years at a university. The first three years should be spent at a home university and the next two years abroad. That is making the profession of chemistry a " closed shop " in all conscience—a " shop " closed to all those who have not the foresight to select wealthy parents. Was Faraday wealthy? Or many another who has made his mark in science? After his expensive five years' training, the embryonic chemist " should now be in a position to apply for an industrial position," but his training is by no means complete in Mr. Rintoul's view.

He has " still to learn all about the organisation and working of the industry in which he finds himself, before he can discover the means by which he can apply the knowledge he has acquired to the best service of this industry." Not only, therefore, is the " trained " chemist of little value to his industry, but he is not even able to decide—nor can anyone else decide—in what direction he is likely to be of value. There can be no difference of opinion that no one, whether chemist or office boy, upon first entering industry is of little value until he has gained experience. But to suggest that the process of training should be so long-drawn-out savours of education gone mad.

Dr. Tizard's View

THERE is much more to be said for the view of Dr. Tizard that the line should be drawn in the further admission of students to universities, and that university education should be restricted to those " who occasion no misgiving." Mr. Rintoul appears to demand an employee chemist spoon-fed, trained in every minute detail, even trained to mix with his fellows. Dr. Tizard says: " The attitude of the universities should be this: We give you here the opportunity of learning, if you wish to, from masters of their subjects; we give you access to well-equipped libraries and laboratories; and opportunities of learning from each other. We help you to help yourself. If you do not or cannot make use of these opportunities, you shall go and make room for others. . . . In such an atmosphere, learning, individuality and self-reliance flourish. Judged by this standard I have little hesitation in saying that universities are too full."

Mr. Rintoul's ideas may be all very well in a huge industrial organisation where the soul of the old close relationship between master and man is lacking. Those who were brought up in the older and smaller concerns know well that there is another way of training which is equally productive of results. By all means let the budding chemist take his degree. If he loves chemistry for its own sake, let him even take an honours degree, though for our part we should prefer a pass degree, with its multiplicity of subjects as being a wider basis on which to build. Then let the chemist enter an industrial laboratory under a sympathetic head. If the head be not sympathetic he should not occupy that position for he can never control a team of educated men without the blessed gift of sympathy and helpfulness. The young chemist will be put to work with and as junior to an older man of wide experience whilst being encouraged to probe into the work and outlook of other departments in the concern so far as opportunity permits. In that way he is trained not only in the art of industrial research, which is quite different in many industries from university research, but he also imbibes something of the spirit of the organisation. Too many men after long years *in statu pupillaris* become stereotyped and unfit to start again at the bottom. All know examples of the man who has spent too long at school—usually a product of a Continental country.

Specialisation at the University

MR. RINTOUL speaks of the dangers of specialisation in too narrow a field, but nevertheless believes that specialisation should start at the university. Here again it is a question of the type of firm and the industry the student proposes to enter. Some industries and some branches of chemical industry demand specialisation; such, for example, is that of dyeing, or metallurgy. But for the most part, and unless the chemist is anxious to enter a large concern, specialisation should be avoided until after an industrial career has commenced. Our experience of the average

laboratory is that it is the place where they send to be done " all those jobs that they can find no one else with sufficient intelligence to undertake "—as one chemist expressed it to us.

Specialisation might be fatal in such an instance. But why must we have all this talk of university training? Is it necessary to train and re-train scientific men? The answer is, yes, if the scientific workers in industry are to be those who do the job just as a means of earning their living. Are those the men we want? Dr. Tizard says emphatically: " No." There are many who hold the view that the true research worker, and the true chemist is born. Whether he will be improved by training is another matter, but certain it is that if he is fitted for the scientific life he will train himself and nothing will stop him.

The Need for Imagination

THE mentality of the true chemist, the inquirer into and controller of the processes of nature, is not fashioned in a training college; it is not by reason of training that a man " attains the highest degree of originality of which he is capable." Originality is imagination, and training will never put imagination where it is not. Training may guide imagination and it is for that reason that we should prefer to see a liberal education broadening the mind as much as possible, rather than specialised education designed during a five-year course to turn out students to a pattern that shall satisfy those who are put over them in industry. Industry should train its own men more.

Most of the characteristics upon which Mr. Rintoul quite rightly puts so much stress may be much better and more expeditiously developed on the works than in the university cloisters. Industry should take more personal interest in young men entering its gates; their sojourn in the university should be as brief as possible provided they attain a proper degree of knowledge—not to be mistaken for a degree!—and at as impressionable an age as possible they should pass into the works, where they will learn as their fathers did in the hard school of experience. No doubt Mr. Rintoul is right in all he has put forward when it is applied to certain specialised industries; and no doubt it is in keeping with modern industrial tendencies. But are we quite certain that " modern industrial tendencies " are likely to give us a generation of chemists comparable with the older one that has built up industries, a combination of science, originality and business acumen?

Attendance at Meetings of Societies

A SPEAKER at a meeting of the Society of Chemical Industry in the north of England some time ago raised a matter that has been troubling us for quite a time. " What struck him," he said " in comparing the meetings of chemical societies to-day with those of old times was the absence of young people nowadays." The need for training the youth of any industry is self-evident: Much of the training can be gained by practical experience in the works and by no other way; that is the way in which a young man is converted into a good process worker, a good foreman, or a good routine chemist. But it is not alone the path that leads to the higher positions in industry. It was told of one of the leaders of industry of the past generation that even in his very junior days he made it a practice of travelling first-class by rail in order to meet and talk with fellow travellers of the highest stamp intellectually and financially. No doubt he was a bit of a nuisance, but he learnt many valuable lessons and obtained a new and wider outlook that served him in good stead when promotion came.

Our juniors of 1934, however, do not seem to grasp the necessity for intercourse with their fellows. They do not attend meetings at which they would hear new view-points, at which they would hear the opinions of their seniors expressed and criticised. They rarely speak themselves—and thus they allow themselves to be forced into an inferiority complex. Admittedly it takes courage for a junior to stand upon his feet and air his views or experience before the general managers of his own and other companies, and before men who were operating chemical plant before he was born. But those who have done so and who have realised that a few sentences expressing briefly and cogently one or two aspects of the subject under discussion will find, and always have found, that the seniors are both appreciative and helpful. That is one of the best methods by which a young man can disclose the ability that is within him; and in these days of competition it is something for which the young man with ambition should be grateful.

Lack of Enthusiasm

APART from the personal aspect of the question, the non-attendance of youth at technical meetings has an important bearing on the future of the industry. It was mentioned to us a few days ago, by a works manager, that the amalgamations that in every branch of industry are so prominent a feature of our generation are removing from the industry many managers, general managers and other who have been accustomed to controlling organisations of moderate size at salaries ranging between £1,000 and £1,500 a year. These men —or perhaps rather, these positions—are being replaced by others in which every decision of even passing importance must be made by, or submitted to head office. The result is bound to be a dearth of men able to think for themselves, self-reliant, and accustomed to look ahead and to plan for the future. The problem of the replacement of this training ground for the future leaders of the industry is not yet solved. It will be more serious than ever if youth is to become content with the day's work and takes no heed of the problems of to-morrow or the manner of tackling them, a great deal concerning which can be learnt from the opportunities for discussion which occur before, during and after meetings.

That the remarks we have quoted above were not made without cause is shown by the experience of another society, closely connected with the chemical industry. Some years ago, in order to encourage the juniors the Council offered prizes for the three best papers presented by juniors, the winning papers being read at a special meeting called " Associates' night." In the early days of this arrangement, perhaps 10 years ago, a sub-committee was appointed to select the winning papers from among the many submitted. Of late years there has been no need for selection; and this year, in spite of frantic, almost tearful, appeals to the juniors from the secretary, not one single paper has been submitted.

At the Sign of the Cheshire Cat

Sir James Jeans and Co.'s Entire and Wavy Grins Aberdeen, 1859.1934

ONE result of this year's meeting of the British Association should be a rush for the edition of the *Wonderland* epic, with Tenniel's inspired illustrations—among them, the *Cheshire Cat* in various phases—from which, aided by "refreshers" from Huck Finn and Tom Sawyer, the President has only too obviously taken his cues, in composing his address. The meeting should go down in history as the *Pig and Pepper Year,* if not as the *Year of Grins.*

The first title on the cover of the official issue of the collected addresses is:

The New World-Picture of Sir James J. Jeans.

What a world-picture of a man is we are not told; Sir James has certainly given himself to the world, with much profit. He would class himself as a theoretical-physicist, even invite comparison with the late Lord Rayleigh. The best authorities define theory as a body of established doctrine; skilled writer though he be, Sir James does not sufficiently consider the meaning of words; scarcely anyone does who uses the word theory; probably no other is more misused in our language. He were better described as a super-speculative metaphysician. He welters in words, probably because the call of the blood is upon him. We are told by the "Glasgow Herald," that his father, during many years, was a reporter in the Press Gallery of the House of Commons. One of his uncles, Sir Alexander Jeans, was the manager of the "Liverpool Post." Another, Mr. William Jeans, was many years correspondent of the "Dundee Advertiser" and his son was chief editor of Reuters. Murder will out, it seems.

An Address that Stirred the Public

Lord Rayleigh stands at the very opposite end of the scale, as an ever-cautious interpreter of fact. Sir James' outpourings are claimed by the clerics as indications of a new approach of science to religion; they are certainly welcome to him as a follower of their methods. He would more fittingly have been with the mystics at Birmingham than at Aberdeen. We may gladly grant the Church the comfort of such witness as he may bear. Meanwhile, we can be satisfied with the signs of awakening intelligence in the modern clergy. Even young Oxford *will see* some day and no longer be satisfied with empty formulæ—either in Church or Chemistry; sufficient of scientific method will have penetrated up to the higher reaches of the Thames to make the coming prophets have some regard for honest probability and truth. They will ask not only for less frequent recitation of outworn Church creeds but also claim relief from supernicene physical doctrine and chains of superstition.

Never probably has a British Association address less stirred the public. People are beginning to resent the constant dragging to the fore of super-astronomical transcendentalism and the sensational advertisement of every new discovery in remote regions of scientific inquiry—especially by the physical school. The public are beginning to ask for something that they can understand—that will help them in their lives. It is useless to tell us that both materials and matter need to be redefined in the light of our new knowledge. It matters not a jot how you define bread and butter matter; all know that we must have it to live and that the difficulty is to get it. Sir James has not a word to say to this end. The Church maintains its superstitions and preaches a future of which it can know nothing, simply because it knows nothing of the present world, apart from its moral shortcomings; it is the least informed and most narrow-minded section of the community, entirely mathematical in its outlook, posing propositions as established which can no longer be taken for granted; having no thought for probabilities. We all need to learn to do our duty where we are and to walk in unison, without thought of future problematical reward or punishment. No Archbishop of York will ever develop a rational educational policy for the B.B.C. The world needs a new Church—one that preaches the doctrine that our duty is to seek to understand the great mansion in which we live and act therein with wisdom. This can only be the body scientific, honestly seeking truth, in so far as this may be found, by positive means such as we can command. Sir James Jeans comes down from his Cambridge mountain with tablets bearing no message of comfort for ordinary mortals. He merely has added to their confusion.

In his closing remarks, the President began by saying that there are many who attribute most of our present national woes to the recent rapid advance in scientific knowledge. In his final sentence he refers to those "who maintain that science is harmful to the race." This is but trifling with facts. Put science—an ever misunderstood and misleading word—into honest English, read knowledge for science, no one is so foolish as to maintain anything of the sort. Strange to say, a Bishop has been found wise enough to suggest that we might well spend ten years in making use of the vast mass of knowledge we have, to serve our own rather than commercial interests, instead of devoting ourselves to research in new fields. The Bishop sees that our knowledge has been used in the service of Mammon mostly. The objection taken is to one-sided scientific inquiry—to undue development of the machine and neglect of man's "bloomin' soul." It is useless to argue that, corresponding to new discoveries, there will be new trades and new popular demands, providing employment for vast armies of labour. What happens, we know, more often than not, is that the new displaces the old industry. Shipping is one example. Very many people and many large institutions have lost their incomes through the destruction of the railways by road motors. They have no money to invest in the new industry. In the lecture Sir Frank Smith gave, he told how we were learning to preserve food. The result is farming is being made impossible here. Nay worse, at a time when every new discovery tells us that fresh food is all important, we are doing more and more to diminish its consumption. Commercial interests have no care for such discovery; we need to bring these into due subordination; this is work for new research. We may get cheaper food through increase of knowledge—but at what cost to ourselves in other ways? This is a question of scientific economics thus far unconsidered. The new industries have mostly been luxury industries; we were better without them.

What the British Association has Done

The question may well be asked—What has the Association done this year to advance Science, beyond bringing together, in the granite city, nigh on 3,000 well disposed persons to play in 'Ercles vein, nominally at the advancement of knowledge? Most of the sectional addresses are as dull as ditchwater, without any relieving growth of green weed to provide oxygenation. They are published, together with the chief Sir Oracle's address, in an official volume, in orange covers, with four pages of advertisement—the last devoted to self-advertisement—sold at 3s. 6d.; dear at the price. Five of the addresses (sections F. G. K. L. M), dealing with the use (not the advance) of scientific knowledge, may be together valued to the public at 3s.; the rest thrown in for the odd 6d.

The extra-special section in economics, upon which the Association puts its stamp this year, is not reported. Why not, if regarded as of particular value? It cannot be a case of modesty, the light and a bushel. Press reports of the meeting have been very meagre—mostly excerpts from t addresses and snippets from the published programme, nc original. The reporter of to-day cannot deal with scientific matter—however ready he may be to take exception to the English in which we display our knowledge, he is so perfectly cultured himself that his mind is like the chart in the Snark, a perfect and absolute blank, to the matter of natural science. The Association might do real service if it devoted a year to essays from each section in the interests of the Press. Nothing so marks the slight advance in public

esteem of the Association or shows how little influence it has had upon society, as the attitude of the Press generally towards natural science. Is education always to be proclaimed great and yet never to prevail? The Association is only seen, not really heard by the public and therefore has no effective general influence. Either it should be given decent burial or some scientific effort made to reconstitute it, so that it may serve public ends.

At present, it has no centre of attraction. Having joined in 1873 and put up with it until the centenary year 1931, the writer has some knowledge of its character. Like everything English, it has both prospered and suffered from the individuality of its actions. In years gone by, men such as Mr. George Griffiths and Professor Bouney, general secretaries, exercised a strong personal influence; they made themselves universally known and liked and were most helpful in keeping people together. It is long since the office has had even a Grin for the members. The Council doesn't count; it never did; it has always been managed by a clique and a good clique, too, always with the best of motives, of course. It has only followed the example set in higher quarters.

The organisation, if it can be so called, is one for the Dissociation of the Natural Sciences. What man would have joined together, each section does its best to keep asunder. This absurdity is recognised by occasional attempts to hold joint meetings. I believe I started these when, in 1885, at the former meeting in Aberdeen, I induced my friend (Sir) Oliver Lodge to introduce the subject of Electrolysis at a joint meeting of sections A and B. I worked hard, in after years, to develop the practice, without much success. Most of us are too ignorant to debate a subject usefully, so far is specialisation carried. Yet the need of criticism and close debate upon theoretical problems was never so great as it now is.

Complaint was rife last year that the proceedings were up in the clouds. We were told that the authorities were to take in hand the problem of coming down to the ground; apparently they have not yet found the necessary parachutes.

To judge from a paragraph in the address in section C (Geology), the Council has suggested that the sections "might explore the possibility of illustrating how far their particular science had added to the sum total of human advancement." The Council is but a set of well-meaning pedagogues. This is not in the least what is wanted. It is useless to tell the public of such things. The advance is there before its eyes, in every direction. What it wants to know is how it can get its bite—how it can learn to have some feeling for what is going on and in some way be taught to make use of the method of discovery and use it in daily life.

Meanwhile, not only luxuries but bread and butter are failing us—what does the British Association do to promote the healthy search for these? Very little. In L, it tells how education is not serving the purpose and insists that the service must be reorganised—but how?

We all need to be told—what is good bread, what is good butter, what else is good food to eat with these; to be freed from the maw of callous industrialism, pressing this or that upon us by force of capital or bold advertisement. "Sure, we are all yearning to acquire *know-ness*," say the public. Let us have no academic Lord Dictator—we want healthy reading about bread and butter and ourselves. No grins will suffice us. The great brotherhood of scientific endeavour has an insistent call upon its services which it must recognise without further delay. The people now perish not from want of knowledge but from their inability to use the vast fund they have.

Letters to the Editor

The Expert Witness

SIR,—As one who has a large experience as an expert witness, as a technical assessor, and as an arbitrator, both in this country and abroad, my conclusions may interest the readers of the note on "The Expert Witness" which appeared in THE CHEMICAL AGE of September 15. The difficulties you mention chiefly arise from the "rush" by both parties to secure *all* the leading experts in any subject. In most subjects, the number of experts who are valuable witnesses does not exceed half-a-dozen, and often there are only one or two, so that, naturally, if more are called for there is a shortage. In writing this I do not regard anyone having a wide general knowledge or organic or inorganic chemistry as an expert in the particular or special part of the subject with which a judge is called upon to deal. Hence, in general, professors, lecturers, and public analysts are not "experts" of the kind required.

An expert witness is needed to do more than place technical data before the court; he is expected to be able to explain the interpretation which ought to be placed upon such data in order that the judge or arbitrator may correctly understand it. The chief facts can usually be established without much difficulty; it is their effect on the matter at issue which is usually so difficult to ascertain. Under such circumstances, to have only one expert as "interpreter" is to place him partially in the position of an arbitrator without the latter's advantages, and if he is an assessor to the court there are, in effect, two judges—one of inferior status to the other—with no guarantee that in the judgment the assessor's inetrpretation of the facts will be rightly interpreted!

I believe that the most accurate means of ascertaining the correct interpretation of scientific and technical facts is to engage an arbitrator who is technically expert in the subject, and, if the law of the subject is not clear, for him to state his findings on the facts to a higher court. It is becoming increasingly common for a high court to delegate "the ascertainment of facts and their technical meanings" to an arbitrator appointed by the court, and for the court to base its judgment on the arbitrator's award.

Apart from patent litigation, the law dealing with matters in which technical expert witnesses are required is usually sufficiently simple for an experienced arbitrator (with the requisite technical knowledge) to deal with the matter. In patent litigation, on the contrary, the arguments are often too complex for any but a judge of the high court to publish a sound judgment, and he necessarily requires expert witnesses on both sides to interpret the facts in every way relevant to the case. Even then, the results—however sound in law—are sometimes technically unsatisfactory.

I cannot agree with your editorial statement that an assessor (by which you mean an expert interpreter of technical or scientific data and not what is usually recognised as an assessor) is seldom needed. In most cases of arbitration, if the arbitrator has been rightly chosen he has the requisite scientific or technical knowledge and needs no assistance, but a judge is in quite a different position and does not (officially) have the expert knowledge required. In an experience of more than thirty years, I have reached the conclusion that our British system gives far more satisfactory results than the Continental one with assessors sitting by the judge, and that in all those cases where technical rather than legal matters predominate a well-chosen arbitrator who is sufficiently an expert in the subject will give greater satisfaction to the parties than any other form of tribunal.

An important advantage possessed by an arbitrator and not by an independent or court assessor is that the arbitrator can ask questions and so obtain information not available to the assessor. Moreover, an arbitrator can often call for evidence or can from his own knowledge provide data which would not, otherwise, be provided in evidence. He is thus in an unusually favourable position to obtain all the relevant facts. The large number of cases in which I have been engaged either as arbitrator or expert witness shows how great is the need for the expert, and I cannot help regretting that in your editorial you seem to endeavour to belittle a group of men who are of great benefit to the community. Or were you poking a little fun at them, and I, for one, have failed to see the joke?—Yours truly,

A. B. SEARLE.

Charlbury, Oxon.

Chlorinated Rubber Anticipates a Great Future

A New British Product Made by I.C.I.

MANY attempts have been made recently to transform natural rubber into derivatives possessing properties similar to those of nitro-cellulose and other paint bases. The most successful products of this kind have hitherto resulted from the action of chlorine on rubber. These have attracted attention as bases for the production of paints, lacquers and varnishes, and there is no doubt that where acid and alkali resisting properties are desired, chlorinated rubber is a great advance on the materials hitherto used.

The new chlorinated rubber known as Alloprene, introduced by Imperial Chemical Industries, Ltd., is the first solid product of its kind to be manufactured in this country. Alloprene possesses a number of interesting properties which should make it useful for a wide variety of industrial purposes. As at present produced, it is a white, fibrous material containing from 65-66 per cent. of chlorine, and having a composition corresponding approximately to $C_{10}H_{13}Cl_7$, both addition and substitution occurring at the same time in the chlorinating process. It is claimed to be remarkably resistant to attack by acids and alkalis at ordinary or higher temperatures; for example, concentrated nitric acid is stated to have practically no effect on Alloprene at 80-90° C. and it is unchanged after heating with 40 per cent. caustic soda solution for several hours. Hydrochloric acid at all concentrations does not attack Alloprene at temperatures up to 100° C., and no discolourisation results from 98 per cent. sulphuric acid at ordinary temperatures even after several days' contact.

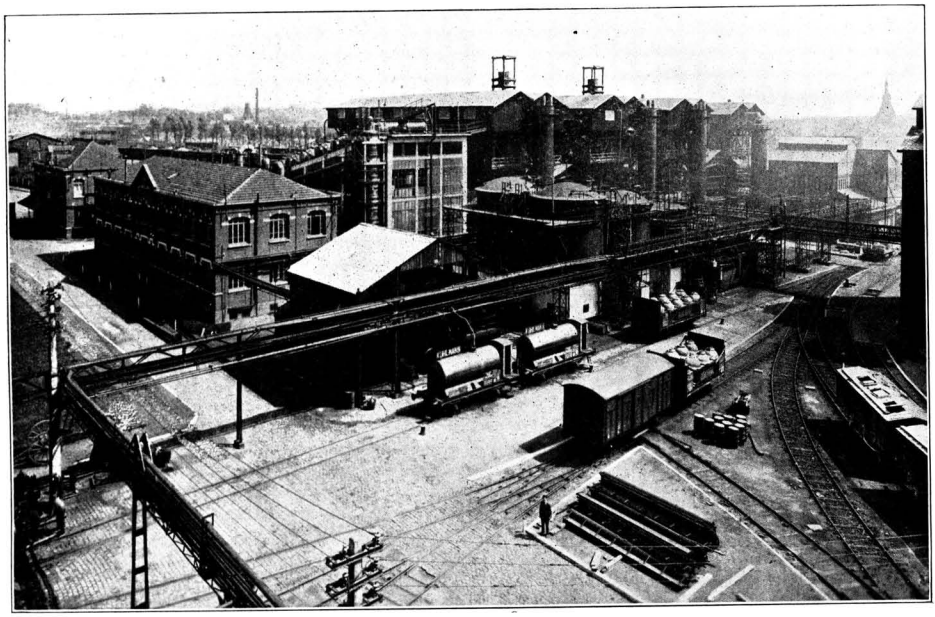
Alloprene is equally resistant to aqueous solutions of oxidising agents such as permanganate, or the hypochlorites and bichromates, and it can also be safely used in contact with such corrosive gases as oxygen, chlorine and sulphur dioxide. Furthermore, Alloprene shares with many other chlorinated products the property of non-inflammability; in prolonged contact with a naked flame it carbonises without burning or fusing.

In addition to non-inflammability and resistance to chemical attack, Alloprene possesses a number of other properties which should assure it a market in the paint and varnish industry. Thus, it is soluble in all proportions in a wide range of solvents at ordinary temperatures, forming colloidal solutions. These solvents include cheap hydrocarbons, the non-inflammable chlorinated solvents and a large number of vegetable oils, but it is insoluble in hot or cold water, alcohols or white spirit. Alloprene thus immediately suggests itself as the base for paints for special service, such as corrosion resistance.

Solutions of Alloprene also possess valuable film-forming properties. Quick-drying solutions can be prepared by the use of a suitable solvent, from the evaporation of which films similar to those produced from nitro-cellulose and cellulose acetate are obtainable. It can be used, if desired, with the usual plasticisers, such as dibutylphthalate, butyloleate and the natural and artificial resins.

This new chlorinated rubber must be regarded as one of the most resistant of organic materials, and as such should find many applications in industry. I.C.I. announce their willingness to co-operate with all who are interested in evaluating Alloprene for special purposes.

The Chemical Industries of France



General view of the synthetic nitric acid plant at the works of Etablissements Kuhlmann, La Madeleine, Lille, France, to which reference is made in The Chemical Age, September 8, page 216. The Kuhlmann Company is the largest of the French chemical concerns, and now directly operates nineteen chemical works. Its capital is approximately 320,000,000 frs. The company is represented in England by Mr. Arnold Ruegg, who has offices in London.

Coloured Textiles and their Fastness

Some Reflections on the Tests Recommended in the Report of the Fastness Committee of the Society of Dyers and Colourists

OVER a period of many years there is to be found in the literature of dyes and textiles numerous tests recommended for determining the fastness of coloured materials. With the discovery of new dyes, the production of new fibres, and changes in the attitude of the public towards the utility of fast coloured decorative and dress goods, there has been a constant revision of these fastness tests.

Within recent years there has grown up a practice among retailers of textile materials to guarantee the standard of fastness of many of the goods which they sell, and "back up" this with an offer to replace any fabric or garment which falls short of the guarantee. At the same time the public has been taught to demand fast coloured goods. It is therefore obvious that at no previous period in the history of dyeing has there been such a large degree of responsibility thrust upon the dyer. For although the retailer may in the first instance replace the defective material it is the dyer who eventually makes good the loss with hard cash.

An Urgent Necessity

With the dyes at present available it is impossible to produce a coloured fabric which will not fade, and since some dyes fade quickly and others slowly, there must be at hand tests to enable the fastness of a coloured fabric to be accurately determined. This necessity was recognised particularly by the Society of Dyers and Colourists in 1927, for in that year ("J. Soc. Dyers and Col.," 1927, *43*, 226) it was announced that a large committee having the support of the various research associations for cotton, wool, linen, and silk, would attempt the work of fixing standard methods for testing the fastness of dyed materials, and would concentrate at first upon the tests for light-fastness, washing, and perspiration. Subsequently, Dr. P. W. Cunliffe was appointed to carry out the experimental work required by the Committee and an arrangement was made whereby this could be done in the laboratories of the Wool Industries Research Association at Leeds, and where, in fact, research on fastness tests had already been proceeding. Later, difficulties in connection with the perspiration tests required the investigation of the nature of perspiration to be undertaken by Dr. C. C. N. Vass under the direction of Professor McSwiney.

During the past seven years the investigations necessary to the formulation of fastness tests have been steadily carried out, and now the Fastness Committee has found it possible to publish their first report (price 7s. 6d.). As might be expected, this report has been awaited with much interest by all concerned with the production of coloured textile goods, and in view of the long time taken and the tremendous cost involved (it is stated to be about £10,000), there has existed the hope that the report would place on a sure and satisfactory basis methods for determining fastness to light, perspiration, and washing.

Standard Dyeings

In reading through the report it is seen that ranges of standard dyeings having graded degrees of fastness have been established for use in testing the fastness to light and to washing of any coloured material; no standard dyeings are mentioned in connection with perspiration fastness tests. Also, the procedure for carrying out the tests has been described. Thus the fastness of a coloured material is determined by subjecting it, together with a standard dyeings, to a specified treatment and noting with which standard dyeing its colour changes most closely correspond. As yet, only red and blue ranges of standard dyeings are available since it was found impossible to prepare a satisfactory green range for the light fastness tests.

By exposure of numerous dyed patterns on various textile fibres including wool, silk, cotton, and viscose rayon, at various parts of the world it was found that the fastness to light of a coloured material varied considerably with the locality at which it was exposed. Dyeings on animal fibres appeared to be less affected by local conditions than those on the vegetable fibres, particularly cotton. This peculiar behaviour of cotton was traced to the fact that the fastness to light of dyes on this fibre is much affected by the humidity and temperature of the surrounding air during exposure; wool and silk are not so much influenced by these factors. It thus became evident that in establishing standard dyeings for use in different parts of the world it would be more reliable to use wool or silk dyeings rather than cotton or viscose dyeings. Eventually the Fastness Committee decided to make their standard dyeings with wool, the fabric finally selected being a Botany worsted serge of 14½ oz. per running yard of 56 inches wide.

Eight degrees of fastness to light were considered satisfactory and this has the advantage of being in agreement with German and American practice. The most fugitive colourings have a fastness of 1 and the fastest 8. Actually the Fastness Committee recommends that all dyeings which are not equal to standard 2 are to be classed in standard 1.

The researches carried out showed that certain dyes were much more influenced than others in respect of their fastness to light by external conditions of humidity and temperature. The dyes used for the standard dyeings were therefore selected from those which were least affected. This selection has occupied much of the time of the sectional committee dealing with tests for light fastness and is responsible to some extent for the long time taken to establish the tests. The red and blue standards now recommended by the committee are as follows:—

Red: *Standard.*	*Dyeing.*
1.	All dyeings which have a fastness less than 2.
2.	0.5% Acid Magenta II S. (I.C.I.).
3.	0.5% Polar Red 3B conc. (Geigy).
4.	1% Cloth Fast Red R (Soc. Chem. Ind.).
5.	1% Alizarine Rubinole GW (I.G.).
6.	1% Kiton Fast Red 4BL (Soc. Chem. Ind.).
7.	1.2% Alizarine Orange A425 powder (I.C.I.) dyed on zinc mordant.
8.	1.75% Durindone Red B B400 powder (I.C.I.).

Blue: *Standard.*	*Dyeing.*
1.	All dyeings which have a fastness less than 2.
2.	0.5% Lissamine Violet 6BNS (I.C.I.).
3.	0.6% Brilliant Indocyanine 6B (I.G.).
4.	1.1% Polar Blue G conc. (Geigy).
5.	0.5% Solway Blue G conc. (I.C.I.).
6.	2% Alizarine Light Blue 4GL (Sandoz).
7.	4% Caledon Blue GCP 300 powder (I.C.I.).
8.	3% Indigosol Blue AGG (Durand and Huguenin).

The German and American standard dyeings for light fastness are also dyed on wool and it is therefore fortunate that there is uniformity in this respect. However, both of these countries use different dyes in the preparation of the standard dyeings as may be seen from the following:—

GERMAN STANDARD DYEINGS.

Standard.	*Dyeing.*
1.	0.6% Brilliant Wool Blue FFR extra.
2.	0.6% Wool Blue N extra.
3.	1% Brilliant Indocyanine 6B.
4.	1.5% Wool Fast Blue GL.
5.	1.3% Cyananthrol RX.
6.	2.5% Alizarine Direct Blue AGG.
7.	2.5% Indigosol AZG.
8.	3% Indigosol Blue AGG.

AMERICAN STANDARD DYEINGS.

Standard.	*Dyeing.*
1.	2% Indigotine conc.
2.	1.2% Scarlet 2R conc.
3.	2% Amaranth extra conc.
4.	1.8% Sorbine Red X.
5.	2.5% Diamine Fast Red FC.
6.	6% Indigosol O.
7.	Not yet definitely selected. Earlier selected dyes are
8.	found not entirely satisfactory.

In the 1933 Year Book of the American Association of Textile Chemists and Colourists (it is this association which has carried out nearly all the work in connection with

establishing methods for testing the fastness of dyes and dyed materials) it is stated that careful exposures indicate that the above German standards are yet capable of improvement, particularly standard dyeings Nos. 7 and 8.

The manner in which the tests shall be carried out is, of course, of paramount importance. In England and Germany particularly, the climatic conditions make it difficult to rely *entirely on natural sunlight.* Yet *it is by sunlight that* coloured textile materials are faded in every-day wear and tear. The alternative of using artificial light for carrying out fading tests is far from satisfactory, since it is most difficult to provide a source of light which will cause fading identical with that produced by sunlight. Under these circumstances in the three countries, England, Germany, and America it is recommended that the fading test be conducted by exposing the material to sunlight. Also in Germany and America the material, during exposure, is protected by window glass in spite of the fact that in the past it has been stated repeatedly that this glass may cut off the effective ultra-violet rays. Curiously enough, the report of the English Fastness Committee does not state definitely how the coloured materials are to be exposed. By inference from a perusal of preliminary reports (" J. Soc. Dyers and Col.," 1931, *47,* 8) it is assumed that exposure behind glass is the accepted procedure.

German and American Tests

In the German and American tests the exposure is required to be with the material facing due south at an angle of 45 degrees with the ground. On these points the English Fastness Report is surprisingly silent. But it is recognised that the fading tests must also be carried out with artificial light. In America it is recommended to use the Fadeometer (the most improved type having temperature and humidity controls) and it is found that one six-hour period of standard sun exposure is approximately equal to 4.66 hours in the Fadeometer. The English Fastness Committee considers the Fadeometer definitely unsatisfactory (this decision refers only to the older type of this instrument) and has therefore examined two alternative types, the Fugitometer and a C.P.A. Fading Lamp, and found them satisfactory so that they can be recommended. Both of these lamps employ a carbon arc as the source of light and, during exposure of the coloured materials, the atmosphere surrounding them is maintained at a constant humidity and temperature. These two lamps are stated to be equally suitable for carrying out accelerated fading tests. It may also be remembered that an improved fading lamp somewhat similar to the Fugitometer has recently been produced in the Canadian textile laboratories of the Ontario Research Foundation.

One important feature of the standards of fastness established by the English Fastness Committee is that each member of the range of dyeings is about twice as fast as the previous one and one-half as fast as the next one. Exceptions to this are standards 7 and 8 where the intervals are rather greater. As regards the necessary period of exposure it is estimated that in an industrial part of England examination of the coloured materials after periods of 1, 4, and 16 weeks will reveal reasonable amounts of fading.

Fastness to Perspiration

Turning now to tests for fastness to perspiration, it is here that the Fastness Committee makes recommendations which differ much from those of German and American committees. The reason for these marked changes is that careful investigations have been made of the composition of human sweat and also of the changes which it undergoes during the period in which it is likely to be in contact with garments which are being worn next to the skin. The investigations of sweat have been carried out by Dr. C. C. N. Vass and Professor McSwiney at Leeds, and they suggest that it is unlikely that any simple perspiration fastness test can be devised so that it consists simply of spotting the coloured material with a solution and noting the resulting changes of colour.

The report contains much information concerning the various substances such as urea, glucose, and sodium chloride to be found in sweat. It also records that the average pH of fresh perspiration is 5.6 whereas after incubation at 37° C. for several hours the perspiration (owing to bacterial changes causing an increase in ammoniacal nitrogen) attains a pH of about 7.8. In view of these facts it is therefore suggested that two perspiration test liquors be employed, the first being slightly acid and the second slightly alkaline. Their compositions are given below :—

ACID TEST LIQUOR.
2.95 gram common salt.
0.75 gram urea.
1000 cc. water.

This liquor is brought to pH = 5.6 by the addition of N/10 acetic acid.

ALKALINE TEST LIQUOR.
0.839 gram ammonium chloride.
1.732 gram common salt.
0.424 cc. 0.880 ammonia solution.
1000 cc. water.

This liquor is brought to pH = 7.8 by the addition of N/10 acetic acid.

In carrying out a perspiration test, a piece of the coloured material and similar pieces of cotton and wool fabrics are thoroughly impregnated with one of the test liquors (acid or alkaline); the coloured material is then placed between the cotton and wool fabrics and placed on the bottom of a flat glass crystallising dish. More of the test liquor is added to cover the fabrics and these are then pressed together and left to stand for 15 minutes. Excess of the liquor is then poured away and the fabrics incubated (in the dish) for four hours at 37° C. Afterwards the fabrics are separated from each other and allowed to dry at room temperature whereupon they are examined for bleeding and change of shade.

It was found that the results obtained in testing by this method, using both test acid and alkaline liquors, were in accordance with general experience as regards the fastness to perspiration of most dyes. But it is obvious that if the coloured material to be tested is markedly acid or alkaline then it will modify the pH of the perspiration test liquor and so lead to unreliable results. The Fastness Committee has therefore had to make further recommendations which make the test independent of the pH of the coloured material being tested. In practice the test is so modified that the pH of the coloured material is determined by a recommended procedure and the material (if necessary) treated to bring its pH within certain limits suitable to testing for perspiration fastness.

A More Complicated Method

In comparing this new method for testing perspiration fastness with the German and American methods it cannot be denied but that the new method is much more complicated. For example, in the German method, the coloured material is simply rolled together with other white fabrics (cotton, wool, silk, etc.) and immersed for one half hour in a solution at 45° C. containing common salt and ammonia, then wringing, adding to the liquor sufficient acetic acid to make it slightly acid, and then treating the coloured material in the same manner as with the alkaline liquor. In the American method, the coloured material is treated, together with other white fabric, with alkaline and acid solutions, both containing common salt and disodium hydrogen phosphate, but the former has an addition of ammonium carbonate and the latter lactic acid. These two solutions have pH of 8.7 and 4.5 respectively and to this extent they closely correspond with the English test liquors.

As regards the American test it is claimed that the results are in close agreement with practical experience, although on account of complaints received from retailers in respect of a certain acid chrome brown dye it is possible that the acid test liquor may be yet made slightly more acid. If this test proves to be accurate over a prolonged period then the question will certainly arise as to whether the more complicated English test is really necessary.

The third and final portion of the report deals with tests for fastness to washing. The Fastness Committee has apparently decided that the tests recommended should be linked to laundry practice rather than to any treatment which a coloured material is likely to receive in a bleaching and dyeing works. The washing tests recommended therefore are not concerned with fastness to chlorine or peroxides.

Four tests of increasing severity are described. Each test consists of placing the coloured material (sewn to a piece of white cotton fabric of approximately one-half the size of the coloured material) together with a detergent liquor in a stainless steel jar, which is then attached to a wash wheel rotating at a constant speed within a water bath maintained at the desired temperature. When an imitation of rubbing is

required, then Monel metal balls are placed together with the fabric within the jar. After this treatment the fabrics are removed from the jars and rinsed with warm water, mangled, and dried. The loss of colour of the coloured material under test and the degree of bleeding are then noted. These tests are also conducted along with standard red and blue dyeings so that the fastness of the coloured material can be measured by the behaviour of these standards. Since the presence of finishing agents in the coloured material may interfere with the action of the detergent test liquor it is recommended to change this after the first ten minutes of the washing test; it is thought that in this manner the effect of foreign substances might be minimised.

Washing Test Conditions

The following are the conditions and liquors used in the four recommended tests :—

Test 1. Wash for ½ hour at 40° C. with a 0.2% solution of soap (Lux or other flake soap has been found suitable).
Test 2. Wash for 1½ hours at 60° C. with a 0.2% solution of soap.
Test 3. Wash for ¾ hour at 85° C. with a solution containing 0.5% of soap and 0.2% of soda ash and the presence of Monel metal balls.
Test 4. Wash for 4 hours under the same conditions as in Test 3.

In the test, the amount of detergent liquor is 50 times the weight of the coloured material. It is believed that Test 1 corresponds to a mild home wash, Tests 3 and 4 to severe laundry boils, and Test 2 to an intermediate severity of wash.

The standard dyeings, prepared with bleached cotton limbric fabric free from oxycellulose, are as follows :—

Red: *Fastness.*	*Standard Dyeing.*
Fails Test 1.	1.9% Chlorazol Fast Red FS (I.C.I.).
Pass Test 1 and fail Test 2.	2% Chlorazol Fast Scarlet 4BS (I.C.I.).
Pass Test 2 and fail Test 3.	5 gram per litre of Brenthol OT (I.C.I.) and 10 gram per litre of Fast Orange Salt (I.G.).
Pass Test 3 and fail Test 4.	2.5 gram per liter of Brenthol PA (I.C.I.) and 4.5 gram per litre of Fast Red RL Salt (I.G.).
Pass Test 4.	1.25 gram per litre of Brenthol BN (I.C.I.) and 1.5 gram per litre of Brenthamine Fast Red KB Base (I.C.I.).

Blue: *Fastness.*	
0	2.5% Chlorazol Blue BS (I.C.I.).
1	2.5% Chlorazol Steel Blue 6BS (I.C.I.).
2	2.5% Chlorazol Steel Blue 6BS (I.C.I.) after treated with copper and chromium.
3	12% Indigo LL2R paste (I.C.I.).
4	12% Caledon Dark Blue GS paste (I.C.I.).

All the fastness tests for washing are described with particular reference to coloured *cotton* materials, but the Fastness Committee state that the conditions of testing can be easily adapted to other coloured materials such as wool, silk, etc. The report also briefly describes the construction of the Fugitometer, the C.P.A. fading lamp, and the wash wheel. It indicates that arrangements have been made whereby this apparatus can be purchased by anyone interested.

Some Criticisms

Turning now to the report itself one or two criticisms must be made. Firstly, the report is not drawn up in an ideal manner. The writer would have expected that after seven years' effort and the expenditure of a very large sum of money the report would have not only contained the recommended tests of the Fastness Committee but also a summary of the tests now being used abroad, notably in Germany and America. Presumably the committee has examined these alternative tests and it would have been interesting and helpful to have had in the report any facts concerning their reliability or reasons for their non-adoption. The section of the report dealing with tests for light-fastness is not very clear and details concerning the conditions under which the patterns are to be exposed must be gained mainly by inference. This section is distinctly inferior as regards straightforward description than the others. The writer has been unable to find out from the report whether, in the tests, the coloured materials are to be covered (with glass) or uncovered during exposure to sunlight, and what degree of humidity and temperature is maintained around the material when exposed in the fugitometer.

Another unfavourable feature of the report is that it definitely states with regard to the information given concerning the preparation of standard dyeings that "they are not intended to enable individual investigators to prepare their own standards, as the difficulty of accurate reproduction is so great that this practice would result in much confusion." Hence arrangements have been made for the preparation and sale of these dyeings through the Society of Dyers and Colourists. It is suspected that the individual investigators referred to will not readily agree that they lack the capability of preparing standard dyeings provided that the methods of preparing them are fully disclosed. On the other hand, if the difficulty of preparing standard dyeings is really so great, then the report could have usefully given some interesting information about these difficulties and the manner in which they are being overcome by those entrusted with the preparation.

A final criticism is that with this report the Fastness Committee have lost an opportunity of bringing together in one volume (as marking completion of the first stage of the Society's effort to establish accurate fastness tests) all the useful information concerning the fastness of coloured materials which has been discovered or reviewed by the Fastness Committee.

A Difficult Task

Apart from the criticisms above and which are made from a constructive rather than a destructive viewpoint, there can be no doubt but that the Fastness Committee has had a very difficult task before it. There is evidence of this in the report itself and also in the numerous publications in the "Journal of the Society of Dyers and Colourists," giving details of certain relevant investigations carried out mainly by Dr. P. W. Cunliffe.

The Fastness Committee has tackled its task in the correct manner, that is, by obtaining accurate information about the fastness of coloured materials and the conditions under which fading is influenced, before establishing fastness tests. A notable illustration of this is to be found in the work done on fading by light and the nature of perspiration. The fastness tests are thus based on much valuable "spade" work. Presumably these new tests will be continuously tried out in the near future, and a mature judgment of the reliability of the tests can only be given when the results of these tests in different parts of the world are known. It is hoped that the verdict will be—"these tests are more reliable than any yet devised."

Canadian Diatomite

Increased Production Anticipated

CANADIAN production of diatomite in 1933 amounted to 1,809 tons. This figure, though it constitutes a new high output record, is not markedly in advance of the quantity of output of former years nor can it be regarded as an indication of the Dominion's potentialities as a producer of diatomite. A survey of the situation indicates, however, that in the near future considerably larger tonnages of Canadian diatomite will be employed in home industries and that the export market will be extended. Canada is at present exporting close to 95 per cent. of her diatomite output to the United States, and is importing the bulk of her requirements from that country. About 60 per cent. of Canada's annual diatomite consumption of roundly 4,000 tons a year is employed in sugar refineries.

About 15 per cent. of the Canadian consumption of diatomite is employed for insulation purposes, particularly as made-up products such as bricks, which are used in high-temperature units. Some companies in Toronto and vicinity are now manufacturing diatomite insulation bricks and insulation pads, while other firms expect to manufacture diatomite insulation, refractory and building products in the near future. Close to 10 per cent. finds a market as an admixture in concrete in which about 3 per cent. diatomite content imparts certain beneficial qualities. Diatomite is also employed in Canada as a filler, particularly in the manufacture of asphaltum battery boxes; as the abrasive base in silver polishes and in some tooth pastes; as a carrier for catalysts in the preparation of oils for soap manufacture; and as an absorbent for acetylene. During the past year there has been an appreciable demand for diatomite as a filter-aid by large cleaning establishments.

Many New Uses for Bone Glue

Results of an International Competition

THE results of the competition organised by the International Bone Glue Manufacturers' Association, "Epidos," to find new uses for bone glue, or to develop existing uses, has now been announced. It will be remembered that this competition, which was open for one year, closed on February 28, 1934. It was provided that 20,000 Swiss francs would be compulsorily distributed on June 30, 1934, among the winners of the competition. Considerable interest was aroused, for 118 competitors, from 21 nations, sent in entries.

The competition jury has now distributed the 20,000 Swiss francs among the following ten entrants in equal shares:

G. F. Michot-Dupont, of Fontaine-Chaalis (France).
Ir. J. Van Stolk, of Delft (Holland).
R. Chanut, of Algiers (France).
V. Boulez, of Brussels St. Gilles (Belgium).
H. Holländer, of Tourcoing (France).
T. Grenness, of Copenhagen (Denmark).
F. Gröbe and St. Reiner, of Berlin (Germany).
F. Strelba, of Prague (Czecho-Slovakia).
P. Walter, of Versailles (France).
W. Scherman, of Budapest (Hungary).

Soap Manufacture

V. BOULEZ (Belgium).—This memorandum related to the use of a product with a bone glue base in the manufacture of soap. Its addition presents numerous advantages in manufacture, for it increases the solidity of the soap base, and thus facilitates plodding, which is rendered possible with much higher moisture content of the flaked soap. In the manufacture of household soap, the greater hardness of the base reduces the cooling in the moulds and facilitates the branding of the soap as well as the manufacture of household soap by the plodding process. Further, the qualities of ordinary soap are improved as regards cleaning power and lather.

G. F. MICHOT-DUPONT (France).—This work dealt with the use of glue as a hydrofuge of cement, with the object of increasing its impermeability. Investigation made into this matter showed that the addition of 3 per cent. to 5 per cent. of bone glue considerably increased the water resistance of cement without the other qualities being affected.

IR. J. VAN STOLK (Holland)—R. CHANUT (Algeria).—These two entries, each of which obtained a prize, were based on the same principle, consisting in the formation of an emulsion of water, oil and bone glue; the bone glue acting in this case as a stabiliser of the oil and water emulsion, and as an adhesive in using the product on vegetables. This product acts either alone, by reason of its physical action, or as a conveyor of insecticides suspended in it. Large-scale tests made with this product for over a year, used alone and with the addition of insecticides such as arsenates, have given very useful results.

Electrical Insulating Materials

H. HOLLANDER (France).—This entry related to the use of glue in the manufacture of preserving products, particularly polish. The addition of bone glue in the composition of this product permits of considerable reduction in the cost price, at the same time improving the brilliance of the product. The addition of bone glue has the double advantage of facilitating and stabilising the basic emulsion and also assists the distribution of the wax in the paste.

T. GRENNESS (Denmark).—The object of this memorandum was a scientific study of the results obtained with adding glue to various rubber composition. Numerous experiments, results of which are shown in the memorandum, indicate the influence of an addition of glue upon the vulcanisation of rubber, particularly as regards alterations in the rubber during this process. It points out the improvements which can be made in rubber by adding glue, both as regards tenacity, durability and homogeneity.

F. GROBE and ST. REINER (Germany).—These competitors indicated the possibility of dissolving glue, not in water, but in organic non-aqueous liquids, such as phenols. The substances obtained in this way are similar physically to artificial resins, but present a much greater insulating resistance than other materials habitually used and thus can be utilised as insulators in the electrical industry.

F. STRELBA (Czecho-Slovakia).—This memorandum related to the manufacture of an insulating material in building construction. This material is constituted by an agglomerant of cork or wood waste, either in powder or shavings, coagulated together with a binding agent having a bone glue base. This material can be made according to the Strelba process, at a much less cost than others of a similar nature. It gives, further, an insulating power, both to sound and heat, much higher than many insulating materials now used.

P. WALTER (France).—This entry related to the manufacture of paints, lacquers and varnishes with a bone glue base. These products can be used either alone or as undercoats for paints and varnishes. The glue contained in these paints or varnishes is, either at the time of its application or in preparation, made insoluble with bichromate or formaldehyde. The interests of this process consist, not only in the fact that it involves a big saving in the preparation of paints, lacquers and varnishes, but also in rendering the paints insoluble in any solvent and much less impermeable.

W. SCHERMAN (Hungary).—This memorandum related to the use of bone glue as a source of nitrogen in the manufacture of yeast. Bone glue made from animal matter contains a large proportion (15 per cent.) of nitrogen which is very easily assimilable and can be used profitably in the manufacture of yeast, when this bone glue has been previously hydrolised by the action of sulphuric acid. Tests have confirmed that the nitrogen content in glue is easily assimilable by the yeast, and also results in the improvement in yield and quality of the yeast.

Latex, Rubber and Paper

Apart from the above ten prize-winning entries, the jury thought it necessary to recompense a certain number of works and for that purpose used the optional sum of 10,000 Swiss francs provided in Article 3 of the rules of the competition.

Two entries thus recompensed related to the use of bone glue as a catalytic agent. The fact of adding 0.6 per cent. to 2 per cent. of glue in the sulphuric and hydrochloric acid baths used for the cleaning of metals, has the result, without affecting the attack of the acid on the oxide, of reducing, to a very large extent (about 50 per cent.) the attack on the iron by the acids and in this way diminishing the release of hydrogen. The authors were Audinos and Leroy (France).

The use of glue in the latex and rubber industry was the subject of three recompensed entries. According to Bourgois (Belgium), the fact of adding to the latex solutions a certain proportion of bone glue varying from 5 per cent. to 8 per cent. presents a definite advantage. The glue acts as a stabiliser in the emulsion and as an anti-coagulant of the latex emulsion in water. Further, when latex baths are used for the manufacture of rubber objects by the steeping method, it is possible to obtain rubber coatings which are much thicker than when there is no glue and, consequently, the number of steepings and intermediate drying operations can be considerably lessened. That of Faidutti (France), examined the various advantages offered by bone glue in the latex industry to facilitate emulsions and suspensions of latex-filled products.

Professor Galle (Czecho-Slovakia) indicated the recipe for a coating with a bone glue base of ammonium resinate and other products. This coating is used for preserving rubberised horsehair which is utilised for the padding of seats, in particular, for motorcoach work. The impregnation of this horsehair with the glue solution prevents the quick decay of the rubberised hair which, otherwise, breaks in the long run and loses its elasticity.

The use of glue in the paper industry was the subject of a recompensed entry by Noss and Goldlust (Austria). This memorandum related to the manufacture of a product with a bone glue base where this is partially insolubilised enabling

its use in the sizing of paper pulp instead of resin, and avoiding the big losses which take place when glue is used in a fully soluble state, which fact has hitherto prevented the use of glue for this particular purpose in the paper trade.

For the use of glue in the textile industry, A. Cave (France) dealt with the manufacture of a varnish with a bone glue base used for rendering materials impermeable particularly to spirits and oils, which enables the manufacture of tubes of material for the circulation of gases, spirits and oils which attack rubberised coatings. Another entry by "X" (Belgium) covered a dressing with glue and glycerine in large proportions. This dressing gives the same qualities as linseed oil sizing and has the big advantage that the de-sizing of the glue dressed materials is much easier and prevents the attack on the silk thread arising from the oxidation of the drying oils. A third entry, Asu Vendor (Switzerland), gave receipts for the use of glue in dressing of various materials, particularly in working up bases in naphthol dyeing, giving very useful results. A fourth, Bruno Fils (Germany) related to the use of bone glue for the washing of dyed materials of pure wool or mixtures which lose their colour very much under friction. This method gives much more useful results than ordinary fullers earth. A fifth, R. Dubois (France), related to the use of the diastases for the purpose of altering the qualities of bone glue and thus facilitating its use for dressings after the glue has been treated by these diastases. By this method it is possible to obtain with a similar charge materials which vary widely as regards pliancy of dressing.

In view of the fruitful results obtained by this first competition, the International Association of Bone Glue Manufacturers, "Epidos," has decided to continue its efforts to study more profoundly new uses of bone glue. Consequently, in the near future it anticipates organising a further competition for the purpose of recompensing all efforts by technicians in any industries likely to use bone glue who may either find new outlets or improve those now existing or those resulting from the first competition. Additional particulars upon the new uses resulting from the first competition can be obtained on application to the General Secretary, "Epidos," 40 Rue du Colisée, Paris.

Two Essential Oils from East Africa

Lemongrass Oil and Cinnamon Leaf Oil

OWING to the general world depression and the consequent fall in prices of staple commodities, growers of such crops as coffee and maize in East Africa have been seriously affected, and many of them have turned their attention to secondary crops which give a quick and high return. Amongst these, essential oil plants have taken a prominent place. There has been insufficient time yet for any extensive industry to grow up, but already Kenya geranium oil is well known on the market and others will doubtless make their appearance in due course. Kenya cedar-wood oil, which falls into a somewhat different category, being a by-product of the local timber industry, is also well known.

The Imperial Institute, according to the July issue of its quarterly bulletin, has been closely associated with this new industry from its commencement, and a large number of samples of oils of different kinds, prepared by planters or by the local agricultural departments, have been received for examination. Most of the samples represent oils familiar to the market, but in addition a number of new oils, distilled from indigenous plants, have been examined in order to determine their commercial possibilities.

Lemongrass Oil from Tanganyika

A sample of lemongrass oil, stated to have been distilled by a planter in the Turiani area, was forwarded to the Imperial Institute by the Director of Agriculture, in September, 1933. This sample consisted of a pale greenish-yellow oil with a pleasant characteristic odour of lemongrass. Its constants are recorded in comparison with the ranges of corresponding figures recorded for East Indian lemongrass oil, obtained from *Cymbopogon flexuosus*, and for West Indian lemongrass oil, obtained from *Cymbopogon citratus*.

	Sample.	*East Indian Lemongrass Oil.*	*West Indian Lemongrass Oil.*
Specific gravity at 15.5°/15.5° C.	0.8846	0.899 to 0.905	0.870 to 0.912
Refractive index n_D 20° C. ..	1.4860	1.483 to 1.488	1.482 to 1.489
Optical rotation a_D	−0.35°	+1.41° to −5°	+0.2° to −1°
Citral (by bisulphite method) *per cent.*	81	70 to 85	53 to 83
Solubility in 70 per cent. alcohol at 15.5° C.	Not completely soluble even in 10 vols.	Usually soluble in 1.5 to 3 vols.	Usually insoluble
Solubility in 80 per cent. alcohol at 15.5° C.	Soluble in 1 vol.	Soluble	Generally insoluble.

Examination showed that the characters of the sample were more in agreement with those of West Indian lemongrass oil than East Indian oil, particularly as regards specific gravity and solubility. The oil was of good quality and contains a high percentage of citral, and its market value was approximately equal to that of the Cochin lemongrass oil of commerce.

With reference to the question of the solubility of the different kinds of lemongrass oil, it may be mentioned that there was formerly a strong preference in the trade for a "soluble" oil, but at present little importance is attached to this feature here as the oil is now principally used as a source of citral. The most important character of the oil is, therefore, the percentage of this constituent. A large firm of essential oil distillers stated that so far as the usefulness of lemongrass oil is concerned it does not matter whether it is of the soluble or insoluble type, as the oil is used principally as a source of citral and its value is dependent on the amount present. Even when the oil is employed in the preparation of cheap perfumes, a soluble oil is not necessarily more useful.

Cinnamon Leaf Oil from Uganda

A sample of cinnamon leaf oil was forwarded to the Imperial Institute by the Director of Agriculture, in August, 1932. It was reddish-brown in colour, and slightly turbid owing to the presence of water. By filtration through paper, the oil was rendered clear. The oil was found to have the following constants as compared with those of samples of cinnamon leaf oils from Seychelles, and the recorded range for Ceylon cinnamon leaf oil:—

	Sample.	*Seychelles Cinnamon Leaf Oil.*	*Ceylon Cinnamon Leaf Oil.*
Specific gravity at 15.5/15.5° C.	1.0477	1.046 to 1.060	1.044 to 1.065
Optical rotation a_D	+1.3° (approx.; solution very dark) at 22° C.	−2.06° to +0.25°	−0.25° to +2.33°
Refractive index n_D 20° C. ..	1.5364	1.532 to 1.539	1.531 to 1.540
Total phenols (as eugenol) *per cent.*	69.5	86 to 92	65 to 95
Aldehydes (bisulphite method) *per cent.*	5.5	0.5 to 6.5	Up to 4
Solubility in 70 per cent. alcohol	Soluble in 1.6 vols.	Soluble in 1.1 to 1.5 vols.	Soluble in 1 to 3 vols.

The present oil is therefore similar in character to the oil distilled in Ceylon and Seychelles, but it contains a rather lower percentage of eugenol than average samples of the commercial oils. Cinnamon leaf oil is used principally as a source of eugenol for the manufacture of vanillin. The bulk of the commercial oil goes to the United States where it is admitted free of duty. Owing to the steadily increasing competition of vanillin made from guaiacol during recent years, the value of cinnamon leaf oil has declined, and, moreover, at the present time, this oil has to compete with Madagascar clove oil as a source of eugenol. Another factor in this connection is that clove oil is more suitable than cinnamon leaf oil for vanillin manufacture, as the constituents other than eugenol in the latter oil render the vanillin more difficult to purify than the vanillin produced from clove oil.

Artofex Mixing and Kneading Machine, with additional mobile mixing bowls.

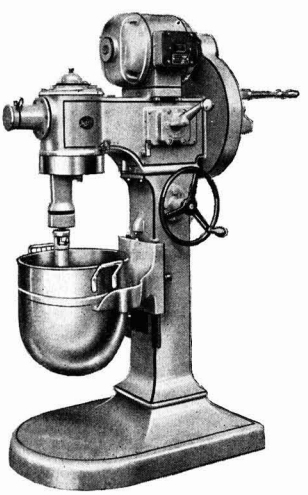
Some Mixing and Kneading Machinery

Seen at the Recent Bakers' Exhibition

SOME of the machinery at the International Bakers' and Confectioners' Exhibition, which was held at the Royal Agricultural Hall, London, September 8-14, proved to be of particular interest to the chemical manufacturer and the chemical engineer.

The patent Artofex dough mixing and kneading machine, supplied by the Artofex Engineering Works, Ltd., is provided with intersecting arms which traverse elliptical paths in the rotating bowl during the mixing operation, whilst the left-hand kneading arm folds, lifts and gently kneads the dough. This machine is therefore pre-eminent as a dough mixer. Not only are all ingredients perfectly blended with each other, but the triple mixing and kneading action is so thorough that in spite of its gentleness stiff doughs are obtained with unusually high absorptions. Because of the design of the machine, the arms aerate and oxidate the dough as they describe the mixing, lifting and stretching action. Such a machine should find useful applications in the manufacture of plastic products.

It is when the Artofex action is closely compared with the acton of any other mixer that one realises why the Artofex mixer has been universally acknowledged as the supreme mixer in the bakery trade. The left-hand arm is designed in such a way that it practically touches the sides and bottom of the bowl, thus making absolutely sure that every particle of the ingredients is brought under the direct mixing action of the two powerful arms. These two arms move over one another in their elliptical paths—they do not simply pass by each other, as in the case of these other machines.



The Hobart Mixer, 7½ gallon Model.

The Hobart mixer, made by the Hobart Manufacturing Co., Ltd., is not just an ordinary mixing bowl geared to a motor, but a complete power plant specially designed and constructed for mixing purposes. The adaptability of this machine to a wide and varied range of products commends it to such concerns as manufacturing chemists, ink, dye, paint, glue, and plastic manufacturers.

Owing to the highly perfected mixing action which is obtained in the Hobart mixer, all ingredients are thoroughly incorporated—oils and insoluble matters get equal distribution, as the beater path covers every part of the bowl, with the result that a much finer finished product is obtained. Hobart machines also operate a number of very useful attachments such as a pulveriser for the grindng of sugar; a slicer for shredding and breaking up cocoanut oil cakes, stearic acid, etc; a chopper for bringing mixtures halfway to granules; and an oil drip feed for adding ingredients that have to be added in minute quantities.

British Overseas Chemical Trade in August

Increased Export Figures Maintained

THE Board of Trade returns for the month ended August 31 show that exports of chemicals, drugs, dyes and colours, were valued at £1,618,421, as compared with £1,505,118 for August, 1933, an increase of £113,303. Imports were valued at £919,636, as compared with £894,548; re-exports were £32,991.

Imports

	Quantities. Month ended August 31, 1933.	Quantities. Month ended August 31, 1934.	Value. Month ended August 31, 1933. £	Value. Month ended August 31, 1934. £
Acids—				
Acetic .. .. cwt.	10,201	12,738	15,073	20,843
Boric (boracic) ,,	344	2,200	359	2,075
Citric .. .. ,,	460	3,370	1,440	9,023
Tartaric .. ,,	1,870	2,533	7,937	10,796
All other sorts .. value	—	—	6,107	7,100
Calcium carbide .. cwt.	61,063	90,038	35,664	46,929
Potassium compounds—				
Caustic and lyes cwt.	10,241	9,855	11,602	12,014
Chloride (muriate) ,,	177,430	135,620	72,886	41,036
Kainite and other mineral fertiliser salts cwt.	96,132	85,297	19,294	14,845
Nitrate (saltpetre) ,,	6,206	9,720	5,572	7,104
Sulphate .. ,,	157,155	130,160	74,678	43,119
All other compounds ,,	6,952	9,479	11,326	17,562
Sodium compounds—				
Carbonate, including crystals, ash and bicarbonate .. cwt.	11,083	27,071	3,340	8,023
Chromate and bichromate .. .. cwt.	2,641	12,497	3,803	16,657
Cyanide .. ,,	—	997	—	2,805
Nitrate .. .. ,,	1,622	2,176	468	571
All other compounds ,,	23,569	13,430	21,013	10,151
Other chemical manufactures .. .. value	—	—	221,788	195,387
Drugs, medicines, etc.—				
Quinine and quinine salts oz.	55,800	44,238	4,361	3,699
Medicinal oils, not elsewhere specified cwt.	3,429	2,363	7,450	6,065
Ointments and liniments cwt.	14	1	1,049	77
Proprietary medicines value	—	—	26,191	35,307
All other sorts .. ,,	—	—	30,135	37,165
Raw or simply prepared value	—	—	36,927	46,051
Finished dyestuffs (coal tar) .. .. cwt.	3,499	3,565	79,131	91,748
Extracts for tanning—				
Chestnut .. cwt.	26,730	31,636	18,075	22,100
Quebracho .. ,,	32,590	44,981	20,655	27,873
All other sorts .. ,,	26,757	56,729	18,051	38,000
All other dyes and dyestuffs, etc. .. cwt.	6,443	3,187	18,454	31,271
Painters' colours and materials—				
White lead, basic carbonate .. .. cwt.	5,851	6,664	7,123	7,819
Lithopone .. ,,	20,201	21,657	14,278	14,230
Ochres and earth colours cwt.	20,806	32,685	9,255	11,808
Bronze powders ,,	5,254	1,319	18,145	9,119
Carbon blacks .. ,,	35,489	22,031	37,974	34,931
Other pigments and extenders, dry .. cwt.	27,468	25,163	8,542	7,487
All other descriptions ,,	10,382	16,016	25,502	29,140
Total .. .. value	—	—	894,548	919,636

Exports

	Quantities. Month ended August 31, 1933.	Quantities. Month ended August 31, 1934.	Value. Month ended August 31, 1933. £	Value. Month ended August 31, 1934. £
Acids—				
Citric .. .. cwt.	2,227	3,430	8,008	11,300
All other sorts .. value	—	—	23,094	20,168
Aluminium compounds tons	1,705	7,979	14,604	87,882
Ammonium sulphate ,,	26,613	30,931	160,992	182,002
Other ammonium salts tons	802	837	13,937	12,669
Bleaching powder (chloride of lime) .. cwt.	67,837	41,130	19,176	11,085
Tar oil, creosote oil, etc. gal.	1,576,770	1,801,257	22,255	34,976
Other coal tar products value	—	—	21,641	18,184
Copper, sulphate of tons	760	776	11,203	11,148
Disinfectants, insecticides cwt.	25,554	34,971	62,662	82,140
Glycerine .. .. ,,	20,407	11,629	36,906	25,618
Lead compounds .. ,,	11,929	12,135	14,363	14,927
Magnesium compounds tons	409	398	9,947	9,355
Potassium compounds cwt.	4,023	4,996	13,443	10,314
Salt (sodium chloride) tons	23,087	22,101	62,452	55,010
Sodium compounds—				
Carbonate, including crystals, ash and bicarbonate .. cwt.	293,247	283,838	81,942	77,784
Caustic .. .. ,,	115,896	163,356	79,216	95,771
All other sorts .. ,,	242,004	131,677	127,798	77,194
Zinc oxide .. tons	1,076	1,076	21,313	19,841
All other descriptions value	—	—	165,943	193,430
Drugs, medicines—				
Quinine and quinine salts oz.	76,895	90,550	8,188	10,325
Proprietary medicines value	—	—	84,062	91,196
All other descriptions ,,	—	—	118,550	125,181
Finished dyestuffs (coal tar)—				
Alizarine and indigo (synthetic) .. cwt.	562	1,269	7,314	7,198
Other sorts .. ,,	7,064	5,936	73,208	69,384
All other descriptions ,,	17,867	15,615	20,209	19,952
Painters' colours and materials—				
Ochres and earth colours cwt.	16,905	13,320	16,236	12,563
Other descriptions ,,	8,155	15,015	11,474	19,173
White lead .. ,,	4,491	5,383	8,361	10,210
Paints and painters' enamels, prepared .. cwt.	30,080	40,738	88,537	104,475
Varnish and lacquer gal.	68,154	91,773	26,475	30,157
All other descriptions cwt.	40,535	30,637	71,609	61,809
Total .. .. value	—	—	1,505,118	1,618,421

Re-Exports

	Quantities. Month ended August 31, 1933.	Quantities. Month ended August 31, 1934.	Value. Month ended August 31, 1933. £	Value. Month ended August 31, 1934. £
Chemical manufactures and products .. value	—	—	20,222	12,975
Drugs, medicines—				
Manufactured or prepared .. .. value	—	—	12,244	9,373
Raw or simply prepared value	—	—	5,424	7,947
Dyes and dyestuffs cwt.	445	506	801	1,761
Painters' colours and materials .. .. cwt.	419	630	745	935
Total .. .. value	—	—	48,436	32,991

A Modern Dairy Refrigeration Plant

THE current issue of the "Sulzer Technical Review" contains a description of the modern refrigerating plant erected for the S.A. Cooperativa de Lecherias, at Montevideo. This dairy

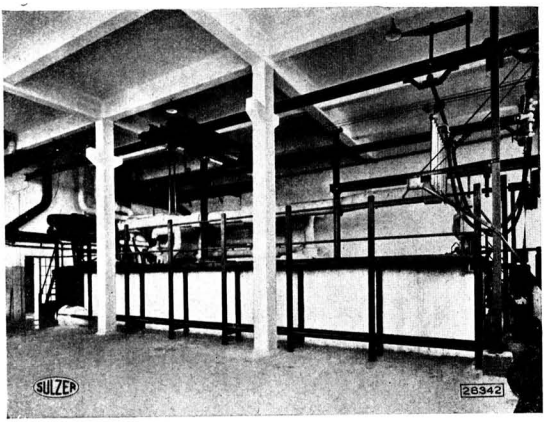


Fig. 1. Sulzer ice tank and brine cooler.

is one of the most important in South America, as regards both the quantity of milk handled (about 44,000 gals. daily), as well as the perfection of the plant installed, which must be considered as a model of its kind.

The refrigerating plant consists of two Sulzer horizontal compound ammonia compressors each driven by a direct-coupled asynchronous motor. The refrigerating capacity of the plant is about 3,200,000 B.Th.U. per hour at an evaporating temperature of 14° F. and a condensing temperature of 36° F. The cold produced is mainly used for cooling the brine in two tanks of large accumulating capacity one of which may be used for ice making (Fig. 1). The rest of the cold produced cools the numerous cold rooms by direct expansion of the ammonia in cooling coils (Fig. 2). The cold brine serves only for cooling the milk and cream after pasteurisation.

All Available Cooling Water Utilised

The cooling-water is available in very small quantities and is also of poor quality, so that tubed condensers had to be provided. These high-efficiency apparatus fulfil their purpose perfectly, since they utilise all the cooling-water available, and the tubes can easily be cleaned without having to stop the compressors. The layout of the ammonia piping was studied with particular care, in order to ensure perfect, simple and reliable working of the plant. For this purpose, a liquid separator was installed on the roof. The liquid ammonia is distributed partly by gravity from the liquid separator to several ammonia evaporators, and partly from a central regulating station located in the machine room. This arrangement of the ammonia piping absolutely prevents any

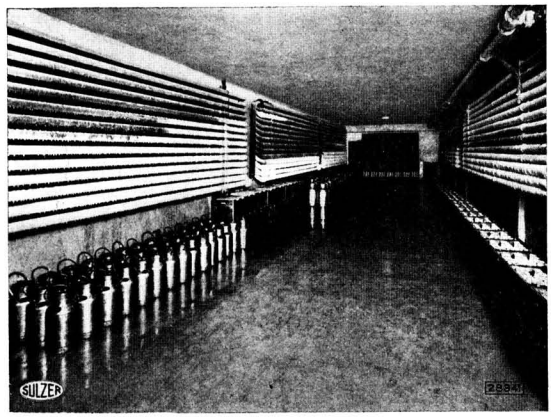


Fig. 2. Cold rooms with coils for direct evaporation of ammonia.

drawbacks, such as liquid hammer and unstable regulation, etc., which may occur in refrigerating plants subject to repeated and sudden fluctuations in the demand for cold at the various points of use, conditions which are typical for a plant of this kind. Sulzer central devices, ammonia gauges, vents, etc., are fitted in the ammonia piping.

The pasteurised milk is cooled in a trickling cooler with two circuits, the fresh water circulating in the upper part, whilst the cooled brine circulates in the lower part. The brine is cooled in the two tanks already mentioned, which are connected by means of a by-pass, so that they may be worked separately or together as the demand for cold requires. The cold brine is withdrawn from one end of the brine tanks by means of two Sulzer medium-lift pumps, designed for handling large quantities of liquid and specially constructed for working with brine.

Four Sulzer pumps of the same construction and dimensions as the brine pumps serve for delivering fresh water to the various departments of the works. Two of the pumps are intended particularly for circulating the water in the ammonia condensers. The cooling-water is taken from a cooling-tower erected on the roof of the building.

National Physical Laboratory

Papers Published during August

PAPERS published by the staff at the National Physical Laboratory during August included :—

"The work of the Engineering Committee of the Food Investigation Board." By E. Griffiths, D.Sc., F.Inst.P., F.R.S., J. H. Awbery, B.Sc., F.Inst.P., and R. W. Powell, B.Sc. Published in the "Report of the Food Investigation Board for 1933."

"The contamination of platinum by graphite." By L. J. Collier, D.F.C., T. H. Harrison, B.Sc., Ph.D., and W. G. A. Taylor. Published in the "Transactions of the Faraday Society," *30*, 581.

"Alloys of magnesium research. Part I.—The constitution of the magnesium-rich alloys of magnesium and nickel." By J. L. Haughton, D.Sc., F.Inst.P., and R. J. M. Payne, B.Sc. Published in the "Journal of the Institute of Metals." *54*, 275.

"Alloys of silver and beryllium." By H. Sloman, B.Sc., A.I.C. Published in the "Journal of the Institute of Metals," *54*, 161.

"A water flow indicator." By F. Adcock, D.Sc. Published in the "Journal of Scientific Instruments," *11*, 258.

The Chemical Age Lawn Tennis Tournament

Winners of the Challenge Cups

THE final contests for the silver challenge cups in the fourth annual lawn tennis tournament, organised by THE CHEMICAL AGE, took place on Saturday, September 15, at the Britannic House Club, Lower Sydenham, by kind invitation of the Anglo-Persian Oil Co., Ltd. There was a large number of guests present, including players and their friends and many representatives of chemical and allied firms who were given a hearty welcome by Mr. Blythe Brook on behalf of the company. Fifteen minutes before the doubles match was timed to open, heavy clouds gathered, the air became heavy with thunder and at three o'clock the storm had broken. The spectators who had comfortably seated themselves in deck chairs alongside the court, awaiting the commencement of play, were compelled to make for the pavilion for shelter and the players watched with much disappointment the grass court gradually assume a shiny, slippery surface. Fortunately, however, the storm was only brief and for the remainder of the afternoon the sun shone brilliantly, the proceedings going forward without any further disturbance. The delightful weather, the pleasant surroundings of the Britannic House Club, combined with the cordial hospitality of the Anglo-Persian Oil Co. in entertaining the guests to tea in their delightful sports pavilion, together with excellent tennis, provided a most enjoyable function.

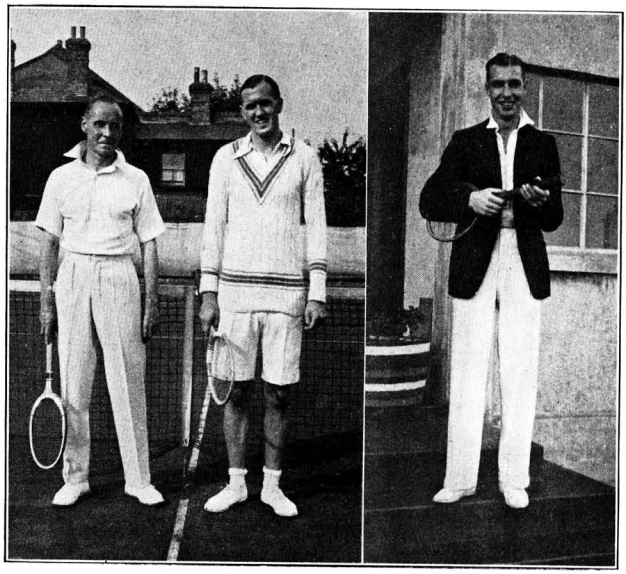
THE CHEMICAL AGE silver challenge cup awarded to the winners of the doubles was won for the second time in succession by Mr. J. Haines and Mr. F. G. Hawley, of the Anglo-Persian Oil Co., who defeated Mr. V. J. Prosser and Mr. A. Baxter, of John Haig and Co., Ltd., and the United Yeast Co., Ltd., by 6-4, 6-1. THE CHEMICAL AGE silver challenge cup awarded to the singles champion has had only one holder, the singles tournament having been inaugurated last year. Mr. C. G. Copp, of Doulton and Co., Ltd., last year's winner, was knocked out in a previous round, and the cup has now passed into the hands of Mr. Albert Baxter, of the United Yeast Co., Ltd., who, on Saturday, defeated Mr. P. A. Tunstall, of the Salt Union, Ltd., Liverpool.

In addition to the cups awarded by THE CHEMICAL AGE, all the players were presented with trophies, which this year took the form of solid silver statuettes of tennis players in action, mounted on black pedestals bearing silver inscription plates. Those given to the three winners also had silver bases, and were known as the "Invicta" statuettes, kindly presented by Thomas Hill-Jones, Ltd. The three statuettes handed to the runners-up were generously provided by Mr. W. Lloyd-Willey and were named the "Lloyd-Willey" statuettes.

The doubles players were fortunate in having Mr. Keith Smith, of Bromley, a well-known Wimbledon umpire, to officiate at their match. Mr. Jones, of the Anglo-Persian Oil Co., kindly umpired the singles.

Both matches produced some excellent play. Mr. Baxter's endurance was taxed to the full, inasmuch as he had to take part in both the doubles and the singles. Prior to the final the records showed that he had played no fewer than 192 games in the course of the tournament, of which 116 had been in his favour. Messrs. Haines and Hawley maintained their record of not having lost a single set for the past two years. Their opponents on Saturday were also their opponents in the third round of last year's tournament. On that occasion Messrs. Prosser and Baxter were beaten by the narrow margin of 7-5, 7-5, but on Saturday Haines and Hawley conceded to them only five games out of the total of 17.

The rain having spoiled the surface of the grass court, it was decided, after consultation with the players, to have the doubles match on the hard court. Haines and Hawley followed their tactics of previous occasions, forcing their opponents out of position and compelling them to put up weak shots. Prosser and Baxter fought hard but Haines and Hawley held the lead throughout and were able to bring the match to a close within the short space of 35 minutes. A total of 17 games was recorded, only five of them reaching deuce.



Winners of The Chemical Age Silver Challenge Cups: F. G. Hawley and J. Haines (doubles) and A. Baxter (singles).

Haines opened with service and quickly took the first game, conceding only one point. The second game progressed to deuce and was in favour of Prosser and Baxter. Haines and Hawley secured the following three games with a loss of four points, bringing the score to 4-1. Baxter's service brought another game to his favour and a further one off Hawley's service was conceded to Prosser and partner, raising the score to 4-3, with Haines and Hawley leading. Prosser showed signs of nervousness, serving several double faults, and Haines and Hawley took a love game (5-3). The losing couple, however, put up a strenuous fight in the next few minutes and recorded the ninth game to their favour after carrying it to deuce twice. With the score standing at 5-4 and Baxter serving there was a possibility of a long set; one fine rally secured a point for Prosser and Baxter but a double fault and some netted shots lost them the set at 6-4.

The second set opened in a similar manner, one game going to each side, but after this the match seemed entirely in the hands of Haines and Hawley, the following five games being taken by them in quick succession. Two games reached deuce and one was a love game. With the score at 5-1 against them and one set down, Prosser and Baxter made a determined effort to increase their number of games. They reached deuce, but Prosser nervously netted the next ball and then Baxter over hit the following, giving Haines and Hawley the

Some Chemical Age Snapshots at Lower Sydenham

1. Mr., Mrs. and Miss Lloyd-Willey on the Pavilion Steps. 2. and 4. Some of the guests following keenly the progress of the match. 3. The finalists ready for their doubles match. 5. The players in the singles final with the donor of the statuettes. 6. Mr. and Mrs. D. McDonald with Mr. Gordon Robbins (right). 7. Runners-up of the doubles (V. J. Prosser and A. Baxter). 8. The organisers keep a watchful eye on the cups. 9. P. A. Tunstall, of Liverpool, runner-up of the singles.

set at 6-1, and the match in two straight sets, having won the first set 6-4.

The contest between Mr. Baxter and Mr. Tunstall for the singles championship was more spectacular. The grass court was used on this occasion and the rallies were longer and more exciting than those witnessed in the doubles, producing tense moments with the possibility of either of the competitors becoming the cup holder. Mr. Tunstall fought hard to the end, although as the match progressed he was obviously tiring and possibly feeling the strain of the railway journey he had made from Liverpool in the morning. Mr. Baxter's low well-placed shots from the base line won for him the cup, and although he had expended a good deal of energy in the doubles earlier in the afternoon, he showed no signs of exhaustion throughout the long rallies of the extended fourth set. Both players gained one game each on service. The third game provided some fine rallies; it was the only game to reach deuce in the first set and was recorded in Baxter's favour (2-1). The fourth and fifth games were Baxter's and Tunstall's in turn (3-2). Tunstall reached 30-40 in the next, then hit out and failed to level the score (4-2). The seventh game was held by Baxter (5-2). Tunstall recovered in the following game, put over some low drives and conceded only one point to his opponent (5-3). Baxter, however, held on to his lead and won the set 6-3.

A Strenuous Fight

There were a number of good tussles in the second set. The first three games were in favour of Baxter, the next three were captured by Tunstall, and the seventh game gave Baxter the lead at 4-3. Tunstall exhibited great determination in the eighth game and after a lengthy duel of 16 points he drew level (4-4). A nicely placed drive down the right hand of Baxter and a smash at the net gave Tunstall a love game and the lead at 5-4. Baxter retaliated with a love game (5-5). Tunstall netted a ball, hit out, missed a backhand drive, gained a point and then put another into the net, handing over the lead to Baxter (6-5). The points stood at 40-30 in the following game; Tunstall picked up the next ball too late, sending it into the net, and giving the second set to Baxter at 7-5. The third set proved to be an easy win for Tunstall; the first five games being in his favour after which Baxter took one on his service, but Tunstall conceded only one point in the next game and won the set, 6-1.

Tunstall, one set in his favour and two down, made a great effort in the fourth set. He gained the lead 3-1, but dropped the next three games to Baxter. The eighth game brought them level once again (4-4). Tunstall failed to get the lead, however, with the next game, but drew level in the tenth (5-5). Baxter's service won him a game (6-5). Tunstall dropped only two points during the next two games and held the advantage of lead (7-6). He served, but returned into the net, hit out, then again into the net, won a point with a nicely placed backhand cross court drive, but Baxter smashed the next ball and again they levelled 7-7. Tunstall failed to pick up Baxter's balls or netted them and gave the advantage to his opponent 8-7. The excitement of the spectators was tense but Tunstall disappointed; Baxter held fast to the lead and won the match 6-3, 7-5, 1-6, 9-7.

Presentation of the Trophies

Mr. GORDON ROBBINS, deputy-chairman of Benn Brothers, Ltd., publishers of THE CHEMICAL AGE, in presenting the challenge cups and silver statuettes, congratulated the winners upon their success, and expressed the gratitude of the organisers of the tournament to those who had been instrumental in bringing about the success of the occasion. Firstly he thanked the Anglo-Persian Oil Co. for the cordial hospitality which had been extended to them at the Britannic House Club, secondly to Mr. Lloyd-Willey and the firm of Thomas Hill-Jones, Ltd., for their generosity in presenting such charming statuettes which had been so greatly admired by everyone, and also tendered thanks to Mr. Keith Smith and Mr. Jones for umpiring the matches. On behalf of those present he thanked the Editor and the Manager of THE CHEMICAL AGE for all the work they had done in connection with the organisation of the tournament.

Mr. BLYTHE-BROOK, on behalf of the Anglo-Persian Oil Co., apologised for the absence of any of their directors which he assured the guests did not in any way indicate lack of interest on their part. He said he had seen some excellent tennis and expressed his great pleasure in being able to entertain the players and their friends.

Mr. LLOYD-WILLEY remarked that he had thoroughly enjoyed himself during the afternoon. He said he was very pleased to give the statuettes and hoped he would be allowed to present similar trophies on a future occasion.

Mr. A. C. CROSS, Editor of THE CHEMICAL AGE, concluded the proceedings by thanking the players for their co-operation throughout the tournament and commented upon the sporting manner in which the competitors had carried through their matches without a single hitch.

News from the Allied Industries

Non-Ferrous Metals

WORLD STOCKS OF REFINED COPPER declined during August by 13,500,000 lb., to 980,000,000 pounds, while American stocks declined 28,500,000 lb., to 765,000,000 lb. Foreign stocks of refined copper increased by 15,000,000 lb., to 215,000,000 lb. The apparent consumption in the United States totalled 61,000,000 lb., while foreign consumption amounted to 158,500,000 lb. The total production of refined copper in the United States aggregated 55,500,000 lb.

Coal Gas

FOR THE FIRST TIME in the history of authorised gas undertakings in Great Britain the number of consumers during 1933 passed the 10,000,000 mark, the exact number being 10,012,379, which was an increase on 1932 of 239,364, or 2.4 per cent. The Board of Trade return deals with 727 undertakings at which 309,557,000,000 cu. ft. of gas were produced, this being an increase of 221,000,000 cu. ft. on the preceding twelve months. The quantity sold, however, showed a decline for the second year in succession, the total of 286,144,000,000 cu. ft. being 844,000,000 below the figures for 1932. The total number of therms sold last year, based on the calorific value of the gas, was 1,366,011,600. The coal carbonised was less than in 1932 by 287,000 tons; 3,000 tons more coke and 2,390,000 gal. more oil were used in the manufacture of water gas. The quantity of coke and breeze made in 1933 was less than that made in 1932 by 326,000 tons.

Mineral Oil

A VERY FAR-REACHING MOVE in the regulation and control of the mineral oil industry has been made by the Bureau of Internal Revenue, in the United States. The Bureau has ordered the opening of all books of record of the producing and refining companies to both Federal and State tax bureaux as well as to bodies dealing with the regulation of oil production. At the same time a tax of one-tenth of one cent a barrel on both the production and refining of crude oil, as authorised under the "hot" oil provisions, is imposed.

Rubber

THE UNITED STATES CONSUMPTION OF RUBBER for August amounted to 33,300 tons, compared with 32,600 tons in July. Imports during August amounted to 33,200 tons, against 41,500 tons. Stocks at the end of August totalled 362,600 tons, 2,300 tons less than at the end of July, and rubber afloat for United States ports amounted to 40,300 tons, compared with 45,900 tons. The consumption of reclaimed rubber during the month was 8,500 tons, against 8,200 tons.

BRITISH AND DUTCH RUBBER GROWERS' PLANS to curtail world rubber production with a view to maintaining prices have created some concern in the United States, which uses half the world's rubber and has bitter recollections of the Stevenson Plan. In a review of the subject, "The Index," the monthly publication of the New York Trust Co., observes that American users are not without means of defence against

unduly high prices. At the end of 1933 stocks in the United States amounted to 365,000 tons, or sufficient to meet American users' needs for about eleven months. A second defence, it is declared, would lie in immediate stimulation of the manufacture of reclaimed rubber.

Sheep and Cattle Dips

COOPER, MCDOUGAL AND ROBERTSON, LTD., manufacturers of sheep and cattle dip, insecticides, etc., have announced an ordinary interim of 2½ per cent., less tax, payable on September 29. This is the first interim payment on the ordinary capital since 1930. For 1933, a final payment of 5 per cent. was made. Total issued capital amounts to £1,571,886. The improvement in the wool position, though at present somewhat retarded by Continental difficulties, should have brought extra profit to the company's extensive Australian and Argentine business in sheep dips. Developments nearer home have undoubtedly stimulated business with our own agricultural community. The company also does a considerable trade in weed killers and insecticides. Such preparations will have been bought more freely with the revival in the nation's purchasing power.

Continental Chemical Notes

A SODIUM SULPHIDE PLANT has been established in Spain for the first time, states "Chemische Industrie."

* * *

LACTIC ACID AND CHEMICAL FOODS are to be manufactured in Budapest by a new company in which the Gschwindt Alcohol Co. is financially interested.

* * *

THE WORLD'S ANNUAL CORK PRODUCTION is estimated at 150,000 tons, the principle producers (according to "Chemische Industrie") being Portugal (55,000), Algeria (35,000), Spain (32,000), and France (13,000).

* * *

THE ROUMANIAN NATIONAL METHANE CO. (Sonametan) contemplates the manufacture of carbon black from pine wood and has received the necessary permit from the Energy Commission.

* * *

THE BULGARIAN ROSE OIL INDUSTRY recorded a decline during the first half of this year, exports of 658 kg. (valued at 19.7 million lewa) comparing with 778 kg. (30.9 million lewa) in the corresponding period of last year.

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THE FIRST RUSSIAN BENZOLE PLANT has been started up in the Kusnezk basin. Work has commenced on the first Russian coal tar experimental hydrogenation plant at Kemerowl and subsequent work will be devoted to the direct conversion of coal into liquid fuels.

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ACCORDING TO A MADRID REPORT the Spanish Government has declared a monopoly on the entire petroleum industry. This development is of particular significance in view of the plans at present under consideration in Spain for the production of liquid fuel by coal hydrogenation.

* * *

CARBON AS AN INGREDIENT OF FERTILISERS is mentioned in a recent German specification (Ger. Pat. 598,392). Intermediate products obtained during the manufacture of active carbon by heating carbon-containing substances with solid or liquid activators have been found to contain ingredients beneficial to plant growth. They are neutralised if necessary and employed in the unwashed condition.

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A CATALYTIC TWO-STAGE PROCESS for eliminating carbon monoxide, carbon and oil particles from motor-car exhaust gases has proved satisfactory in prolonged running tests. In the first stage oil and carbon react with water of combustion to form hydrogen and carbon monoxide. The latter in admixture with air are passed over a second catalyst which promotes further combustion to carbon dioxide ("Chemiker-Zeitung," September 12).

* * *

IN ADDITION TO THE BAUXITE DEPOSITS now being exploited in several French departments (the total amount of which is estimated at 60 million tons), a bauxite-bearing area has now been located at the foot of the Eastern Pyrenees in the Arriège department extending over an area 50 kilometres long and 4 kilometres wide. With a production of 478,000 tons in 1933, France is by far the most important world producer of bauxite with the United States and Hungary occupying the second and third places.

THE SOLE SPANISH IODINE MANUFACTURER has been compelled to cease production owing to the very much lower price of Chilean iodine.

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BORIC ACID AND BORAX have been detected in many slimming preparations sold in Germany and an official warning against their use has been issued.

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A NEW SULPHITE PULP FACTORY, with an annual capacity of 80,000 tons, is being erected in Finland by the firm of Enso Gutzeit and Tornator. It is intended to utilise the effluent in cement manufacture.

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A HEAVY SPAR DEPOSIT, recently discovered in the Podzirzda district of Jugoslavia, is already being exploited by a financial group and employs 300 workers, producing 30 tons per day.

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A POLISH CHEMICAL JOURNAL announces the commencement of sodium bisulphite manufacture in 65 per cent. concentration by the Silesian Mining and Zinc Smelting Co. Two other Polish concerns are already manufacturing bisulphite. About 900 tons of this product were imported into Poland in 1933.

* * *

A NEW ROUMANIAN CHEMICAL CONCERN, Industria Chimica S.A., is erecting works at Satu-Mare, where printing inks, earth colours, sealing wax and red oxide of iron will be manufactured. Another entrant into the printing ink industry is the Unio Chemica, whose new Bucharest factory commenced operations on September 1.

* * *

THE JUGOSLAVIAN OPIUM HARVEST is estimated this year at 100,000 kg. The morphine content is 11 to 13 per cent. The company holding the export monopoly had originally agreed to take over the entire crop on the basis of 25 dinars per morphine percentage per kilogram, but is now hesitating whether to carry out the transaction on these terms. In the meantime, large quantities of opium are changing hands for speculative reasons at prices ranging from 170 to 210 dinars per kg.

* * *

RUSSIAN PLANS for ensuring ample supplies of rubber include an enlarged area for cultivation of natural rubber in the three regions of Kasakstan, Central Asia and Transcaucasia. The synthetic output from the three existing factories at Jaroslawl, Voronesch and Efremow is estimated at 12,000 tons for this year and considerable expansion is contemplated in this department. According to "Metallbörse" imports of raw rubber into Russia in 1933 amounted to over 31,000 tons.

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A MANUAL OF SPECIAL REGULATIONS governing the erection and operation of chemical plants in France has been published by the Comité des Industries Chimiques de France. French legislation classifies chemical manufacturing plants into three groups depending upon the hazards involved in the process of manufacture. In addition to a discussion of the existing regulations governing construction of plants and warehouses, the manual contains abstracts of regulations for the protection of workpeople in chemical industries.

Weekly Prices of British Chemical Products

Review of Current Market Conditions

QUOTATIONS in most cases in the chemical market during the past week continue unchanged. Among industrial chemicals the chief interest has been in acetone, acetic acid, formic acid, formaldehyde and oxalic acid, and there has been quite an active demand. Business in potassium carbonate and caustic potash has increased, while arsenic, barium chloride and sodium sulphide continue dull. In the coal tar products market there has been a slight reduction in the prices of pure toluol and xylol and most other prices have been well maintained. Good business is shown in many products, particularly cresylic acid and creosote oil. Refined naphthalene has also been in demand. A certain amount of export business has been transacted in refined coal tar but home demand for this product is dull. The coal tar pitch market generally is shown for sodium salicylate, thymol and vanillin. Business in essential oils has been fairly active.

LONDON.—Prices remain firm generally with a fair general demand. There is no change to report in the prices of coal tar products from last week.

MANCHESTER.—Not a great deal of improvement can be reported this week in the general position of the chemical market here. A steadier. Pharmaceutical chemicals and prices remain steady and a fairly satisfactory business has been transacted. The best inquiry appears to have been for bromides, citric acid, cream of tartar, phenacetin and tartaric acid. Some firms have experienced relatively quiet conditions so far as actual new bookings are concerned. The bulk of the business since last report has consisted of orders for small parcels over near delivery dates and little more than a sprinkling of forward contracts of any consequence from the point of view of quantities concerned has been placed. On the other hand, fair deliveries of the leading alkali products and other bread-and-butter lines are being made to users against old contracts, although the position in respect of the dyeing and finishing establishments leaves a deal of room for improvement. Prices generally show little alteration on balance, and there is a disposition in most quarters to look for a continued steady market for most products. The outstanding exceptions are one or two of the products although even in these cases there has been little further actual weakness compared with a week ago.

SCOTLAND.—Continued and steady improvement is reported in the Scottish heavy chemical market.

Price Changes.

Tar Products.—TOLUOL, pure, 2s. 2d. per gal; XYLOL, pure, 2s. 2d. per gal.

Perfumery Chemicals and Essential Oils.—BENZOPHENONE, 4s. 6d. per lb.; SAFROL, 2s. 2d. per lb.; ANISE, 2s. per lb.; CITRONELLA, Java, 1s. 8d. per lb.; LEMON, 4s. 3d. per lb.; SANDALWOOD, Australian, B.P. and French Codex, 92/95%, 15s. 6d. per lb.

All other prices remain unchanged.

General Chemicals

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

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

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

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

ACID, CITRIC.—9d. per lb. less 5%.

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

ACID, FORMIC.—LONDON: £43 10s. per ton.

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

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

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

ACID, OXALIC.—LONDON: £47 17s. 6d. to £57 10s. per ton, according to packages and position. SCOTLAND: 98/100%, £48 to £50 ex store. MANCHESTER: £48 10s. to £53 ex store.

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

ACID, TARTARIC.—LONDON: 1s. per lb. SCOTLAND: B.P. crystals, 11d., carriage paid. MANCHESTER: 1s. 0¼d.

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

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

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

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

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

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

AMMONIUM CHLORIDE.—£37 to £45 per ton, carriage paid. LONDON: Fine white crystals, £18 to £19. (See also Salammoniac.)

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

ANTIMONY OXIDE.—SCOTLAND: Spot, £26 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: £16 10s. per ton c.i.f. main U.K. ports for imported material; Cornish nominal, £22 10s. f.o.r mines. SCOTLAND: White powdered, £23 ex wharf. MANCHESTER: White powdered Cornish, £21 10s. ex store.

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

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

BARYTES.—£6 10s. to £8 per ton.

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

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

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

CADMIUM SULPHIDE.—2s. 5d. to 2s. 9d.

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

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

CARBON BLACK.—3⅞d. to 5d. per lb. LONDON: 4½d. to 5d.

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

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

CHROMETAN.—Crystals, 3½d. per lb.; liquor, £19 10s. per ton d/d.

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

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

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

DIPHENYLGUANIDINE.—2s. 2d. per lb.

FORMALDEHYDE.—LONDON: £26 per ton. SCOTLAND: 40%, £25 to £28 ex store.

IODINE.—Resumblimed B.P., 6s. 3d. per lb. for quantities not less than 28 lb., increasing to 8s. 4d. per lb. for quantities less than 4 lb.

LAMPBLACK.—£45 to £48 per ton.

LEAD ACETATE.—LONDON: White, £34 10s. per ton; brown, £1 per ton less. SCOTLAND: White crystals, £33 to £35; brown, £1 per ton less. MANCHESTER: White, £34; brown, £31 10s.

LEAD, NITRATE.—£28 per ton.

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

LEAD, WHITE.—SCOTLAND: £39 per ton, carriage paid. LONDON: £37 10s.

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

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

METHYLATED SPIRIT.—61 O.P. Industrial, 1s. 6d. to 2s. 1d. per gal. Pyridinised industrial, 1s. 8d. to 2s. 3d. Mineralised, 2s. 7d. to 3s. 1d. 64 O.P. 1d. extra in all cases. Prices according to quantities. SCOTLAND: Industrial 64 O.P., 1s. 9d. to 2s. 4d.

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

NICKEL SULPHATE.—£49 per ton d/d.

PHENOL.—8½d. to 9d. per lb. without engagement.

POTASH, CAUSTIC.—LONDON: £42 per ton. MANCHESTER: £37

POTASSIUM BICHROMATE.—Crystals and Granular, 5d. per lb. net d/d U.K. Discount according to quantity. Ground 5½d. 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.—LONDON: £37 to £40 per ton. SCOTLAND: 99¾/100%, powder, £37. MANCHESTER: £38.

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

POTASSIUM IODIDE.—B.P., 5s. 2d. per lb. for quantities not less than 28 lb.

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

POTASSIUM PERMANGANATE.—LONDON: 9½d. per lb. SCOTLAND: B.P. crystals, 9d. MANCHESTER: B.P., 9½d.

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

RUPRON (MINERAL RUBBER).—£14 10s. per ton.

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

SODA ASH.—58% spot, £5 15s. per ton f.o.r. in bags.

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

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

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

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

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

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

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

SODIUM CHLORATE.—£32 per ton.

SODIUM CHROMATE.—4d. per lb. d/d U.K.

SODIUM HYPOSULPHITE.—SCOTLAND: Large crystals English manufacture, £9 5s. per ton ex stations, min. 4-ton lots. Pea crystals, £14 10s. ex station, 4-ton lots. MANCHESTER: Commercial, £10 5s.; photographic, £15.

SODIUM META SILICATE.—£16 per ton, d/d U.K. in cwt. bags.

SODIUM IODIDE.—B.P., 6s. per lb. for quantities not less than 28 lb.

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

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

SODIUM PHOSPHATE.—£13 per ton.

SODIUM PRUSSIATE.—LONDON: 5d. to 5¼d. per lb. SCOTLAND: 5d. to 5¾d. ex store. MANCHESTER: 4¾d. to 5¾d.

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

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

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

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

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

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

SULPHATE OF COPPER.—MANCHESTER: £14 5s. per ton f.o.b.

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

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

VERMILION.—Pale or deep, 3s. 11d. to 4s. 1d. per lb.

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

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

ZINC SULPHIDE.—11d. to 1s. per lb.

Coal Tar Products

ACID, CARBOLIC.—Crystals, 8¼d. to 8¾d. per lb.; crude, 60's, to 2s. 2½d. per gal. MANCHESTER: Crystals, 7d. per lb.; crude, 1s. 9d. per gal. SCOTLAND: 60's, 2s. 6d. to 2s. 7d.

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

BENZOL.—At works, crude, 9d. to 9¼d. per gal.; standard motor, 1s. 3¼d. to 1s. 4d.; 90%, 1s. 4d. to 1s. 4¼d.; pure, 1s. 7¼d. to 1s. 8d. LONDON: Motor, 1s. 6¼d. SCOTLAND: Motor, 1s. 6¼d.

CREOSOTE.—B.S.I. Specification standard, 4d. to 4¼d. per gal. f.o.r. Home, 3¾d. d/d. LONDON: 3¾d. f.o.r. North; 4d. London. MANCHESTER: 3¼d. to 4¼d. SCOTLAND: Specification oils, 4d.; washed oil, 4¼d. to 4¾d.; light, 4¼d.; heavy, 4¼d. to 4¾d.

NAPHTHA.—Solvent, 90/160%, 1s. 6d. to 1s. 7d. per gal.; 95/160%, 1s. 7d.; 99%, 11d. to 1s. 1d. LONDON: Solvent, 1s. 3¼d. to 1s. 4d.; heavy, 11d. to 1s. 0¼d. f.o.r. SCOTLAND: 90/160% 1s. 3d. to 1s. 3½d.; 90/190%, 11d. to 1s. 2d.

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

PITCH.—Medium soft, 57s. 6d. per ton, in bulk, at makers' works. LONDON: £3 per ton f.o.b. East Coast port for next season's delivery.

PYRIDINE.—90/140, 7s. 6d. to 9s. per gal.; 90/180, 2s. 3d. per gal.

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

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

Intermediates and Dyes

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

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

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

ACID NAPHTHIONIC.—1s. 8d. per lb.

ACID, NEVILLE AND WINTHER.—Spot, 3s. per lb. 100%.

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

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

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

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

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

BENZIDINE HCL.—2s. 5d. per lb.

p-CRESOL 34-5° C.—2s. per lb. in ton lots.

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

DICHLORANILINE.—1s. 11¼d. to 2s. 3d. per lb.

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

DINITROBENZENE.—8d. per lb.

DINITROTOLUENE.—48/50° C., 9d. per lb.; 66/68° C., 01¼d.

DINITROCHLORBENZENE, SOLID.—£72 per ton.

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

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

β-NAPHTHOL.—Spot, £78 15s. per ton in paper bags.

α-NAPHTHYLAMINE.—Spot, 11¾d. per lb., d/d buyer's works.

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

o-NITRANILINE.—3ss. 11d. per lb.

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

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

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

NITRONAPHTHALENE.—9d. per lb.; P.G., 1s. 0¼d. per lb.

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

o-TOLUIDINE.—9¼d. to 11d. per lb.

p-TOLUIDINE.—1s. 11d. per lb.

Perfumery Chemicals

ACETOPHENONE.—6s. 3d. per lb.

AMYL CALICYLATE.—2s. 6d. per lb.

ANETHOL, 21/22° C.—4s. per lb.

BENZYL BENZOATE.—2s. 6d. per lb.

CINNAMIC ALDEHYDE, NATURAL.—12s. per lb.

CITRAL.—7s. per lb.

COUMARIN.—8s. per lb.

ETHYL CINNAMATE.—7s. 9d. per lb.

ETHYL PHTHALATE.—2s. 3d. per lb.

GERANIOL (PALMAROSA).—15s. 6d. per lb.

GERANIOL.—5s. to 10s. per lb.

LINALOL (EX BOIS DE ROSE).—7s. 3d. per lb.

LINALOL (EX SHUI OIL).—4s. 9d. per lb.

METHYL ANTHRANILATE.—8s. per lb.

METHYL BENZOATE.—4s. per lb.

NEROLIN.—4s. 6d. per lb.

PHENYL ETHYL ACETATE.—8s. 6d. per lb.

PHENYL ETHYL ALCOHOL.—7s. per lb.
RHODINOL.—58s. per lb.
SAFROL.—1s. 10d. per lb.
LINALYL ACETATE (EX BOIS DE ROSE).—8s. 6d. per lb.
LINALYL ACETATE (EX SHUI OIL).—6s. 3d. per lb.

Essential Oils

ANISE.—2s. 1½d. per lb.
BERGAMOT.—6s. 3d. per lb.
CAMPHOR, WHITE.—1s. per lb.
CANANGA, JAVA.—9s. 3d. per lb.
CINNAMON, CEYLON.—3s. 6d. per lb.
CASSIA, 80/85%.—4s. 9d. per lb.
CITRONELLA, JAVA.—1s. 10d. per lb.
CLOVE, 90/92%, ENGLISH.—4s. 4d. per lb.
LAVENDER, MONT BLANC, 38/40%.—18s. per lb.
LEMONGRASS.—4s. 9d. per lb.
ORANGE, SWEET.—6s. per lb.
PALMA ROSA.—7s. 3d. per lb
PEPPERMINT, JAPANESE.—4s. 6d. per lb.
PEPPERMINT, WAYNE COUNTY.—15s. per lb.
PETITGRAIN.—4s. 9d. per lb.

Wood Distillation Production

ACETATE OF LIME.—Brown, £9 to £10. Grey, £15 to £16. Liquor, brown, 30° Tw., 7d. to 9d. per gal. MANCHESTER: Brown, £12 10s.; grey, £17 10s.
ACETIC ACID, TECHNICAL, 40%.—£17 to £18 per ton.
AMYL ACETATE, TECHNICAL.—95s. to 110s. per cwt.
CHARCOAL.—£6 5s. to £10 per ton.
WOOD CREOSOTE.—Unrefined, 6d. to 9d. per gal.
WOOD NAPHTHA, MISCIBLE.—2s. 9d. to 3s. 3d. per gal. Solvent, 3s. 9d. to 4s. 6d. per gal.
WOOD TAR.—£2 to £4 per ton.

Nitrogen Fertilisers

SULPHATE OF AMMONIA.—September £6 16s., October £6 17s. 6d., November £6 19s., December £7, January, 1935, £7 2s., February £7 3s. 6d., March/June £7 5s. for neutral quality basis 20.6 per cent. nitrogen delivered in 6-ton lots to farmer's nearest station.
CYANAMIDE.—September £6 16s. 3d., October £6 17s. 6d., November £6 18s, 9d., December £7, January, 1935, £7 1s. 3d., February £8 2s. 6d., March £7 3s. 9d., April/June £7 5s., delivered in 4-ton lots to farmer's station.
NITRATE OF SODA.—£7 12s. 6d. per ton for delivery up to June, 1935, in 6-ton lots carriage paid to farmer's nearest station for material basis 15.5 per cent. or 16 per cent. nitrogen.
NITRO-CHALK.—£7 5s. per ton for delivery upto June, 1935, in 6-ton lots carriage paid to farmer's nearest station for material basis 15.5 per cent. nitrogen.
CONCENTRATED COMPLETE FERTILISERS.—£10 5s. to £10 17s. 6d. per ton according to percentage of constituents.
NITROGEN PHOSPHATE FERTILISERS.—£10 5s. to £13 15s. per ton according to percentage of constituents.

Latest Oil Prices

LONDON, Sept. 19.—LINSEED OIL was lower. Spot, £20 10s. (small quantities 30s. extra); Oct.-Dec., £19; Jan.-April, £19 5s. SOYA BEAN OIL was quiet. Oriental (bulk), Sept.-Oct. shipment, £14 per ton. RAPE OIL was inactive. Crude extracted, £27; technical refined, £28 10s., naked, ex wharf. COTTON OIL was dull. Egyptian crude, £13 10s.; refined common edible, £16 15s.; and deodorised, £18 5s. naked, ex mill (small lots 30s. extra). TURPENTINE was steady. American, spot, 41s. 3d. per cwt.

HULL.—LINSEED OIL, spot, quoted £19 16s. per ton; Sept., £19; Oct.-Dec., £19; Jan.-April, £19 2s. 6d.; May-Aug., £19 7s. 6d., naked. COTTON OIL, Egyptian, crude, spot, £14; edible refined, spot, £16; technical, spot, £16; deodorised, £18, naked. PALM KERNEL OIL, crude, f.m.q. spot, £14 10s. naked. GROUNDNUT OIL, extracted, spot, £20 10s.; deodorised, £24 10s. RAPE OIL, extracted, spot, £26; refined, £27 10s. SOYA OIL, extracted, spot, £16 10s.; deodorised, £19 10s. per ton. COD OIL (industrial), 25s. per cwt. CASTOR OIL, pharmaceutical, 36s.; first, 31s.; second, 28s. per cwt. TURPENTINE, American, spot, 43s. 3d. per cwt.

Inventions in the Chemical Industry

Patent Specifications and Applications

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

Complete Specifications Open to Public Inspection

SYNTHETIC RESINS, production.—Dr. K. Albert Ges. Chemische Fabriken. March 8, 1933. 1397/34.

PURIFYING GASES by treatment with copper ammonia solutions.—Chemical Engineering Corporation. March 7, 1933. 2085/34.

WATER-SOLUBLE DIAZOAMINO COMPOUNDS and of water-insoluble azo dyestuffs derived therefrom, manufacture.—I. G. Farbenindustrie. March 9, 1933. 5908/34.

MONOAZO DYESTUFFS, manufacture.—Chemical Works, formerly Sandoz. March 7, 1933. 6632/34.

ACRIDINIUM COMPOUNDS, manufacture.—I. G. Farbenindustrie. March 4, 1933. 6845/34.

MANUFACTURE OF FILMS from solutions of cellulose acetate.—I. G. Farbenindustrie. March 4, 1933. 6984/34.

INSULIN PREPARATIONS.—Pharmaceutische Werke Norgine A.-G. S. Hermann and H. Kassowitz. March 7, 1933. 6994/34.

COMPOSITE TITANIUM PIGMENTS, production.—Titan Co., Inc. March 7, 1933. 6998/34.

THERAPEUTIC AGENTS, manufacture.—Chemische Fabrik von Heyden A.-G. March 8, 1933. 7273/34.

PREPARATIONS HAVING ANTI-EMETIC ACTION, manufacture.—Chemische Fabrik von Heyden, A.-G. March 8, 1933. 7274/34.

POLYVINYL COMPOUNDS, manufacture of combinations containing.—Consortium für Elektro-Chemische Industrie Ges. March 8, 1933. 7277/34.

DIAZOTIZATION, process.—Soc. of Chemical Industry in Basle. March 9, 1933. 7278/34.

VAT DYESTUFFS, manufacture.—I. G. Farbenindustrie. March 7, 1933. 7279/34.

DIAZONIUM COMPOUNDS from 4-aminodiarylamines, manufacture. I. G. Farbenindustrie. March 7, 1933. 7280/34.

PRODUCTION OF SUGAR and for manufacturing a milk suitable for infants, process.—Allgauer Alpenmilch A.-G. March 7, 1933. 7370/34.

ARTIFICIAL THREADS and the like, manufacture.—I. G. Farbenindustrie. March 9, 1933. 7582/34.

VAT DYESTUFFS, manufacture.—I. G. Farbenindustrie. March 9, 1933. 7603/34.

STABILISING PHOTOGRAPHIC EMULSIONS, process.—I. G. Farbenindustrie. March 10, 1933. 7806/34.

CASE-HARDENING OF IRON AND STEEL.—E. I. du Pont de Nemours and Co. March 10, 1933. 7841/34.

Specifications Accepted with Dates of Application

CATALYTIC MATERIALS and process of manufacture.—Houdry Process Corporation. March 23, 1932. 416,025.

CYANHYDRINS, manufacture.—Triplex Safety Glass Co., Ltd., L. V. D. Scorah, and J. Wilson. March 1, 1933. 416,007.

PURIFYING LIQUIFIED GASES, processes of and apparatus.—Linde Air Products Co. April 23, 1932. 416,051.

CONTINUOUS MIXTURE of liquid and gas, method and device to obtain.—C. Coleatti. March 3, 1933. 416,038.

DYEING CHROME LEATHERS with basic dyestuffs.—Imperial Chemical Industries, Ltd., and G. S. J. White. March 4, 1933. 416,016.

DISAZO DYESTUFFS, manufacture and production.—J. Y. Johnson (I. G. Farbenindustrie). March 6, 1933. 416,053.

SOLID CHLORINATED RUBBER PRODUCTS, production.—J. P. Baxter and Imperial Chemical Industries, Ltd. March 7, 1933. 416,056.

RUBBER having age-resisting properties, manufacture.—E. I. du Pont de Nemours and Co. March 12, 1932. 416,079.

PHOSPHORUS OXYCHLORIDE, production.—I. A. Davies and Imperial Chemical Industries, Ltd. March 9, 1933. 416,084.

COLOURING RUBBER SURFACES.—Dunlop Rubber Co., Ltd., D. F. Twiss, F. A. Jones, and D. J. Hadley. June 16, 1933. 416,154.

FERROCOBALT, production.—F. L. Bosqui, and Rhokana Corporation. June 22, 1933. 416,158.

ANTHRAQUINONE DERIVATIVES.—Imperial Chemical Industries, Ltd., and F. Lodge. March 4, 1933. 416,020.

ANAESTHETIC PREPARATIONS.—H. A. Metz Laboratories, Inc. Oct. 3, 1932. 416,193.

UTILISING WASTE HEAT of condensates, apparatus. I. G. Farbenindustrie. Dec. 15, 1932. 416,227.

ALLOYS POOR IN OXYGEN, production.—Soc. d'Electro-Chimie, d'Electro-Metallurgie, et des Acieries Electriques d'Ugine. Dec. 19, 1932. 416,228.

1 : 4-DIAMINO ANTHRAQUINONES, manufacture.—Soc. of Chemical Industry in Basle. Jan. 18, 1933. 416,245.

Applications for Patents

(September 6 to 12 inclusive).

PURIFYING GASES, ETC.—R. N. B. D. Bruce. 25767.

EXPLOSIVES, manufacture.—W. M. Burden, L. J. L. Hammond, H. H. Hazel, F. Holden and G. Rotter. 25665.

AZO DYESTUFFS, manufacture.—A. Carpmael (I. G. Farbenindustrie). 25692.

CONDENSATION PRODUCTS CONTAINING SULPHUR, manufacture.—A. Carpmael (I. G. Farbenindustrie). 26093.

PIGMENT COLOURS, manufacture.—E. I. du Pont de Nemours and Co. (United States, Sept. 8, '33.) 25987.

ACYL DERIVATIVES of salicylic acid, etc., production.—H. D. Elkington (Gödecke and Co.). 25988.

CONVERSION PRODUCTS of azo dyestuffs, manufacture.—J. R. Geigy A.-G. (Germany, Sept. 15, '33.) 26189.

HYDROCARBON OILS, treatment.—C. Hahn. 25668.

3 : 4 : 6-TRIAMINOQUINOLINES, manufacture.—I. G. Farbenindustrie. (Germany, Sept. 28, '33.) 25895.

ARTICLES FROM PLASTIC MATERIALS, manufacture.—Imperial Chemical Industries, Ltd. 25679.

FILTERS.—Imperial Chemical Industries, Ltd. 25826, 25827.

DESTRUCTIVE HYDROGENATION of solid carbonaceous materials.—International Hydrogenation Patents Co., Ltd. (Germany, Sept. 29, '33.) 26046.

PURIFICATION OF SYNTHETIC METHANOL, apparatus.—J. Y. Johnson (I. G. Farbenindustrie). 25771.

DODECAHYDROTRIPHENYLENE, manufacture.—J. Y. Johnson (I. G. Farbenindustrie). 25875.

From Week to Week

IRISH METAL INDUSTRIES, LTD., have been granted permission to establish a factory for the manufacture of sporting ammunition at Earl's Island, Galway.

OWING TO HEAVY OVERSUBSCRIPTION the letters of allotment in connection with Monsanto Chemicals, Ltd., were only dispatched on Tuesday. Letters of regret will be sent out for all applications up to 250 shares, and approximately 5 per cent. be allotted for other applications of the public.

K. R. PLASTICS, LTD., manufacturers of chemicals and synthetic resins, etc., East Street, Prittleweli, Essex, have increased their nominal capital by the addition of £11,000 beyond the registered capital of £4,000. The additional capital is divided into 9,000 7½ per cent. participating preference and 2,000 ordinary shares of £1 each.

FURTHER EVIDENCE OF THE IMPROVEMENT in the steel trade of Scotland is to hand in the announcement that yet another smelting furnace will be put into operation at Stewarts and Lloyds, Clydesdale Steel Works, at Mossend. Since the transfer of the Universal Mill from Mossend to Corby, work at Clydesdale has been plentiful for the employees who were retained, and present indications point to a continuance of this happy state of affairs.

THE SCOTTISH CO-OPERATIVE WHOLESALE SOCIETY has decided to enter the sugar trade and is preparing to erect a refinery as soon as conditions are settled. According to Mr. Neil S. Beaton, president of the S.C.W.S., this proposal is being held up by the policy adopted by the sugar refiners, the sugar beet growers, and the Government. There are proposals in the scheme submitted by the Government for the reorganisation of the industry which would prevent the S.C.W.S. or any other party entering the industry, and Mr. Beaton states that an attempt is actually being made to create a monopoly.

SHIPMENTS OF CHINA CLAY for the month of August show a slight drop compared with July, but the combined tonnages for the eight months are over 16,000 tons above the corresponding period in 1933. Following are the shipping records for August :—Fowey : 32,588 tons china clay; 1,609 tons china stone; 901 tons ball clay. Par: 9,096 tons china clay; 252 tons china stone; 51 tons ball clay. Charlestown: 6,780 tons china clay; 590 tons china stone. Penzance: 841 tons china clay; Padstow: 387 tons china clay; Looe: 251 tons china clay; Plymouth: 240 tons china clay; Newham: 15 tons china clay. Sent direct to destination by rail: 4,658 tons china clay, making a total tonnage of 58,219 tons.

THE NAMES OF CHINESE OFFICIALS who are alleged to have accepted commissions from the Du Pont de Nemours Corporation have been withheld from the official record at the United States Arms Inquiry, on the ground that their publication might have political repercussions abroad. A suggestion stated to have been put forward in 1933 that Imperial Chemical Industries and the Du Pont de Nemours Corporation should make representations to their respective Foreign Offices with a view to facilitating arms shipments to Canton was referred to. Mr. Lammot, a representative of the Du Pont de Nemours Corporation, said that in 1933 the joint Shanghai representative of Imperial Chemical Industries and his Corporation suggested that representations should be made to the British Foreign Office and to the United States State Department. The purpose, he said, was to try to get the restrictions on the shipment of munitions to the Canton Government raised. Mr. Lammot also told the Committee about a visit he and Senator Townsend paid to the Assistant Secretary of State, Mr. Rogers, in 1932, prior to the sale of a patented hydrogen process to the Mitsui Company (Japan) in Japan and China. This company was then engaged in what were described as warlike activities. The Du Pont de Nemours Corporation had paid "commissions" to high Chinese officials.

THE COST OF RUNNING the Irish Free State Government Laboratory for the year ended March 31 last was £16,707. During the same period receipts for analyses by the State chemist only totalled £218.

THE COUNCIL OF THE INSTITUTE OF FUEL announces that Prince George has been pleased to accept the invitation of Sir Harry McGowan, president-elect of the Institute, to be present at the annual dinner at the Connaught Rooms, Great Queen Street, London, W.C.2, on Monday, November 12. Prince George will propose the toast of the Institute. The Melchett Medal will be presented to Dr. Bergius immediately following the dinner.

THE IRISH FREE STATE GOVERNMENT has now decided that only 160,000 gallons of industrial alcohol will be produced in the first year of operation of its scheme. This means that about 35,000 tons of potatoes will be required by the distilleries. Cooley, County Louth, has been selected as a site for one distillery, but no decision has yet been taken with regard to the other four. The following advisory committee has been appointed to take charge of the government end of the scheme: T. J. Nolan, professor of chemistry University College, Dublin; J. Reilly, professor of chemistry, University College, Cork; R. C. Ferguson, Department of Industry and Commerce; and W. F. Prendergast, Department of Agriculture.

THE 6TH INTERNATIONAL CONGRESS FOR SCIENTIFIC MANAGEMENT will be held in London, July 15—20, 1935, under the patronage of the Prince of Wales. A Council has been convened by the Federation of British Industries and consists of representatives of the leading professional and scientific associations connected with management in all its aspects. An eminent and representative Executive Committee under the chairmanship of Sir George Beharrell, is responsible for the organisation of the Congress. The full programmes will be available from the end of October, 1934, and may be obtained from the Secretary: Mr. H. Ward, 21 Tothill Street, London, S.W.1. The Congress will discuss papers on practical applications of management. References to actual technique will relate to specific problems and how they have been met. Special opportunities will be provided so that members may meet those from other countries interested in the same problems as themselves. The Congress will appeal to all those holding managerial positions, but it is a further object of the Congress to arouse public interest in the subject of management.

HERBERT GREEN AND CO., LTD., who recently acquired the Duo-Sol process for refining lubricating oils in this country, have acquired a factory at East Halton, Lincs. The Duo-Sol process has established an advanced technique in the refining of lubricating oils, and has already been adopted by the Standard Oil Co. of New York, and other oil companies in America. An allowance has already been granted to the Shell Petroleum Corporation which is about to erect the Duo-Sol plant at two of its refineries in the United States. Similar refining plant will be laid down in this country immediately. On completion the company will be in a position to supply 40,000 tons of refined lubricating oil per annum. The approximate consumption in this country of refined oil is estimated to be 500,000 tons per annum. The Board of Trade reports show that of this amount for the year 1933, 423,000 tons of refined lubricating oil were imported. The company will be in a position to enjoy the existing preferential tariffs afforded by the colonies owing to its supplying 100 per cent. British refined lubricating oil. The board will include Mr. Herbert Green, managing director; Mr. James Arnott, managing director of James Arnott and Sons, Ltd., lubricating oil vendors and distributors; Mr. C. E. Dick, managing director of W. R. Dick and Co., lubricating oil vendors and distributors; Dr. E. F. Armstrong, of Fuel Industries, Ltd., and Mr. Kenneth Thelwall, managing director of Alan Thelwall, lubricating oil blenders and distributors.

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).

New Zealand.—A Palmerston North firm of agents, the proprietor of which is at present in England, wish to represent United Kingdom manufacturers of general chemicals, drugs, chemists' sundries, for the whole of New Zealand. (Ref. No. 253.)

Mexico.—A firm in Mexico City wishes to represent, on a commission basis, United Kingdom manufacturers and exporters of raw materials for the paint trade, including colours, gum lac and linseed oil. (Ref. No. 264.)

France.—An agent established at Villefranche-sur-Saone (Rhone) wishes to obtain the representation, on a commission basis, of United Kingdom exporters of mazout oil and butane gas. (Ref. No. 260.)

Company News

William Blythe.—The directors announce an ordinary interim of 3 per cent., less tax (same).

Lactagol.—The report for the year ended June 30, 1934, shows a net profit at £3,446 (against £3,321). The directors propose writing off preliminary expenses £300, and paying a dividend of 4 per cent. on the ordinary shares, carrying forward £628.

International Nickel of Canada.—A quarterly dividend of 87½ cents per share on the preferred stock is announced, payable on November 1, at cable rate of exchange on N. York obtaining in London at the opening of business on November 1.

Dartmoor China Clay Co.—The report for 1933 states that the volume of sales was maintained, but prices remained at low average. The combined effect has been the curtailment of profit on working to £559. Adding to this the amount brought forward, and deducting tax, there is £7,653 to be carried forward. The bank overdraft, which stood at £6,500 in last account, now stands at £1,500.

British Aluminium Co.—The company announce that it has been decided to await the full year's trading results before consideration of a dividend on the ordinary shares. Payment at the rate of 6 per cent. per annum, less tax, will be made in respect of preference shares Nos. 1/300,000 and 1,500,001/2,200,000 on October 1. No ordinary interim has been paid since 1930. Ordinary dividends of 5 per cent. have been forthcoming in respect of the past three years.

Anglo-Continental Guano Works, Ltd.—The profits for the year to June 30 last amounted to £94,416, compared with £86,471 in 1932-33, and £79,738 in 1931-32. The allocation to depreciation reserve is maintained at £5,000, and, after debenture charges, the net balance is up from £40,798 to £49,475. The directors recommend an ordinary dividend of 7½ per cent.—the first since 1921—and a transfer of £8,017—against nil—to reserve. The carry-forward is raised from £35,538 to £37,246.

Forthcoming Events

Sept. 27.—Birmingham Metallurgical Society. Presidential address. J. Fallon. 7 p.m. The James Watt Memorial Institute, Great Charles Street, Birmingham.

Sept. 28.—Staffordshire Iron and Steel Institute. Presidential Address. "Pulverised Fuel Firing for Metallurgical Purposes." H. E. Cookson. 7 p.m. The James Watt Memorial Institute, Great Charles Street, Birmingham.

APPOINTMENTS VACANT

(1s. per line; minimum charge 3s. Sixpence extra is charged when replies are addressed to Box Numbers.)

ASSISTANT WORKS MANAGER required for Chemical Factory in the North of England. Write giving age, experience and salary required to Box No. 1618, THE CHEMICAL AGE, 154 Fleet Street, London, E.C.4.

APPOINTMENTS WANTED

(Prepaid—1½d. per word; minimum number of words 16.) Replies can be received "Box , Office of this Journal," in which case our address is included in cost of advertisement, and sixpence is charged.

ASSISTANT CHEMIST, B.Sc. (age 25), of Explosive Manufacturers wishes adventurous commission such as provided by Expedition to foreign parts. Consider Anything. Reply Box No. 1619, THE CHEMICAL AGE, 154 Fleet Street, E.C.4.

FOR SALE

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CHARCOAL, ANIMAL and VEGETABLE, horticultural, burning, filtering, disinfecting, medicinal, insulating; also lumps ground and granulated; established 1830; contractors to H.M. Government.—THOS. HILL-JONES, LTD., "Invicta" Mills, Bow Common Lane, London, E. Telegrams: "Hill-Jones, Bochurch, London." Telephone: 3633 East.

FILTER PRESS, Dehne, 17 C.I. Plates 24 in. x 24 in. and Frames, with Pump 2½ in. plunger, nearly new condition. C. F. DAVIS, LTD., Hatcham Road, Old Kent Road, S.E.15. New Cross 1147.

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