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Notes and Comments

The Industrial Reorganisation Bill

THE discussion at the annual dinner of the British Chemical Plant Manufacturers' Association was devoted to a consideration of the Bill which Lord Melchett has introduced into the House of Lords. Those present were privileged to hear a lucid exposition of the measure by Lord Melchett himself, following which representative industrialists at the invitation of the chairman expressed their views. Quite a surprising, or should we say significant, feature was the absence of real disagreement with the objects of the Bill. It is, therefore, evident that behind it is something of real import to industry which must be worth the close consideration of the whole of the business community. There is a widespread feeling among business men that Parliament should not meddle with the affairs of trade. Behind the discussion was the fear of Parliamentary interference that is claimed to be ill-advised.

It is true that few members of the House of Commons have expert knowledge of the matters upon which they debate. It is also unfortunately true that the amount of time consecutively allotted to any one subject precludes that close study of technical details upon which sound opinion alone can be based. Lord Melchett also pointed out that expert views are often not heard in Parliament because of the accident that the Member in question has failed to catch the Speaker's eye. On the night succeeding the dinner, we heard a prominent industrialist, also a Member of Parliament, maintain that Parliament did its best to legislate for industry according to its lights. Industrialists do not trust the "lights" of Parliament and prefer to manage their own affairs. Therein lies the foundation of this Bill, though as the measure stands it is inextricably interwoven with the procedure of Parliament, and the Board of Trade has a prominent part to play.

Future Structure of Industry

WHETHER the Bill is to be supported or not depends upon the acceptance or rejection of Lord Melchett's view of the future structure of industry. The chemical industry, it is claimed, has advanced at a more rapid rate during the last 25 years than has any other industry. That statement is open to question; but at least it may be accepted that the application of science to industry has enabled vast strides to be made within that period which makes the efforts of the Victorians, great as they were, seem puny. As a consequence, it is physically possible to double the production of every prime commodity within the short space of ten years. That the world does not do so and become twice as prosperous within that time is the fault of the existing economic machinery. One day we shall solve that great problem and the millenium, insofar as it can be gained by material prosperity, will be appreciably nearer. To-day we must realise that the solution of the problem is not in sight, and our arrangements must, in Lord Melchett's opinion, be made in the light of the knowledge that unless there is some grip on production the forces of science will defeat us by destroying price levels. "A grip on production" does not mean the wanton destruction of the fruits of the earth that has lately been practised in some countries; Lord Melchett's view is in consort with that recently expressed by the Church that we should not throw the Creator's gifts back in His face, but should learn to use them in order to attain that state of well-being to which it is evidently intended we should aspire.

Control of production means control of the means for production, *i.e.*, of plant capacity. Excess productive capacity leads to industrial warfare, which to-day is "neither short, sharp, nor decisive"; on the contrary, Lord Melchett sees in it the root of an "industrial anæmia" which affects many industries and leads to many ills. These ills assuredly exist: small profits, low wages, inefficiency, loss of courage and initiative, and cessation of research. Lord Melchett believes that sensible men will divide up what is going, nationally and internationally, and that when that is done the result is industrial virility. He believes further that the majority of any industry is composed of sensible men, but that their wise arrangements are wrecked by a small minority who "won't play." The Bill is therefore designed to make the minority "play," at the behest of the majority. The explanation of the safeguards introduced in the measure to ensure that the will of the majority is sound and that the minority would have its rights safeguarded was impressive, but the provisions would clearly need more careful analysis than it was possible to give in the course of an after-dinner discussion.

Standardised Prices

THERE is much in industry to-day that is wrong. It is not necessary to tabulate all the ills, but that of price-cutting to below the limits of profit is not the least. From that has arisen trade agreements in many industries, some of which work exceedingly well. In some manufactures nearly all makers have standardised prices; that works fairly well, but prevents any real competition—other than "friendship"—for orders for standardised products and does not ensure that the work goes round. In others they have established a quota so that orders are taken in rotation at a standard price. Both have the disadvantage that surplus capacity exists which is not used and that costs are therefore high and employment is not assured.

One aspect of the proposal arouses some concern in our mind. Will it not put a powerful brake on progress? We can imagine a powerful group of firms, a closed corporation under the Industrial Enabling Act, making a product for which they are equipped. An inventor brings along an improvement which cannot be made by the existing machinery. He offers it to the group because there is no one else to whom to offer it. The group may refuse it on the ground that they do not wish to disturb existing machines and plant, and as there is no competition they need not make costly improvements. The inventor thereupon attempts to form a company; the financier will at once say that since he is entering a market that is already closed and in which he is not wanted, the chances of success are small and in any event a new firm can only hope to be allotted a small quota so that the project is unsound. On the face of it, the Bill provides for the entry of new concerns, but in practice there may be the greatest difficulty.

Entry of New Concerns

IT is only firms whose business lies mainly in the export market that will be constrained to make continual advances with their accompanying expenses in replacing equipment rendered obsolete. Even that incentive disappears if the arrangements, as appear to be in the proposer's mind, include international cartels. The only incentive to advancement will be in the direction of cheaper production methods so as to secure a larger profit on the agreed prices. There are industries which to-day are the most efficient wherein advances have resulted entirely from those who build the necessary plant being in competition. The by-product coke oven industry is an instance. Competition is the root of advance and arrangements such as are presupposed in this Bill will eliminate competition, nationally and even internationally. Lord Melchett meets this objection by asserting that the structure of industry will not alter greatly in the future. Industries may come to maturity and from maturity to senility, but the firms will go on making changes slowly. Many do not think this view well-founded. Imperial Chemical Industries, Ltd., itself, the biggest change in structure in the chemical industry within recent years, has come about within the lifetime of our office-boy. Many new industries have arisen since the war. Too often industrialists think only of their own group. Even in Lord Melchett's group there has been the rise of synthetic ammonia. Outside we have the rise of artificial silk and the entertainment industries connected with motion pictures and wireless which have altered the whole life of the nation. The Bill seems to prohibit changes, or at least to put as many obstacles in their way as is possible.

Before giving our approval we should like to be certain that it would not assist the inefficient to prosper. It might well be imagined that an inefficient industry, or a number of inefficient concerns in a "mixed" industry would be able to get the price levels higher than could be justified, or that they would get a larger price because they would have their quota after the "cheaper" firms had exhausted theirs. We recollect being on more than one committee engaged in drawing up specifications in which it was agreed to make the specification less drastic because certain concerns were backward and must not be cut out.

The Small Man's Charter

LORD MELCHETT described his measure as "the small man's charter." That may be good politics, and is certainly good electioneering, but is it wise? If the "small man" runs his business efficiently, doing his utmost to introduce improvements, he is worthy of the greatest encouragement. But more often he is highly inefficient; his workmen and staff, are paid off at the conclusion of each job and re-engaged when he has got another order. He carries no technical staff and research is just waste of money to him. But he will get his quota and he will be perpetuated at the expense of the larger and efficient firms whose expert staff and research departments cause their overheads to be far higher. The industry of the last century was an affair of highwaymen, metaphorically speaking; and in Lord Melchett's picturesque analogy we have passed beyond the era of those lawless times and we do not now "shoot each other up." There can be no doubt that at the moment we must visualise some control of production by the producers for the sake of the world which is so dependent upon the stability of price levels. Firms must not "shoot each other up," a system of police must be introduced. The function of those police, while preventing deaths, must not be to prevent births; does the present Bill ensure that? Lord Melchett states that the present scheme has been in successful existence in the alkali industry for 75 years past. It would be interesting to have a comparison of the advances in chronological order made in that industry during that time with those of some uncontrolled branches of chemical industry.

Some arrangement to prevent present ills, we repeat, is inevitable and seems to be welcomed in principle by most responsible industrialists. Under proper safeguards that arrangement should be in the hands of industry itself. We would throw out the suggestion to Lord Melchett and his collaborators that this Bill and all similar arrangements must be regarded purely as the starting-point, and even as a temporary expedient. The real problem is to discover how to enable production to be increased two-fold within the next ten years, and how to let everybody have twice as much material goods as they get now, without giving rise to the disturbances that are entailed by destruction of the price levels. It is to that problem that we invite the great brains of the age to give their attention. It is an economic problem, a business man's problem. The world is like a poor starving tailor who dare not grow vegetables in his garden because to do so might prevent his greengrocer from buying a suit from him. Why cannot the greengrocer have two suits and the tailor have twice as many vegetables?

The Institute's Charter Jubilee

THE President and Council of the Institute of Chemistry have announced that the Institute will celebrate its charter jubilee this year. The Institute was founded in 1877, and incorporated by Royal Charter in June, 1885. Arrangements are being made for a banquet to be held on July 9, and a reception on the following evening.

Lord Melchett's Reorganisation Bill

Its Provisions Explained to Chemical Plant Manufacturers

LORD MELCHETT was the principal guest at the annual dinner of the British Chemical Plant Manufacturers Association at Jules Restaurant, Jermyn Street, London, on January 24. It is customary at the Association's annual dinner to dispense with the formal toast list and to devote the evening to discussion, and on this occasion Lord Melchett, a director and son of the first chairman of Imperial Chemical Industries, Ltd., initiated a discussion on industrial reorganisation with special reference to the Industrial Reorganisation (Enabling) Bill which he recently introduced in the House of Lords. Mr. E. A. Alliott, chairman of the Association, presided and amongst the principal guests were Mr. L. S. Beale, Dr. F. H. Carr (chairman of the Association of British Chemical Manufacturers), Mr. H. W. Cremer (hon. secretary of the Institution of Chemical Engineers), Mr. F. Grab, Mr. A. Herbert (Import Duties Advisory Committee), Mr. J. M. Leonard (hon. secretary of the Chemical Engineering Group), Mr. W. Macnab (president of the Institution of Chemical Engineers), Mr. L. W. Meekins, Dr. W. R. Ormandy (chairman of the Chemical Engineering Group), Mr. H. J. Pooley (secretary of the Society of Chemical Industry), Mr. W. Prescott (Federation of British Industries), Mr. E. Thompson (president of the Society of Chemical Industry), Mr. G. S. Whitham and Mr. W. J. U. Woolcock.

Possibilities of the Next Decade

LORD MELCHETT said that chemical manufacture and the subject of industrial reorganisation as affected by the Bill under discussion were closely related because there had been more advances in chemistry over the past twenty or twenty-five years than in any other of the sciences or industries, and it was to deal with the rapid advances of the modern world that the Bill had been conceived and produced. Two years ago he addressed the Chemical Engineering Group on general industrial and economic questions and since then the situation had clarified itself even much more than was apparent at that time.

No technical man would deny that it was physically possible to double the production of every raw material and every important manufactured commodity within the period of the next ten years. It was a perfectly practicable problem from the purely technical point of view. They could go through all their prime commodities and principal manufactured products and deal with them in some detail, and he did not think they would find one product which could not be doubled quite easily without any extraordinary factors having to be brought in within the next decade. One would leave out of that category gold, which was of a rather different character. If that was true, why should not the world become twice as prosperous as it was to-day?

One of the reasons, and the outstanding and obvious reason, was that we had no economic—he would not say only financial—machinery for dealing with that side of our affairs which enabled us to extend at anything like that rate. Many questions had been raised and discussed in recent years as to the reform and improvement of our currency and our financial methods in order that our financial machinery should not obstruct the progress which science placed at our disposal.

Control of Production

A French economist had put the position very well when he made the observation that they could do what they liked in regard to currency and stabilisation of rates of exchange and the removal of obstacles to international trade, or—for those who believed in such reforms—the complete control of international trade, the erection of price levels or anything else they liked on a financial or economic basis, but unless they controlled production itself, unless they had some grip on production, the forces of science would invariably defeat them and would produce a catastrophe in the end, a catastrophe of overproduction which would destroy any price level that was built up, and, by destroying that, would destroy all the rest of the machinery they might create with it. He believed that was fundamentally true.

At some stage in the development of our industrial and economic affairs we had to have an adequate control of production, and he did not wish that to be in any way confused with what was happening to-day—a very deliberate and brutal restriction in many respects. They looked all over the world to-day and they saw immense quantities of commodities of one kind and another being destroyed. All forms of commerce and economics consisted merely of the exchange of one commodity for another, and it was necessary to preserve such a balance as would enable them to produce all their commodities at a reasonable price and so that they could be exchanged the one for the other in ever-increasing quantities. In order to do that, sooner or later they must have some measure of control of production. If they went a little deeper into the complex economic scheme they had erected they would see that something more than that alone was necessary. There was not only the question of the control of the rate of production but also the question of having more control of the rate of the creation of the power of production. Quite obviously there were any number of cases where excess plant capacity existed, where people had rashly erected factories for the production of a great deal more than any reasonable future market could be expected to absorb.

They were faced with surplus stocks, excess production and excess plant capacity. In other words it was not only sufficient to have reasonable control of production but it was also necessary to have reasonable control of excess plant capacity to prevent, as soon as any line of manufacture was found to be a profitable one, a number of ill-advised people rushing in and putting up factories to make that particular commodity and by so doing to destroy the balance which that commodity had with the other commodities in the world. In days gone by there was a period when these things worked with a certain amount of automatic planning. The planning existed only in the mind of the manufacturer, it was true, but people were more cautious about the way in which they spent their money on plant and machinery, to some extent because it was their own money. That day had long since passed.

Spending Other People's Money

To-day, those who were spending money on plant and machinery were chiefly spending other people's money—the money of their shareholders. We had passed from the day of companies with a handful of twenty shareholders, all of whom could maintain close personal contact with the business. There were now vast bodies of shareholders who had entirely different interests apart from the remuneration of that small part of their capital invested in a particular enterprise, and they had not the same power of coming back upon those who had the spending of their money on plant. In many cases governments were shareholders and governments often encouraged the erection of plant for purposes altogether other than the normal business of the concern, and that was true not only of one country but of nearly all industrial countries. An entirely different state of affairs existed to-day; the automatic planning of the few serious men engaged in industry was replaced by a large number of multifarious concerns which had not behind them the same knowledge or the same sense of obligation, and we frequently saw conditions arise which produced very disturbing elements. It had been said that modern warfare tended to become short, sharp and decisive, but industrial warfare had none of those three qualities to-day. It was never short, sometimes sharp and never decisive. There was a whole new set of conditions which made industrial warfare a prolonged and bitter agony and which produced a condition which might be diagnosed as industrial anæmia. Its symptoms were seen when profits became negligible or non-existent. It followed from that, taking industry as a whole, and not individual firms, that the rate of wages in the industry was low; the men were oppressed. There was usually a great deal of trouble in the industry. It led to bad relationships between men and employers, and the research for that industry was inadequately done; there was no research, or very little, and the type of people engaged in the industry deteriorated. As a result there was very little bargaining power and there was no capacity for taking risks in the export market, and the whole enterprise was liable to be undermined and considerably weakened.

The natural tendency of sensible men faced with those conditions was to come together and say something on the following lines. We are not gaining anything by cutting each other's throats. We do not succeed in cutting anybody's throat sufficiently to kill him, but we are all losing a lot of blood and weakening our condition. What we had better do is to arrive at some sort of agreement whereby we can all live moderately well, although no one may live quite so well, and no one quite so badly. There is room in the industry for us all if we develop it sensibly. Let us agree among ourselves and then if possible reach an international agreement with those of a like mind in other countries. That was being done all over the world. There was hardly a single industrial country where that process had not made great strides. The recent depression had brought pressure to bear upon industrialists to promote agreement.

A Simple and Obvious Condition

A simple and obvious condition should be that they should sell their products at a reasonable price. The old trust notion of the later years of last century and the early years of the present century was that greedy manufacturers agreed to charge exorbitant prices for their commodities, but to-day that was rarely the case. It nearly always paid better to-day to charge a moderate price and get a large distribution in a large market, rather than to charge a high price for a small market; this was due chiefly to technical development. It was important to provide in any agreement that each of the parties should accept a reasonable quota for his output in proportion to his market or capacity, so that people did not produce more than the market could reasonably consume. Those were the principal provisions and there were many others that naturally followed in making such agreements.

Agreements of that kind had usually produced more profits and greater stability and order in industry and markets. Industries that had adopted that method of working had become prosperous. They had been able to pay good wages, their research had improved and they had made great advances in their technical work. They could be cited generally as the sort of industries that everybody could copy and follow. In some cases agreements of that kind were destroyed and vitiated by the fact that there was a small number of people who would not play the game, and a small number of people could always wreck any such plan. That fact had been recognised by the legislature of this country in other cases. If they took the case of pure financial amalgamations they would recollect that a few years ago a law was passed enabling them to deal with recalcitrant minority shareholders if they refused to come into a general scheme when 90 per cent. of the other shareholders had agreed. Such a measure was found to be absolutely necessary. They had cases over and over again in Imperial Chemical Industries, Ltd., where 99.2 per cent. of the shareholders agreed to an exchange of shares and the other 0.8 per cent. refused to come in, not because they had any particular objection to the scheme but because they had to deal with people representing uninformed shareholders scattered over the face of the earth. They could not rely upon anybody always doing the sensible thing.

The Small Man's Charter

The Industrial Reorganisation (Enabling) Bill was really designed to deal with small minorities; to deal with those cases of which there were far too many at the present time of recalcitrant minorities who for one reason or another would not come in with the great majority of their colleagues in an industry who saw that certain steps were necessary for the progress and salvation of that industry. Naturally, in designing any plan of that kind they had to be careful and they had to provide a number of safeguards. He thought the safeguards in this case had been carefully provided. He would not maintain that the Bill provided against every possible contingency in the world, but the question was whether they could make a law which provided for the great majority of cases and which, on the whole, would do good. Reorganisation did not necessarily mean financial amalgamation, so that those who imagined that a Bill of this kind would be one which would enable great industries to mop up small ones were at fault. The Bill was really the small man's charter, perhaps too much so. It enabled the small man to subsist against the big man and proposed to give him a definite right and status for the first time in a world which was tending to organise itself in larger and larger units. That might be put forward as an objection, but he believed that it was better to give the small man his charter and let him deal with the big man on a comparatively equal level rather than see a fight going on over a prolonged period.

The Bill enabled any body of industrialists or organisations in any industry to go to the Board of Trade and say they believed their industry required reorganisation and that they had a scheme which they wished to put forward. The President of the Board of Trade then had to consider two things: principally whether the proposal for reorganisation was in the general public interest and whether the industry was one that was suitable for reorganisation, and secondly whether they had a substantial interest in the industry. These were practical common-sense considerations upon which the Board of Trade could easily decide. If it considered the proposal was frivolous it could turn it down.

The National Industrial Council

If the Board considered it was a serious proposal it would forward it to a National Industrial Council which was to be specially set up for the purpose. The National Industrial Council would be set up to consider these schemes as and when they came forward, and it would have to consider various points in regard to each scheme. It would next submit to the Board of Trade a draft report which would contain the opinion of the Council as to whether the application of the scheme would be in the best interests; whether the industry was fit for a scheme of independent reorganisation; whether the scheme provided for the consultation of people having special interests in the industry; whether it could be carried out without detriment to other activities and whether it made proper safeguards for the development of the industry to which the scheme related. In drafting the provision for persons having a special interest in the industry to be heard one was faced with the difficulty of deciding who had any right to speak on the question. There were two kinds of interests. There was what was defined in the Bill as ownership interest, and among the other interests were those of the people working in the industry, and they were entitled to be heard. There were the people who bought the products and the people who sold them and these were mentioned as people having a special interest in the industry.

When the Board of Trade had received and adopted the Council's draft report it would order a general inquiry into the scheme. The Council would then have the business of hearing all the evidence that might be produced for or against the scheme. If people with a special or ownership interest objected to the scheme as a whole, or certain provisions which they thought were likely to injure their interests they could put their case before the Council. The Council would then issue a final report in which it would say whether, having heard all the evidence, it thought this was a scheme that should go forward. If it was turned down the matter dropped, but if it went forward the Board of Trade then had to prepare an industrial register of the industry and the scheme was submitted to the industry to be voted upon. If 75 per cent. of the industry considered it a good thing for them it was then binding upon all the parties, and an Order was laid on the table of the House of Commons and then on the table of the House of Lords. This would give formal opportunity for debate, which would be very rarely exercised, and then the draft Order would become law.

A Supervisory Committee

When the scheme became law a supervisory committee had to be created, whose business it would be to watch the procedure of every scheme and to receive any complaint that might arise. This committee would place any necessary amendments before the industry; it would, in effect, be a sort of appeal court. Industry, and industry alone, had the power of initiating any reorganisation scheme. No one else could propose a scheme—no government department or no special interest could submit a scheme. The scheme could be proposed by the ownership interest alone and the ownership interest alone had the power of voting upon it. The Bill gave to industry a measure of real self-government which he thought was vitally important. He wanted them to consider that procedure in comparison with the procedure which the government of the day was proposing by a Bill on this question, because the government fully admitted that this was an urgent problem. It could hardly fail to do so when it observed that every industrial country was taking steps to that effect because they found it to be necessary. It was one of the most frequent topics of industrial legislation at the present time. The government said it did not think it was a subject for a general measure but it would be prepared to consider an individual measure for each industry as it brought it forward. Let them conceive that, instead of this Bill being in operation, providing for an inquiry by experts and a specially appointed council of men who knew their job, they were to have a Bill promoted by a government department, led in the House of Commons by the President of the Board of Trade. They would have to put their scheme forward to a government department and have it accepted by the President of the Board of Trade, and he would be the advocate for the department. He could hardly be expected to know the inside details of every industry. When that stage had been passed, a scheme would be presented on the floor of the House of Commons. There it would not be debated by experts who had spent their lives in dealing with the subject and who had no interest except to seek a proper solution. It would be dealt with by Members of Parliament who had been elected for entirely different reasons, and it would be up against extraneous subjects and party politics which had nothing whatever to do with the question. Parliament had tried repeatedly to legislate for industry and he thought its efforts had been extremely feeble; they were bound to be feeble. Parliament was not elected to debate that sort of thing.

Defining an Industry

He appealed to them as industrialists to get this matter into their own hands and support it for better or worse. They would make mistakes, perhaps, but they would not be due to the fact that the speaker failed to call up a particular member. His Bill probably had many shortcomings, and industry presented many difficulties just now, but he was convinced that his was a better proposition than that of allowing this question to come up piecemeal in the House of Commons. Parliament was deeply engaged on other and broader questions and was entirely unfitted for dealing with such matters.

Many people were worried and disturbed about the schedule to the Bill. Usually the schedule was the most important thing about a document, but they could take it from him that in this Bill the one thing they need not read was the schedule. One of the difficulties in drafting the Bill was to define an industry. The schedule defined the industries of this country but its significance was very slight because there were clauses in the Bill which laid it down that a scheme might be limited to any one of those industries, any part of any one of those industries or to any combination of industries or any combination of any parts of any two, three or more industries.

Provision for New Entrants

Another question was that of providing for new entrants into any given industry. That aspect of the question had presented more difficulty than any other. Lord Trent and Lord Leverhulme had remarked to him that they could not see how their respective fathers could have started up the great businesses they now controlled if this Bill had been in existence at the time. That was perfectly true; they could not have done so. The answer was not very difficult, though it was very important. Those were the pioneer days of industry when it was possible for a new industry to come along and entirely and completely, after a comparatively short number of years, displace another industry. Industry to-day was so highly complex and so closely interwoven that it was not to the benefit of industry as a whole that a death blow should be dealt to any important industry. It was much more valuable to the community as a whole that what progress was made—and progress would continue to be made whatever steps they took—was made with some regularity and with some hope that those who had already sunk large sums of capital in employing large numbers of men and occupying an important part of the economic functions should be given the opportunity of dying decently instead of violently. It was better that new entrants and new processes should be brought in in some order instead of by violence and disorder. That was one side of the matter and the other side was that in point of fact the progress of industry to-day was made in rather a different way. One did not find new processes coming along and entirely displacing the older processes. One found much more that as the result of a much larger amount of research a constant, continual, sometimes rapid and sometimes slower progress was being made in every industry. He did not think they need fear that that progress would not continue. What they had to fear rather more was that that progress might be rather more rapid than they could digest.

Points from the Discussion

Mr. C. A. Hill remarked that the provision in the Bill for the setting up of a Council had provoked considerable discussion among industrialists. Another clause empowered the Council to make inquiry into the scheme and stated that such inquiry might involve the hearing of evidence from traders who would be liable to heavy fines for withholding evidence; that was a matter upon which many people had strong feelings. Clause 11 of the Bill provided that the Board of Trade should draw up a draft Order which should provide for the establishment of the body to administer the scheme and for imposing penalties, etc., and the Board had to lay such draft Order before each House of Parliament. It appeared to him that the Bill seemed to favour some of the enactments concerning which they had had some trouble in the past. They had seen cases of Acts being passed to control certain industries—for instance, the coal industry—which had not been a howling success. They had the electrical industry and the Agricultural Marketing Acts which had handed over to "experts" the milk trade, the bacon trade, the potato trade, the hop trade and the pig trade. They were all handed over in such a way as seriously to restrict the freedom of those engaged in those trades. He yielded to no man in his admiration of the Civil Service, but, on the other hand, they were proud of their constitution. The Civil Service, when it was unadvertised, was an efficient service, but since it had been widely advertised and given powers which were super-Parliamentary it had become slightly arrogant. He was constrained to ask whether this Bill would not forge a link in the chain which was already binding industry to bureaucracy and help forward the work that led to the new despotism, *i.e.*, government by Civil Servants. It was our proud boast that the English people made their laws and that the laws were administered by independent judges, but the new despotism placed bureaucracy above Parliament. It might be that these fears were groundless; if so, Lord Melchett would tell them so. He was prepared to be told that other countries had somewhat similar measures for rationalising their industries, and if we did not follow suit we should be at a disadvantage in world competition. His own feeling was that they had probably better bear the ills they had than fly to those they knew not of.

Evidence Under Oath of Secrecy

Lord Melchett, returning to the question of new entrants, said he thought it was necessary to preserve the balance between the danger of a large number of new entrants and the danger of shutting them out altogether; the latter was the greater danger of the two. Regarding the production of evidence, every business man hated making returns, but he wished to appeal to reason on that question. If everyone went on with his own business without regard to anybody else's everyone was capable of making all sorts of mistakes. Under the Bill everybody would be in the same boat. Such information as was required upon oath would also be given on an oath of secrecy, so that competitive firms need not be afraid of disclosing information to each other.

Mr. J. A. Reavell said the Bill was an amazing piece of constructional work which showed that there had been a very active brain behind it. He wondered what was the alternative to such a Bill. If they did not accept this Bill what were they going to get? The way out of the difficulty was to get the business men themselves to run the scheme. He wondered what it was proposed to do with big organisations like the co-operative societies, both wholesale and retail. Those societies represented one of the biggest organisations in the world. He also wondered whether it was going to be suggested that the scheme outlined by Lord Melchett should be tried out in the first place on some more or less limited industry, such as the dyeing industry or the artificial silk industry. He could not understand how they were going to get over the question of new inventions and new processes. The artificial silk industry, for example, was not so very old, and he could not agree that the pioneering days had passed. He believed that pioneering days would remain with us as long as the world lasted. Industry and science would go ahead and we had to provide for them. Unless we encouraged every possible new development we should find foreign countries cutting their prices.

LORD MELCHETT said the intention and desire throughout the Bill was to provide machinery whereby industry could control itself. The last idea in his mind had been to introduce any extraneous power, either Parliament or the Civil Service. The whole intention of the Bill was that industry should, in fact, govern itself. They were faced as manufacturers with the problem of the co-operative movement and they could not escape from it. If any selling organisation set itself up with such purchasing power it had a grip on their business. It could dictate its terms, and if the manufacturers had no such Bill as this they were powerless and they would be at its mercy. The measure would bring the manufacturing element of the co-operative societies into the schemes and prevent them using 5 per cent. of the total manufacturing capacity in any given commodity to break the prices of the rest of their commodities so as to buy at their figure and resell at their own figure. They would meet with opposition from the co-operative societies. Replying to Mr. Reavell's suggestion that the scheme might be tried out in given industries, Lord Melchett said it had been done in the alkali industries for the past 75 years. It was started by his own grandfather and had been continued through three generations, and that was one of the reasons why he was now proposing it. He knew it worked, and if they looked up the history of other industries in which it had been tried they would see that it had worked there also. So far as pioneering was concerned there was now no real pioneering in the personal sense. He regarded the Bill as a very moderate one. If they had a Socialist Government after the next election they would pass more drastic measures.

Mr. W. PRESCOT said private enterprise really died, or went into a different channel, when the various company acts and trade union acts were created. If they viewed the situation from a detached point of view how many of them could say industry represented private enterprise to-day? Restriction after restriction had been passed and apparently, while private enterprise in the past was the only thing that could meet the situation, an entirely different set of conditions had arisen in recent years. They no longer spent their own money or were responsible for their own work. The only fear he had regarding the Bill was that it had first to pass through Parliament. He only wished they could get the principle adopted without going to Parliament at all. One could easily over-estimate the danger of government control. He imagined the biggest antagonism to the Bill would come from inside the Civil Service. He thought the government would welcome some sort of method by which these vital problems could be considered and discussed outside Parliament and for which they would no longer be responsible in regard to administration.

Dr. A. J. V. UNDERWOOD humorously suggested that the first step towards industrial organisation was taken by Noah when he invited his fellow-workers and others into the Ark. He pointed out that the French Government had lately adopted similar principles to those embodied in Lord Melchett's Bill, and he believed that due acknowledgement had been made of the source of the ideas.

The CHAIRMAN, in closing the discussion, said he believed the general sense of the gathering was that Lord Melchett had put before them many ideas which were worthy of their attention. He had made the point that the products of industry were likely to expand, but that they were not likely to derive any real benefit if that expansion remained unregulated, and they must envisage some amount of regulation. The small man had a definite contribution to make to industry and to many factors in the human life of the country. Provided they could cut out the factors which made the small men cut each other's throats the small man was a factor in industry that should be maintained. They could envisage many desirable regulations in industry to which they would all be prepared to agree if only they could trust in the moral responsibilities of the other fellow and of the shareholders.

Agreed Charges for Rail Transport

Flat Rates for Chemical Products

OLD-ESTABLISHED customs are rapidly giving place to revised conditions necessitated by the march of progress. A new facility which must have a far-reaching effect on traders throughout the whole country is the "agreed charges" which the railway companies are authorised by the Road and Rail Traffic Act, 1933, to grant to traders with the sanction of the Railway Rates Tribunal. During 1934 more than 160 applications for "agreed charges" were put into operation. These are taking the form of a flat rate per ton or per package and apply irrespective of distance. Prior to 1934 it was the practice to fix all railway rates on a ton-mile basis, and the law bound the railway companies to accord no undue preference to any person, company or description of traffic. The obligation on the railway companies to make equal charges and accord no undue preference is no longer operative.

In this new facility lies a danger to the individual trader, a danger which is not yet fully appreciated by the majority. Important trading concerns and large industrial interests can approach the railway companies for a preferential rate. By virtue of their large turnover they can bargain with the railway companies and obtain a preferential "agreed charge" or flat rate. They can therefore quote their merchandise at a price which represents a small profit to them, but a loss to the local trader who has to pay higher transport charges.

Equality of transport charges for all traders is essential to fair competition. A flat rate which applies to all stations in Great Britain, irrespective of distance, and in many instances works out to several pounds for one penny, obviously possesses a tremendous advantages over a rate based on so much per ton per mile. As transport becomes cheaper the radius of effective competition open to the trader is increased, and progressive firms with wide ramifications and the advantage of a flat rate, large turnover and other favourable conditions are able to enter the territory which may hitherto have been the exclusive hunting-ground of the smaller trader and capture his business before he is aware of it, and trade once lost is difficult to regain. Flat rates have been granted to two firms in favour of varnish, stains, dyes, enamels, colours and turpentine, to two firms of dyers and cleaners, and to other firms for ammoniated liquid soap and ammonia solution in bottles in cases.

The Traders' Defence Association has been formed to protect traders whose business will suffer as a result of the new powers in relation to railway rates which have been conferred upon the railway companies. The Association is in favour of the flat rate, providing it is applied equally to all traders in like circumstances. It benefits the producer, the distributor and the consumer, and the more flat rates in operation the better for all concerned. Under the new Act, railway companies are not under any obligation to grant flat rates to all applicants. The Traders' Defence Association representing many varied trades is in a favourable position to help traders in this respect. This Association, for a membership fee of 10s. 6d. per annum, will advise members of all applications for, and all "agreed charges" granted by the Railway Rates Tribunal affecting the member's trade, and if such charges are likely to operate to the detriment of the member's business, the Association will negotiate for a similar charge to be fixed in his favour.

Although the initial object of the Association is to deal with the "agreed charges" question, believing that this constitutes the greatest potential danger to local traders at the present time, it does not propose to limit its activities to these matters in the future, but will deal with all problems affecting the trader from time to time as these arise. Inquiries should be addressed to 37 St. Nicholas Street, Bristol.

Some Problems of the Glass Bottle Industry

Joint Meeting of the Institution of Chemical Engineers and the Society of Glass Technology

A JOINT meting of the Institution of Chemical Engineers and the London Section of the Society of Glass Technology was held in the Rooms of the Chemical Society, Burlington House, London, on January 9, when Mr. W. A. Moorshead, A.R.C.S., read a paper on "Some of the Problems of the Glass Bottle Industry." Mr. W. Macnab (president of the Institution of Chemical Engineers) presided, and was supported by Mr. G. V. Evers (president of the Society of Glass Technology). The chairman said that this was the first occasion on which the two bodies had held a joint meeting, and he expressed a hearty welcome to the members of the Society of Glass Technology.

The raw materials for the manufacture of glass bottles consists chiefly of pure silica sand, limestone, soda ash and cullet or broken glass are stored in suitable bins. The sand is sometimes thoroughly dried before storage; this is essential for the accurate weighing out of the materials, because of the large and varying proportion of water usually contained in it on arrival. The weighing and mixing of the batch are important processes. The most troublesome impurity causing difficulty in the manufacture of colourless glass is iron, for 0.08 per cent. of iron oxide will turn the glass green in spite of decolorising agents, and for good colourless glass it is desirable to keep the amount down to 0.05 per cent.

The Melting Furnace

A large melting furnace, designed for melting and delivering to the machines 35 tons of glass per day, will hold about 130 tons of glass and will melt, if required, for short periods 60 tons of glass per day. The temperature of such a furnace will be about 1,470° C. The melting point of the sand is over 1,600° C., and that of the limestone over 2,500° C., so the transformation of the batch to molten glass is not a simple melting process. It can be better described as the fluxing and solution of the sand and limestone by the melted soda ash and cullet. The furnaces are usually regenerative and directly heated by oil or producer gas.

The glass is taken from the furnace in two ways—by suction and by gravity. In the suction process the gathering or parison moulds attached to the machine dip on to the surface of the molten glass. The mould cavity is connected through a valve, operated by a cam, to a vacuum line. When the valve opens the glass is forced into the mould. As the mould lifts out of the glass, the tail of glass, so caused, is cut off by a knife which is adjusted level with the bottom of the mould. The size of the mould cavity determines the weight of the article, since it is always completely filled. Where the suction process is used the glass is generally taken from a revolving pot holding about 2 tons of glass. The glass is fed from the furnace to the revolving pot through a spout, the rate being controlled by a stopper.

The Gravity Process

In the gravity process a feeder is attached to the furnace. This consists of a covered trough, about 5 ft. long, 12 in. wide and 6 in. deep. At the end of this is a hole about 2 in. diam. through which the glass flows. A suitably shaped vertical plunger is given both a rotary and up-and-down motion above the hole and concentric with it, and this, in combination with a pair of shears underneath the feeder, is operated to feed a continuous supply of ellipsoidal charges or gobs to the machine underneath. The weight, shape and temperature of the gobs can be controlled independently, by the size of the opening and length of stroke, nearness of the plunger to the opening, and fuel supply to the burner.

In both processes the charge of glass, after preliminary chilling in the gathering mould to hold it in shape, is transferred to a finishing mould having the shape of the bottle being manufactured, and is finally blown out against the walls of the finishing mould by compressed air.

On leaving the machine the glass articles are at an average temperature of 650-700° C., the glass in the middle of the walls being semi-molten, and the outside surface or skin, which has been in contact with the mould, is set and holds the object in shape. To avoid strains when cooling, the article must be annealed, and is therefore conveyed through a lehr, which is usually 60 to 90 ft. in length and 2 to 7 ft. in width. In the lehr, gradual cooling, according to some definite time temperature schedule, takes place, the time required being 1 to 5 hrs. On emerging from the lehr the articles are carefully examined; the defective ones, about 10 per cent., being broken up and returned to the cullet bin, and the good ones packed for despatch.

The overall efficiencies of the glass furnaces are about 18 per cent. on normal load and 27 per cent. on maximum load, so it would appear that there is plenty of room for improvement. It has been felt that such low efficiencies are a disgrace to the glass industry, and so many attempts have been made to improve on them. These have taken the form not only of improving their fuel efficiency, but combined with it of improving the mixing of the molten glass. In the original furnaces no thought was given to the latter, and troubles occurred through what is called cordy and streaky glass, which sometimes indicates poor mixing.

Resistance to Corrosion

The vital part of every furnace is the tank which holds the glass, and which must be made of a very refractory material having the highest possible resistance to both corrosion and erosion by the molten glass. Except in the case of melting certain dark-coloured glasses, the life of all furnaces is limited by the abality of the blocks to stand the wear so caused. The blocks become thinner and thinner, particularly at the glass line, until it is necessary to stop the tank to avoid a burst. Inferior tank blocks, besides reducing the life of a furnace and increasing fuel consumption, may cause stones by the corrosion of the bond in the block leaving the more insoluble grog particles to float in the glass. Apart from this, the gradual solution of the blocks results in cordy and streaky, or inhomogeneous, glass.

Sillimanite tank blocks are giving considerably increased life in furnaces worked at comparatively low temperatures and melting special glasses, opal in particular, and there is every hope that as a result of further experiments they will prove a substantial improvement for all conditions.

At least 15 years ago, experiments were made on the production of highly refractory blocks by fusing clays, but until comparatively recently the idea had not been developed commercially. Now, highly aluminous materials, such as diaspore and bauxite, are fired in an electric arc furnace and poured like steel at a temperature of 1,900° C. into sand moulds. The resulting blocks undoubtedly resist both erosion and corrosion in a glass furnace better than anything known to-day. They are very expensive, however, and on account of their high thermal conductivity cause an increase in fuel consumption. Other attempts on the production of super refractories are being made by moulding the plastic clay and grog mixtures under very high pressures with the idea of increasing density.

Annealing Glass Bottles

In the annealing of glass bottles in what are known as lehrs, astonishing progress has been made during the past few years and the bottle industry, or a section of it at any rate, is in the happy position of being almost completely satisfied with their present apparatus. A few years ago a suction machine producing 20 tons of manufactured articles per day required two brick lehrs, 7 ft. wide. They were, on the average, 80 ft. in length, and the ware took about 5 hrs. to go through them. Each lehr required about 1¼ tons of fuel oil or its equivalent to heat it. This was wasteful, because, although the average temperature of the bottles put into the lehr was about 700° C., the lehr itself was usually maintained at a temperature about 570° C., which is very close to the upper annealing temperature of the glass. By completely redesigning the lehr, but keeping to the same size and using the same conveyor belt, weighing about 100 lbs. per ft. run, they brought the fuel consumption down to under 100 gallons, or 0.4 tons per day.

Mr. EDWARD MEIGH (chairman, London Section, Society of

Glass Technology) said the greatest problem in the glass bottle industry was the inefficiency of the furnace; it had troubled the industry for many years and still did so. If any of the members of the Institution of Chemical Engineers could throw some light on that problem or could make suggestions to the glass industry, the meeting would have not been held in vain. In regard to the important part played, in the efficiency of the furnace, by the refractories of which the tank was built, Mr. Meigh referred to the fusion type of refractory and was not sure that it was correct to leave the matter as the author had done, merely by saying that owing to its high cost and high thermal conductivity its economic value had not been proved.

Effect of Iron Content

Dr. W. R. ORMANDY referred to the author's statement that iron was a nuisance and that the maximum amount which could be got into the glass without causing discoloration was 0.05 or 0.08 per cent. He, however, had discovered that when one analysed the finished glass and calculated the amount of iron in it, and then compared it with the amount of iron present in the limestone and silica and sodium sulphate or sodium carbonate employed, the glass contained very much more iron than was accounted for by the iron in the raw materials; nor could one balance the figures by making an allowance for the amount of dissolved fire-clay from the blocks and drippings from the roof. But, eventually, he believed he was able to trace the discrepancy to the fact that producer gas fired furnaces were being used, and he had rather suspected that the very fine dust carried through from the producers (for the gases were employed hot) accounted for the increased amount of iron in the glass. He had carried out a series of analyses of the dust deposited in the big producer mains and had found that as he got further from the producer and nearer to the gas tank the percentage of iron oxide in the dust was higher; that was a possible explanation. Another question was whether the fire-clay blocks made with clays which were super-aluminated, so to speak, which contained an amount of alumina in excess of that necessary for the formation of kaolinite, such as were found in some parts of Scotland, in Austria, around Worms and in parts of France, would be more resistant than those made with clays having as a maximum the theoretical amount of alumina, corresponding to the formula Al_2O_3 $2SiO_2$ $2H_2O$.

The "Muck" Factor

Mr. MOORSHEAD, replying to Dr. Ormandy, said that the makers could not account for all the iron in the glass; if one analysed all the materials and estimated how much iron the glass was taking up from the refractories, there was still more than that, and that difference was termed "the muck factor." Every glass manufacturer experienced it. The iron came from all sorts of places and seemed to come even from the air; but he did not believe that it came from the producer gas because this muck factor arose even when one used oil-fired furnaces containing no measurable amount of iron. He was unable to answer Dr. Ormandy's question concerning the alumina/silica ratio in the glass clays used. There had been an idea that the higher the alumina content of the clays used, the more resistant were the blocks to erosion and corrosion; but that was not a fixed rule. There was a clay named grossealmerolde which was rather siliceous and which in many cases resisted attack better than more aluminous clays; on the other hand, the development of sillimanite and the fusion cast blocks was in the direction of increasing the alumina in the block material.

Company Registrations at Somerset House

568 New Chemical Companies Formed in 1934

A STATISTICAL report relating to new companies registered in England during the year ended December 31 has just been issued by Jordan and Sons, Ltd., company registration agents, Chancery Lane, London. The figures given in the report appear to justify reasonable anticipation of the realisation of the hopes for recovery expressed during the past twelve months. The following items are extracted from the statistics:

Classes.	Public Companies.		Private Companies.		Totals.	
	Number Registered.*	Capital.	Number Registered.	Capital.	Number Registered.	Capital.
		£		£		£
Cement, etc. ..	11	1,592,000	187	1,300,170	198	2,892,170
Chemicals	8	3,198,100	560	2,223,065	568	5,421,165
Engineers	20	8,484,798	677	3,076,357	697	11,561,155
Food	23	1,465,600	985	3,999,339	1,008	5,464,939
Glass and Pottery	1	120,000	68	401,450	69	521,450
Laundries	1	250,000	113	392,416	114	642,416
Leather	1	48,000	88	460,520	89	508,520
Metals	2	100,000	124	5,121,002	126	5,221,002
Miscellaneous ..	39	196,600	284	669,755	323	866,355
Oil	4	275,100	63	1,058,250	67	1,333,350
Rubber	5	1,500,000	36	207,750	41	1,707,750
Textiles	10	927,300	433	2,684,199	443	3,611,499
Others	360	51,800,724	8,695	52,854,266	9,055	104,654,990
Totals (for year 1934)	446*	69,761,622	12,029	73,778,784	12,475	143,540,406
Corresponding figures in 1933	330	39,857,295	11,054	54,688,261	11,384	94,545,556

* In this Column are included 53 "Companies Limited by Guarantee" and "Associations Not for Profit" without Share Capital, such Companies being technically Public however small the Membership may be.

The figures indicate a variation in the character of the companies registered which points to a change in the attitude of the public towards investment. In 1932 there was virtually an embargo on public issues, but company registrations reached the record number of 10,204 (a total exceeding the figures of the boom year, 1920). In 1933, despite continued depression, the number increased to 11,384. The hopeful aspect of this record is that it indicates not only a steady increase in the number of public companies registered, but also an increase in more marked degree in the capital with which public companies are being registered. The aggregate nominal companies on registration of the 12,475 companies registered during the period covered by the reports amounted to approximately 143½ millions, of which "public" companies accounted for over 69 millions and "private" for over 73 millions, whereas the 1933 total of approximately 94 millions was divided into roughly 40 millions "public" and 54 millions "private."

Analysis also shows increase in the proportion of "public" as against "private" concerns. While the 1932 total of 10,204 comprised 255 "public" and 9,949 "private" companies and the 1933 total of 11,384 consisted of 330 "public" and 11,054 "private," last year's total of 12,475 includes 446 "public" and 12,029 "private" companies. The 1934 figures shows an all-round increase over 1933 as follows: "Public" companies 116, "private" 975—total numerical increase 1,091. "Public" companies' capital increase £29,904,327, "private" £19,090,523—total capital increase £48,994,850, which is an increase of 50 per cent.

The aggregate nominal capital of £143,540,406 shown above is a big amount, but the figures would have been a great deal larger (particularly in the "public" company section) but that the returns include companies incorporated with very small nominal capitals which are subsequently increased shortly after incorporation. The following examples (out of many such cases) indicate how appreciably the capital figures would be swelled if such increases were taken into consideration: Eno Proprietaries, Ltd., initial capital £100—increased to £200,000; Monsanto Chemicals, Ltd., initial capital £100,000—increased to £700,000. There have been also several instances of companies being converted from "private" to "public" concerns, shortly after incorporation, without increase of capital.

Companies "limited by guarantee," without share capital, are philanthropic, patriotic, literary, or religious concerns, or associations for promoting the interests of certain industries, or something similar. The 1934 registrations in the second category represented the interests of oil burner and nameplate manufacturers, phonographic copyright owners, tanker owners, business consultants, grain shippers, bakers, relay services, timber development, potato merchants, etc.

The Properties of Pigment Powders

Presidential Address of the Manchester Section of the Oil and Colour Chemists Association

TO-DAY fewer new colours are introduced each year, but the colour chemist busies himself with the question of the quality of the existing standards, said Mr. G. A. Campbell, M.Sc., in his presidential address to the Manchester Section of the Oil and Colour Chemists' Association, at the Manchester College of Technology, on January 17. Moreover, a new technique is arising, based not upon differences in chemical composition and structure, but upon the more fundamental physical properties of pigment powders.

The colour trade, continued Mr. Campbell, has now to meet exceptional demands in the fineness of grinding of their pigments. Particle size is carefully specified and the standard sieves are much used for testing and estimating the proportion of outsize material present. With air flotation methods of separation, powders can be obtained whose particles do not vary a great deal one from another. The size distribution covers a narrow range. Air flotation methods, however, are by no means general and usually a powder contains particles of varying size and shape. Specific surface has therefore been introduced as a more reliable guide to the fineness of the powder, *i.e.*, the surface area per unit weight. Unfortunately, methods for the direct measurement of the quantity are tedious and only approximate, with the degree of approximation very difficult to establish. The fineness of a powder, so essential in certain modern requirements, is most difficult to specify and repeat, and in the more exacting industries succesful efforts have been made to sidetrack the use of dry powders and substitute for them colours in various dispersion media according to their ultimate applications.

Nature of Surface at Interface with Liquid

No matter how the colour is applied it becomes more and more recognised that the determination of its properties rests essentially on its surface area and the nature of the surface it presents at the interface with the liquid medium. The conditions at the interface determine many of the properties of the mixture. Most of the work on the investigation of specific surface of powders has been done in the cement industry, agricultural research, and in ore-dressing, in all of which the particles are rather larger than in the colour industry. It soon becomes apparent, however, that even the definition of surface area is uncertain when the surfaces are irregular, as in the case of powders fresh from a pulveriser.

For approximate estimations, microscopic examination or direct examination of the silhouette projected on a ground-glass screen, are the simplest and most reliable methods. For more accurate investigations of very fine powders X-rays have been used. Absorption methods for the determination of specific surfaces are most extensively employed but these are based upon two assumptions which are difficult to reconcile with the facts at their disposal. What is actually measured is the number of molecules of the substance which the surface will take up; the consequent surface can only be calculated by an assumption as to the average area per molecule occupied by the absorbed material. At present this is only an assumption based on information gleaned from research on liquid surfaces, as no reliable knowledge exists as to the area per molecule for an absorbed layer on a solid surface. The other assumption is that the quality of the surface is the same throughout. There is no guarantee whatever that the surface will absorb that particular substance equally throughout its area. Even on perfectly-formed crystals some faces absorb dyes and others do not. For example, lead nitrate crystals absorb Methylene Blue on certain faces, and picric acid on other faces, so that, if grown in a mixed solution of these dyes, faces of each colour can be obtained. Moreover, these different absorptions regulate carefully the rate of growth of these crystal faces (Gaubert, " Recherches sur le Facies des Cristaux," 1911).

The solid surface is not uniform like the liquid surface. It is established that the surface layer in a liquid is of the order of one molecule in thickness, but the mobility of the molecules is so great that their relationships one to another are averaged out over an area, so that for any area, however small, the free surface energy expressed as surface tension has a real and definite meaning and measure. For a solid surface the mobility of the atoms and molecules is restricted and the surface is very uneven. The atoms stay where they happened to be when the new surface was formed, and it may be therefore that every atom or molecule is in a different state of strain and no two have exactly the same properties. Strictly speaking, it is not quite accurate to use the phrase " surface properties " of a solid as these may vary from atom to atom, but certain properties can be averaged over considerable areas, and these properties are sometimes of great importance in industry.

Activity of Ultra-Fine Particles

The decreased activity of ultra-fine particles on standing and ageing presents a fascinating but complicated problem. Every colour manufacturer has instances of this ageing process. There is the well-known case of certain Lithol Red lakes and at least one Permanent Red which, while giving a lake with a fairly yellowish undertone on freshly laking and grinding, develops a beautiful blue undertone if left to stand some days. Occasionally a colour will develop a nasty caking propensity owing to the absorption of moisture under bad conditions of storage or transport. The problem of caking is met with more in the case of soluble dyes than with pigments; some of these are of a tarry nature rather than crystalline, and when freshly ground and packed they tend to develop "flow properties" to form a solid hard compact mass. This tendency can be reduced to a minimum by working the colour over a sieve, simply for air exposure, before packing.

It is interesting to note in this connection that if a clean crystalline surface is obtained by splitting a large crystal of calcite, and a few drops of a solution of an isomorphous salt dropped on this clean surface and allowed to evaporate, the crystals formed will have then edges parallel to those of the large crystal. Barker (" Journ. Chem. Soc." 1906, 1120) described this peculiar phenomenon and pointed out that the orienting power is lost if the surface be exposed to air for any length of time, presumably because a layer of impurity is absorbed.

The free surface energy, expressed as surface tension, in a solid cannot be uniform, but we can speak of the surface tension of a solid as the work required to produce one sq. cm. of fresh surface. Unfortunately there is no reliable method of measuring the surface tension of a solid. The usual methods for liquids fail because of the immobility of the solid surface.

Determination of Surface Tension

Ostwald worked out a method (" Z. Phys. Chem.," *34*, 503) founded on sound theory but still full of experimental errors. Just as the vapour pressure of small drops of liquid is greater than that of large drops, so the vapour pressure of solubility of small powder particles is greater than that of large. The surface tension can then be calculated from the relationship between radius, surface tension and vapour pressure or solubility. Unfortunately, while the theory is sound the methods of reducing the particle size to get a measurable alteration in vapour pressure or solubility must inevitably result in a fundamental alteration in their surface structure. The small particles will have their surface atoms in much less regular arrangement than a larger particle; also, grinding always produces a certain proportion of the so-called Beilby layer obtained in polishing and which has an intrinsic solubility which added to that due to the greater curvature of the surface will result in a too high surface tension by this method.

Degree of fineness of the pigment does not determine the final stability of the paint in storage, and while of course the settling due to gravity will still occur, if the paint has been well formulated with all regard for the pigment vehicle surface properties the settling which does take place will be such as responds immediately to vigorous stirring, and does not result in a hard cake separating at the bottom of the can. The problem however is not quite so simple as this, as is shown in a very interesting investigation carried out by Ryan, Harkins and Gans ("Ind. Eng. Chem.," *24*, 1288) which led to the conclusion that the stability of the system as influenced by the surface relationships depended upon the orientation of the molecules of the liquid and also of the solid at the interface.

The purpose of this inquiry was to determine the fundamentals controlling the settling of pigments from paint during storage, but, to avoid the complex problems of linseed oil, in the first place they studied the settling and suspension properties of pigments in benzene, oleic acid, water, ethyl alcohol, etc. Benzene was taken as a type of non-polar liquid, and suspensions of pigment powders in this liquid are flocculated suspensions of large volume. Oleic acid was taken as a type of polar-non-polar liquid—molecules have one end of the chain polar, the other end non-polar—and it is found here that the molecules of liquid adjacent to the pigment become orientated with the polar group towards the surface of the pigment. Settling takes place much more readily and the final volume is smaller.

If a pigment is immersed in benzene to which a little oleic acid is added, the pigment particles absorb a mono-molecular layer of the polar-non-polar compound on their surfaces with the polar groups at the surface of the pigment. This decreases flocculation and settles to a smaller volume. The addition of a little water to this will re-flocculate the pigment and make the volume larger than before. From this it will appear that the problem of settling is not a simple function of wetting, since water and polar-non-polar substances, both of which wet well, have entirely opposite effects.

Various pigments were used, particularly titanium oxide, zinc oxide, titanox, and the results of the energy of immersion and also for the de-flocculation of suspensions indicate that all these pigments have absorptive capacities of the same order. When the pigment reacts chemically with the vehicle to form a metallic soap, no doubt, each particle will surround itself with a mono-molecular layer of that soap. If this is soluble in the vehicle some of the soap diffuses into the vehicle but the chemical reaction gives more soap to the film layer. A chemically inert pigment will surround itself with a mono-molecular layer of whatever polar-non-polar substance is present. The stability of a paint depends largely on the absorbed film at the pigment vehicle interface.

For years the intensity of colour in carbon black depended essentially upon decreasing particle size, and brought with it increased oil absorption, increased difficulty in grinding and after-grinding, tendency to flocculate and so lose strength. Really intense shades are now available without these drawbacks owing to modification of the surface conditions designed to give lower interfacial tension between black and vehicle. Not only this, but a carbon black giving a very intense black when rubbed out in a linseed oil medium gives a much less intense result in mineral oil and quite a different result again, say, in nitrocellulose lacquer. Through slight modification of the surface conditions of the powders, grades have been put on the market in recent years to give the most intense shades in carefully specified vehicles—linseed oil of a given acid value, nitrocellulose lacquer, and so on. Much has been done in the carbon black industry in the study of surface and interfacial conditions, and much has been accomplished in relation to the newer dispersion media in which the pigment has now been introduced.

How much can be done to modify the surface conditions of other pigments cannot be estimated at present. Bartell and Walton ("J. Phys. Chem.," *37*, 543) publish interesting figures relating to antimony sulphide. Carbon wets extremely well by benzene but poorly to water. In distinction to this, silica wets well to water but poorly to benzene—these were results of previous tests. Antimony sulphide as purchased from the manufacturers behaved like the carbon above, but on heat treatment at only 170° C. the surface of the particles was so modified, possibly owing to the surface film of oxide, that it actually wetted out like the silica.

Hull City Laboratories

Chemical and Engineering Society's Visit

By permission of Mr. A. R. Tankard, F.I.C., the City Analyst, members of the Hull Chemical and Engineering Society spent a pleasant and instructive evening at the city laboratories on January 15, Hull. The buildings, which were completed in 1932, offer an excellent example of a modern laboratory, being well thought out and well equipped for meeting the demands made upon it. A number of exhibits had been prepared by Mr. Tankard's assistants.

A short account of the work was given by Mr. Tankard before proceeding to the bacteriological laboratories. Here the technique of culture preparations was demonstrated and members were able to examine microscopically a number of the better-known bacteria, such as those of diphtheria and tubercle. Interest was also shown in the bacteriological examination of milk and the differences between the various grades now on the market. Altogether, between 7,000 and 8,000 bacteriological examinations are carried out in this department per annum. In another corner of this laboratory were demonstrated methods for the detection of pollution in water from different sources. In this way a control is exercised over the water in the Hull swimming baths and the degree of chlorination necessary is determined accordingly. The city supply water, which is bacteriologically very pure, is kept under regular control. On the same floor an apparatus for the volumetric estimation of sulphur dioxide in the atmosphere was exhibited and large graphs were displayed indicating the variations found over several years. Those due to season and weather were particularly noteworthy and provoked much discussion.

On the second floor is the main analytical laboratory and in it was displayed a wide variety of apparatus and showcards. Among the latter were those indicating the adulteration of numerous items on the daily menu. Special attention had been paid to added colouring matter, and pieces of wool dyed vivid pinks and yellows from such commodities as strawberry ice and lemon curd made an effective exhibit. It was explained that a departmental committee had recently recommended that standards for those foodstuffs which suffer most from adulteration should be set up, and interesting methods of analysis of foods have been devised and were shown to the members. An exhibit was also made of the standard methods of estimating the common inorganic poisons such as arsenic, lead and copper, which are determined in the laboratory not only in foodstuffs but in a variety of biological materials. Adjoining this laboratory is a dark room in which members were shown a number of uses to which a mercury vapour lamp could be put. To give an example, the stamped "country of origin" mark on foreign eggs having been removed by chemical means, the area from which the mark was erased appeared under the lamp as a dark patch indicating removal of the mark.

The next laboratory to be visited contains apparatus for the determination of physical constants such as flashpoint, viscosity, freezing-point and refractive index. A tintometer is used for the colorimetric estimation of vitamin A in cod liver oil and other colour tests. This is the instrument room, and all the apparatus is set up ready for immediate use.

Members were shown, in addition, apparatus for measuring the solid matter in the atmosphere, apparatus for detecting dirt in milk, tests for blood-stains and methods for the determination of carbon monoxide in blood and air, and other items. Altogether, 10,165 samples were examined in the city laboratories in 1934, which is 10 times the number in 1909.

A pleasant evening ended with the passing of a hearty vote of thanks to Mr. Tankard and his staff for the way in which they co-operated in making the visit a success.

Colour and Colour Nomenclature

British Colour Council's Standards

COLOUR and colour nomenclature was the title of a paper read before the Royal Society of Arts on January 16 by Mr. R. F. Wilson, general manager of the British Colour Council. Mr. Wilson stated that since the beginning of time man had constantly sought to express his emotions by means of pigments and dyestuffs applied to the surfaces of many different materials. Among the earliest colours were red and yellow earths with a black possibly composed of soot, charred bones or wine lees. A wider range of colours was used by the Egyptians, as seen in their temples and burial chambers, some dating back to 4000 B.C.

The colours were limited to primaries of mineral origin. The blues appear to be oxides of copper; reds were red oxide or yellow ochre burnt to redness; green was obtained from malachite and bright yellow from orpiment; black and white were also used, and many tones were obtained by mixture. During the sumptuous Alexandrian age the art of mosaic was developed in Greece, and probably the mosaics of Pompeii and Herculaneum were copies of Greek paintings. The schemes varied, but were generally created with grounds of black, red, yellow and white upon which light and fanciful decorations were painted with great delicacy. All through the ages colours had been a source of inspiration to designers, and we could trace the peaceful development of the various craftsmen under the shadows of the Gothic churches, the coming of the industrial era, and lastly the developments of the science of chemistry which had resulted in synthetic dyestuffs taking the place of natural dyestuffs in our present era of industrial competition.

All coloured objects, materials or surfaces produced since the beginning of time came within the family group of one of the six spectrum colours—red, orange, yellow, green, blue and violet. These colours, unalterably fixed in the rainbow, were the same as the pigmental colours used by men throughout the ages, while all colours of full intensity appearing in the chromatic circle should be regarded as primary, in the sense that intensity of hue could not be achieved by mixture of the three recognised primaries.

Dictionary of Colour Standards

The British Colour Council had produced a Dictionary of Colour Standards composed of two volumes—the first volume showing 220 colours featured on silk ribbon which showed a matt and glossy surface. Each colour was named, numbered and coded. The second volume gave the history of each colour, the various names by which each had previously been known and the authority for standardisation. A complete range of spectrum colours was prepared working through the hues from red to orange, orange to yellow, and so back through green, blue and purple to red. This formed a definite foundation which might be used as the basis of all colour education and should ultimately be of advantage to all concerned with colour. The different colour-using industries were so accustomed to matching to the materials in which they usually worked that they were apt to lose sight of the fact that a similar colour could be reproduced in many materials and could be known by the same name. In order, therefore, to test the practicability of matching to a given standard, a number of firms had co-operated with the British Colour Council in an experiment of matching each of fifteen samples in yellow and other colour groups to one small piece of standard silk ribbon. The resulting differences on samples of pottery, printing ink, enamel surface paint, plastic material, cotton, silk, artificial silk, wool, rubber, leather, glossy surface and matt paint, tiles, wax and fur could easily be seen. This was an experiment in colour to show the value of being able to order a number of different materials by name or number, and the colours chosen were not intended to be particularly suitable for the material featured. Consultative committees were to be set up to represent each specialised industry to work in conjunction with the British Colour Council, their aim being to formulate a closer co-operation between those industries which reacted upon one another. In this way dyers, manufacturers, wholesalers and retailers could plan with a view to what a public of discrimination would wish to buy in six months' time, and the results were economy of time and money and the reduction of unsaleable stock.

On the subject of colour nomenclature, Mr. Wilson said that colour names had arisen in a variety of ways. Often they had grown out of an industry or a district where a particular craft was practised. The famous "Gobelin" factory gave rise to the association of certain hues of red, blue, yellow, grey and pink with this particular craft, while we still heard of "Beauvais grey," "Adam green," and the "Mortlake" colours. Ceramic art had given us many names, including "Wedgewood" and "Worcester."

Brief accounts of a number of colours were given in the British Colour Council Dictionary of Colour Standards, and it was hoped that all the definite colours which had come from past ages and the various names by which they had been known would be charted.

Even as colours themselves had remained unchanged since earliest times, so had the meaning of each colour also remained unchanged. Red, being the colour of fire and blood, was naturally associated with life, action, passion and anger, while blue had an intellectual appeal. Yellow, the most luminous of all colours, was closely connected with the symbolism of the sun, and green, in Nature the commonest of all colours, had a sense of immortality and was closely associated with sacred things.

Far Eastern Chemical Notes

Manchuria

A LEAD DEPOSIT IN THE VICINITY OF CHINCHOW has been estimated to contain about 3 million tons of the metal. Capital is being raised for its exploitation and the South Manchurian Railway will participate in the new company to the extent of 4 million yen.

Japan

POTASSIUM CARBONATE IS TO BE MANUFACTURED by the Sumitomo Kagaku Kogyu K.K. with a commencing monthly output of 20 tons.

ACETIC ACID AND ACETATES will be manufactured by the newly-formed Showa Gosei Kagku Kogyo K.K. which is building a factory at Kase.

WITHIN THREE YEARS, according to the President of the Hoshi Pharmaceutical Society, Japan may be expected to produce 25,000 kg. of quinine annually from cinchona bark obtained from Formosa.

THE JAPANESE ACETIC ACID CO. recently increased its capital to 1.5 million yen and plans to operate a new process for the manufacture of vat dyes, and to expand its formaldehyde production to 250 tons per month.

A PYRETHRUM HARVEST of about 8,000 tons is estimated for 1934. The United States took more than 90 per cent. of the total exports during the year (amounting to 9 million lbs. of the value of about 5.5 million yen).

THE TOKIO SULPHURIC ACID CO. (Tokio Ryusan K.K.), which recently commenced dyestuffs manufacture, has changed its name to the Tokio Sulphur and Chemical Industrial Co. (Tokio Toryu Kagaku Kogyo K.K.).

OWING TO THE STEADY INCREASE IN DEMAND by the rayon industry, several firms are taking an active interest in zinc sulphate manufacture. They include Dainippon Jinzo Hiryo K.K. (initial output 100 tons monthly), Nippon Soda K.K. (monthly production recently increased to 200 tons) and Mitsubishi Kogyo K.K. (100 tons monthly from April, 1935). Japanese consumption of zinc sulphate is about 600 tons per month.

FERRIC PHOSPHATE IS RECEIVING ATTENTION as a possible agent for dehydrating glycerine to acrolein. The optimum reaction temperature, using pumice stone as a carrier for the phosphate, lies between 400 and 460° C.; the water content of the glycerine should be as low as practicable and the rate of travel over the catalyst should correspond to 11 to 13 grams per hour per 25 grams of catalyst; the proportion of ferric phosphate should not exceed 13 per cent. Under these conditions yields of 50 per cent. of the theoretical are reported.

Fractional Distillation at Provan Chemical Works

Merits and De-merits of the Continuous Process

MR. R. W. EADIE, F.I.C., of the Glasgow Corporation Chemical Works, Provan, gave a paper on "Fractional Distillation" at a meeting of the Andersonian Chemical Society held in the Royal Technical College, Glasgow, on January 18. He introduced his subject by a short historical description and then considered distillation from the point of view of physical chemistry.

The term fractional distillation, he said, was applied to the process of separating so far as possible a mixture of various volatile substances into its components by distilling the mixture, and collecting in separate portions the liquid phase reformed on cooling, combining the fractions with similar boiling points, and repeating the process until the desired degree of separation has been obtained. He showed that by simple distillation only one small step in the direction of separation can be accomplished and then considered the effect of a fractioning column. This effects a more complete separation, and he showed how this could be followed by using a boiling point-composition curve. He used as his illustration a curve constructed from the vapour pressure data of two individual components, benzene and toluene, which follow Raoult's Law very closely. Raoult's Law states that the lowering of the vapour pressure of a solvent by the introduction of a solute is proportional to the molecular concentration of the solute, provided there is no association of the two types of molecule in the solution. It follows, therefore, that at any one temperature the vapour pressure of a solvent plotted against the molecular concentration of the solute added to it, will give a straight line graph.

What Happens in the Fractionating Column

Continuing to use benzene and toluene as his example, he showed how a complete temperature-composition diagram for mixtures in all proportions of the two liquids could be drawn. From this, he pointed out that a 26 per cent. molecular solution of benzene in toluene boiled at 100° C. and that the vapour coming from it contained 45 per cent. benzene. A picture was thus drawn of what happens in a fractionating column.

The less volatile material is given an opportunity to condense and in doing so liberates its latent heat which, in turn, is utilised to evaporate or volatilise some of the more volatile component, and so, in a fractionating column, there are many successive distillations taking place at the one time. Unfortunately for the technical chemist, the conditions in practice are seldom so easily illustrated. Most mixtures deviate considerably from Raoult's Law in behaviour, and the number of components in technical liquids requiring separation by fractional distillation is subject to no restrictions. Mr. Eadie was forced to admit that theoretical considerations had only a limited value in actual practice. In the design of processing apparatus much reliance was placed upon empirical data and more depended upon past good or bad experience than upon any scientifically-developed formulæ.

Essential Pieces of Plant

Three essential pieces of plant were required to carry out large-scale distillation, a still or tank, a fractionating column and a condenser. The still required to be mounted in such a way as to be readily accessible to some source of heat. Heating might be conducted by a steam jacket, an oil bath or by steam coils fitted internally, or the still might be arranged over a combustion chamber in which gas, oil or solid fuel was burned to produce the necessary heat. Above the surface of the liquid, when the still is fully charged, there must be sufficient free space to allow of frothing when boiling and there must be a wide vapour outlet leading to the fractionating column. From the foot of the fractionating column there must also be a draining pipe connected to the still to take the refluxing condensate from the column. To prevent vapours passing from the column by this pipe it is necessary to seal it with a U-bend or by continuing the pipe through the crown of the still to a point near the very bottom, so that the open end will be constantly under liquid during distillation. In addition to these fittings, such auxiliaries as pressure gauges, thermometers, safety valve, manhole door and dip cock for ascertaining the level of the liquid inside are necessary.

In the stills at the Provan Chemical Works, manhole doors have been fitted at the bottom as well as at the top. This step has made for much greater safety during cleaning operations. The requirements of a fractionating column are that there should be very intimate contact of ascending vapour and descending liquid and that the latent heat possessed by ascending vapours be used to do useful work on descending liquids and not be lost to the external atmosphere. Packed columns have the advantage of giving very little back pressure; their chief disadvantage is the danger of channelling or choking and the only cure is to remove the entire packing and repack. The disadvantages of columns fitted with perforated plates are that the quantity of liquid held in the column varies with the speed of distillation and the size of the holes changes from the original, either due to corrosion or due to scaling up with solid deposit. What is now regarded as the most efficient type is a column fitted with bubbling hood plates.

The prevention of condensation throughout the length of the column is achieved by thorough lagging. The reflux effect is obtained by means of a partial reflux condenser or dephlegmator or by means of a controlled reflux condenser. The dephlegmator is simply a condenser, the cooling water supply to which is controlled in such a way that a certain proportion of the total vapour rising from the column is condensed and returned while the main portion passes forward to the main condenser of the system. In the controlled reflux condenser the whole of the vapour coming from the column is condensed in a water condenser and the condensate passes to a measuring or metering box from which the operator may feed back to the top of the column whatever proportion of the condensate he considers necessary, and again the remaining portion passes forward as distillate.

Advantages and Disadvantages

Mr. Eadie discussed the relative merits of continuous and discontinuous distillation. In the continuous process there is, as a rule, a reduced fuel consumption, the losses through bad manipulation of the liquids are reduced, the wear and tear of the plant is less, and smaller quantities of material to be distilled are exposed to the heating source and the time of exposure is less. Large volumes may be dealt with in unit time and consequently process labour costs are generally less. The distillates coming from predetermined points on the fractionating column do not vary in quality except within narrow limits, and there are no intermediate fractions of distillate requiring redistillation.

The disadvantages of continuous working included much higher initial cost, and if the continuity of the process is upset much damage may be done before the process can be stopped. Shutting down and starting up is expensive. The fact that distillates produced are of constant quality becomes a disadvantage often, when market requirements change, and the plant is not flexible enough to allow of the new requirement being produced without expensive alterations in design. The fact that there are no intermediate fractions requiring redistillation generally means that the fractionation on the whole is not so clean cut as in the discontinuous operation. While there is fuel saving for heating purposes, the cost of power to keep the liquids in continuous motion must be added. The continuous plant requires attention from more skilled labour than does the discontinuous plant.

In conclusion, Mr. Eadie dealt with products obtained by the distillation of coal tar and by means of lantern slides showed examples of typical plant used in tar distillation.

Czechoslovak Sulphur Market

IMPORTED elemental sulphur and pyrites and domestic pyrites supply the Czechoslovak sulphur requirements. Chief consumers are the wood-pulp mills and the two ultramarine factories of Prague. Sulphur imports were 9,300 metric tons in 1929, 6,900 tons in 1930, and averaged 7,900 tons annually for 1930 to 1933 inclusive. The chief suppliers were the United States and Italy.

Letters to the Editor

The Editor welcomes expressions of opinion and fact from responsible persons for publication in these columns. Signed letters are, of course, preferred, but where a desire for anonymity is indicated this will invariably be respected. From time to time letters containing useful ideas and suggestions have been received, signed with a nom-de-plume and giving no information as to their origin. Correspondence cannot be published in THE CHEMICAL AGE unless its authorship is revealed to the Editor.

Light Week-end Reading

SIR,—The "thrillers" investigated by "Northerner" of the "Yorkshire Post," and referred to in THE CHEMICAL AGE last week, were not discovered in the library of the Huddersfield Technical College but in the Report of the Principal at the recent prize distribution. The titles quoted are those of the year's publications of the Coal-Tar Colour Chemistry Research Department, which is actively engaged in research in aromatic organic chemistry under the direction of Dr. H. H. Hodgson. The average journalist, in his usual hurry, generally fails to convey to the public the real meaning of scientific work, but it is not often that a stupid blunder like this is carried so far.—Yours faithfully,

ERNEST W. SMITH.
Research Assistant.

Colour Chemistry Department.,
Huddersfield Technical College.

Fatty Acid Distillation

SIR,—In your issue of December 29 an article by Professor Hilditch referred to the fact that distilled fatty acids are more and more finding application in Germany for soap manufacture, and added that distillation plants such as those of the Wecker process were employed for the manufacture of these fatty acids. We should like to point out, however, that the Wecker is a continuous distillation process and continuous distillation has not been found particularly suitable in actual practice.

The Lurgi Gesellschaft fuer Waermetechnik, m.b.H., Frankfurt-am-Main, whom we represent in this country, have supplied quite a number of high-vacuum fatty acid distillation plants on the Continent, whilst they are also being used in the United States and in this country. This plant works semi-continuously. Normally speaking, a soap factory has to treat several different types of crude fatty acids and with a semi-continuous plant the distillation of a new crude fatty acid can be commenced immediately after the previous batch has been put through. There is only an interval of about half an hour to enable the pitch to be run off from the still under vacuum. It is also possible to run Lurgi plants continuously; but this only comes into question when very large quantities of the same crude fatty acid have to be handled.—Yours faithfully,

JOHN ROLLAND AND CO., LTD.
W. J. GORDON,
Managing Director.

Abbey House,
2 Victoria Street, S.W.1.

Grain Size

SIR,—With reference to your editorial note on "Grain Size" in THE CHEMICAL AGE of January 19, the "Fineness Modulus" system may be of interest to your readers who from time to time have to report the result of screen tests which admittedly are difficult to compare without some common term of reference. During 1918, Duff Abrams, in Bulletin 1 of the Structural Materials Research Laboratory, Chicago, gave a full account of his work on the "Design of Concrete Mixtures" and he studied different methods of proportioning, one of which was based on the sieve analysis of the aggregates. The experimental work gave rise to what he termed the "fineness modulus" of the aggregate, a function which furnished a method of measuring the size and grading of the materials in use.

The sieves selected, of square mesh wire cloth, were the equivalent of the now existing British standard test sieves—1½ in., ¾ in., ⅜ in., 3/16 in., 7, 14, 25, 52, and 100. Each sieve had a clear opening, half that of the preceding one, and the sieve analysis is expressed in terms of the percentages of material by volume or weight coarser than each sieve. The sum of the percentages in the sieve analysis of the material divided by 100 is the "fineness modulus." Obviously, the same series of sieves must be used for every determination, although there is no reason why the requirements of any particular industry should not be met by the introduction of half-size sieves which would give a greater range of separation but, of course, a different standard of comparison. The "fineness modulus" may be considered as an abstract number; it is, in fact, a summation of volumes of material.

Full details of Abrams's system may be obtained from the publication referred to, but a few typical examples quoted by him will serve to illustrate the procedure :—

Range in Size.	Fineness Modulus.	100	52	25	14	7	3/16"	⅜"	¾"	1½"
0—14	2.16	95	84	37	0	—	—	—	—	—
0—3/16"	3.06	96	90	62	40	18	0	—	—	—
0—⅜"	4.26	96	91	83	71	54	31	0	—	—
0—¾"	5.24	98	96	91	83	71	54	31	0	—
0—1½"	6.04	99	98	95	90	81	68	49	24	0
0—1½"	6.82	100	100	99	98	94	86	68	37	0

All sieves in the series below the maximum size must be used for every test, even although 100 per cent. is retained by the finer meshes. This is important. A reading of the "fineness modulus" then gives a clear indication of the nature of the grain sizes in total and it will be seen on trial that a very large number of size distributions can give the same "fineness modulus."

The utility of the method is generally in connection with products of a similar nature. Finer sieves might likewise be introduced but always bearing the same ratio to each other, but departure from the original system should not be made except by agreement. Screen tests made with other sieves, providing their apertures are known, may be converted to this system by plotting and interpolation. A logarithmic plot for this purpose is the most convenient. Another great advantage is the readiness with which the "fineness modulus" of mixtures may be calculated by the following simple formula :—

$$p = 100 \frac{A - B}{A - C}$$

Where p is the percentage of finer material; A, fineness modulus of the coarser material; B, fineness modulus of the final mixture; C, fineness modulus of the finer material. British standard test sieves 1½ in. and ¾ in. are perforated plate instead of wire.—Yours faithfully,

A. V. HUSSEY.
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Arsenic in Sulphur

SIR,—I am much interested in the questions with regard to the arsenic content of sulphur raised in THE CHEMICAL AGE of January 5, under the heading "Sulphur is Facing a Crisis." You say that "in Germany sulphur containing 0.05 per cent. of arsenic produced at home sells readily to industry and for a higher price than the imported article containing less than 0.005 per cent.; we have ourselves seen this high arsenic sulphur on sale to the public in chemists' shops in Germany." As far as I am aware, practically all the elementary sulphur produced in Germany is recovered from coal and coke oven gases. I should hardly have thought that sulphur from these sources could contain so much as 0.05 per cent. of arsenic, which is equivalent to 500 parts per million. In England, sulphur is recovered from this source in the form of spend oxide, which seldom contains more than 0.01 per cent. of arsenic, and it is generally believed that most of this arises from the iron oxide used in the recovery process. It is difficult to see, therefore, why sulphur obtained from coal in Germany should contain so much more arsenic than sulphur from the same source in England.

You raise the question of the importance of the arsenic content of sulphur. It is perfectly true that sulphur with a high arsenic content is not injurious to health; in fact, arsenic sulphide itself is quite harmless and can be handled or even swallowed with impunity. This is presumably because arsenic sulphide is an extremely insoluble material and is not converted in the human body into soluble arsenic compounds. On the other hand, sulphur containing perceptible proportions of arsenic may become a source of great danger when it is used as a raw material in processes which require that the sulphur should first be burned. When such sulphur is burned, the arsenic is converted into arsenious oxide which is, as is well known, extremely poisonous.

Arsenical sulphur therefore can only safely be used either for purposes which do not require that it should be burned, or for conversion into SO_2 or sulphuric acid in circumstances in which the presence of arsenic is unimportant. For the whole latter field, *i.e.*, the conversion into SO_2 or sulphuric acid, pyrites is equally satisfactory and is much cheaper than sulphur. It is clear therefore that for this particular market arsenical sulphur is not likely to find favour.

The uses which do not require that the sulphur should be burned, such as vulcanisation of rubber, preparation of fungicides, insecticides, etc., do, in fact, consume considerable quantities of sulphur. Sulphur is required on a large scale for the manufacture of sulphur dioxide and sulphuric acid which may be used in the preparation of food products, for which purposes the sulphur must, of course, be practically free from arsenic. If arsenical sulphur is to be used, therefore, it must be rigorously segregated from non-arsenical native sulphur, and we should be faced with the necessity of handling at least two grades and of ensuring that the arsenical grade should never be used for purposes requiring conversion into sulphur dioxide or sulphuric acid which might be used directly or indirectly for preparation of food products.

It has to be borne in mind that the native sulphur of America and Sicily is practically arsenic free. You mention a figure of 0.005 per cent. of arsenic for this imported sulphur, which is equivalent to about 50 parts arsenic per million. I have always understood that imported sulphur containing more than three parts of arsenic per million is practically unknown. Since the supply of native sulphur far exceeds the world's present requirements, there is no reasonable likelihood that a demand will rise for arsenical sulphur.

On the other hand, there is no reason why producers of sulphur from sources other than native sulphur should not meet this latter on its own ground with respect to quality and to arsenic content. It is possible to obtain sulphur by metallurgical and chemical processes practically free from all impurities other than an arsenic content not exceeding three parts per million (0.0003 per cent.). The Rio Tinto Co., for example, is making in Spain a sulphur the arsenic content of which does not exceed this limit, and which is equal in purity to the most carefully prepared fine chemicals and synthetic products of the present time. The position then amounts to this. For those purposes for which sulphur is burned, but for which the presence of arsenic is of no importance, neither native sulphur nor manufactured sulphur can compete with sulphur in the form of pyrites. There is never likely to be a wide market for arsenical sulphur. For general purposes for which sulphur has hitherto been required arsenic free, and for which it is unlikely that arsenical sulphur will ever be used in large quantities, the manufactures of sulphur from metallurgical or other sources should be in a position to offer a product as free from arsenic as native sulphur and superior to native sulphur in other respects.

If we are to look for home sources for production of sulphur, there is no reason why we should not be able to obtain, as in so many other cases, a product superior to the imported material.—Yours faithfully,

S. I. LEVY.

4 Elm Court, Temple, E.C.4.

Chemical Centenaries in 1935

ON August 28, 1835, was born John Attfield, F.R.S., who, from 1862 to 1896, was professor of practical chemistry to the Pharmaceutical Society of Great Britain and was author of the " Manual of Chemistry," which passed through seventeen editions in thirty-one years. From 1854 to 1862 Attfield was chemical demonstrator at St. Bartholomew's Hospital and lecture and research assistant to Dr. Frankland, who was professor of chemistry at that hospital. He wrote most of the chemical articles in Brande's " Dictionary of Art, Science and Literature." When he took his university degree, in 1862, his thesis was an account of an original research on the spectrum of carbon. He was a member of the Council of the Chemical Society and one of the founders of the Institute of Chemistry. He edited the fourth "British Pharmacopœia." In 1896 he retired into private practice as a chemical analyst and consultant.

* * *

George Carey Foster, F.R.S., was another celebrity who studied chemistry under Bunsen. He was born on October 20, 1835, and became professor of physics at University College, London. To the great " Dictionary of Chemistry, and the Allied Branches of other Sciences," he contributed articles on matters of general chemical theory. Foster was responsible for the opening of the Physical Laboratory of University College. In 1856 he was elected a Fellow of the Chemical Society.

* * *

On September 6, 1835, August Dupré, F.R.S., was born at Mainz. He studied under Bunsen and came to London as lecturer on chemistry to the Westminster Hospital Medical School, becoming subsequently a consulting chemist and publishing papers on chemistry, food analysis and water. In 1871, he was appointed chemical referee to the Medical Department of the Local Government Board; in 1872, chemical adviser to the Explosive Department of the Home Office; and in 1873, public analyst for Westminster. In 1886 he published (in conjunction with Wilson Hake) " A Short Manual of Chemistry." In 1877-8 he was president of the Society of Public Analysts.

Sir Julius Vogel was born on February 24, 1835. He began life as a student at Dr. Percy's metallurgical laboratory at the Royal School of Mines, studying " the chemical art of assaying," and testing of gold and silver. He went to Australia with the intention of utilising his knowledge in the newly-opened goldfields, but ultimately became Premier and Agent-General for New Zealand.

* * *

The most eminent of the foreign chemists born in 1835 was Adolf von Baeyer (October 31), who, in 1860, became chemical demonstrator at the Applied Sciences Academy, Berlin. He was called to the Chair of Chemistry at Munich, when Liebig died. Baeyer was famous for his researches in organic chemistry, especially in connection with the action of the aldehydes, the discovery of a green colouring matter (coraleine), a red colouring matter (eosine), and the discovery of indol, the base of indigo. Another famous German chemist born in 1835 was Johannes Wislicenus. He became a professor at Leipzig in 1885 after having taught chemistry in New York and Zurich.

* * *

On March 20, 1735, was born the great Swedish chemist, Torbern Olof Bergman, professor of chemistry at Upsala, who published in 1767 his famous thesis on the manufacture of alum. It was Bergman who first observed the properties of an acid in air, and first described the characteristics of nickel. He discovered the presence of sulphuretted hydrogen in mineral waters. Above all, his was the discovery that the differences between wrought iron and steel were due to the presence of small quantities of carbon (which he called plumbago).

* * *

There are two outstanding names in the tercentenaries of the year. There was born in 1635, one Johann Joachim Becher, whose " Physica Subterranea " was the first attempt made to bring physics and chemistry into close relation. In England, in the same year, Robert Hooke was born. Among Hooke's early inquiries were researches on the nature of air, and its function in respiration and combustion.

Notes and Reports from the Societies

British Association of Chemists

Chemistry and Crime

In a lecture on "Crime and Chemistry" read before the British Association of Chemists at Liverpool University, on January 23, Mr. H. T. F. Rhodes said that secret inks were usually chemicals which were used in solution in water like ordinary ink. They were invisible when applied to the paper but they showed up when the paper was treated with another chemical which produced a coloured compound with the secret ink. Vacuum cleaners were now an essential of every police laboratory, being fitted to collect dust which had to be examined chemically and microscopically. Ultra-violet light, however, said Mr. Rhodes, had the largest number of uses in criminal investigation. Secret writing made by criminals could generally be made visible under ultra-violet light, while stains upon garments or other material which were not visible to the naked eye were often revealed with surprising clearness under the rays. The spectroscopic use of ultra-violet light was the most recent development, and it was possible that a method might be found for distinguishing between animal and human blood to replace the rather complicated precipitin reaction at present in use. In conclusion, Mr. Rhodes said that it was a great pity that a fully equipped department of scientific police was not attached to Scotland Yard. He thought that faculties of criminology and police technology should be set up in the universities and that the higher grades of the police ought to undergo a systematic course of training in the theoretical and practical aspects of the science of criminal investigation.

Manchester Section : Professional Societies and Society

Speaking before the British Association of Chemists (Manchester Section) in Manchester on January 23, Mr. R. Brightman discussed the place of professional organisations in society. The profession of chemistry, he said, is among the most numerous of the scientific professions and even now is comparatively well organised compared with some of the others. It is clear that modern life is grouping itself into professions to an increasing extent, in much the same way as ancient society was grouped and co-ordinated by crafts. The antithesis to a profession is an avocation based upon customary activities and modified by the trial and error of individual practice and one of the gravest dangers which besets a profession is that of degeneration into such a craft through adherence to routine and lack of reception to new ideas. Practice cannot be divorced from the theoretical understanding of a profession and the gradual establishment of closer relations between theory and practice is one of the marks of the development of the professions during the last two centuries. Professions emerged first in the eighteenth and nineteenth centuries as customary activities largely modified by detached strains of theory, professional influence from earliest times representing the continual lapse of intellect into instinct.

The charge that professional men do not grasp the essential features of the social and economic structure and the place of the professions in it may still be largely true, but has lost a good deal of its force in the last two years. The discussions provoked by the addresses of the late Sir Alfred Ewing, Professor Miles Walker, Sir Frederick Gowland Hopkins and others have done a good deal to stir the chemist along with other scientific workers to consider his place in society and the contribution which his profession might make to the solution of many pressing problems of to-day. What Bavink terms the philosophy of technology is spreading—the desire to see the most fitting means used for given purpose and the revolt against a narrow economic or financial conception of efficiency or fitness.

Besides this approach there is another which is well illustrated alike in Professor Whitehead's brilliant study "Adventures of Ideas" and in Professor Julian Huxley's "Scientific Research and Social Needs." Scientific workers have come more and more to realise that even in its narrowest sense scientific or professional work is not something entirely apart from the life of society. It cannot be truly isolated. It has to be integrated into the general life of the community, and in actual fact the direction and volume of scientific work are largely determined by the resources and outlook of the community, the social and economic conditions which surround it. It is only under the stimulus and inspiration of an active professional association, both powerful enough to afford adequate defence against victimisation and wise enough to restrain immature or premature policies, that the individual will feel himself able to play his part in moulding organisations and machinery whether in industry or society.

Regarding international organisations, the International Health League of the League of Nations may be mentioned as organising effective action against such diseases as malaria and leprosy, while there is evidently urgent need for the formulation of an international ethical code on the part of scientific workers towards preparation for war.

Another field to which professional associations of scientific men might well turn their attention is the study of structure of industrial units and organisations in relation to the service of industry and the community. Such organisations as the Institute of Industrial Administration, the Management Research Groups, the Department of Business Administration at the London School of Economics, the Industrial Health Research Board, the National Institute of Industrial Psychology, etc., are already dealing with special phases of industrial management or administration.

The ways in which professional associations can serve society, said Mr. Brightman, are only just being appreciated by a few. It is for these few to infect the general body of the profession with a sense of the opportunities and responsibilities which are theirs when professional duties and problems are approached from the point of view of life as a whole and not as merely a technical or scientific isolate.

Physical Society

Guthrie Lecture

The 20th Guthrie Lecture of the Physical Society was delivered at the Imperial College of Science and Technology, South Kensington, on February 1, by Professor Arthur H. Compton, of the University of Chicago. The subject of the lecture was "An Attempt to Analyse Cosmic Rays."

Professor Compton, who is at present Eastman Visiting Professor at Oxford University, is best known for his discoveries of the laws of interaction between radiation and free electrons and for the associated effect, called after him, which results in a modification in the quality of a beam of monochromatic radiation such as X-rays on passing through matter. It was for these discoveries that he was awarded the Nobel Prize for Physics in 1927. In recent years Professor Compton has turned his attention mainly to the investigation of the cosmic rays, those mysterious radiations which come into the earth's atmosphere from outside.

Institute of Metals

Annual General Meeting

The 27th annual general meeting of the Institute of Metals will be held at the Institution of Mechanical Engineers, London, on March 6 and 7. On Wednesday, March 6, the following papers will be presented for discussion: "Corrosion-Fatigue Properties of Duralumin With and Without Protective Coatings" (I. J. Gerard, M.Sc., and H. Sutton, M.Sc.); "Some Further Experiments on Atmospheric Action in Fatigue" (H. J. Gough, D.Sc., F.R.S., and D. G. Sopwith, B.Sc.Tech.); "The Effect of Five Years' Atmospheric Exposure on the Breaking Load and the Electrical Resistance of Non-Ferrous Wires" (J. C. Hudson, D.Sc., A.R.C.S.); "The ε, γ and β Phases of the System Cadmium-Silver" (P. J. Durrant, Ph.D.); "The Penetration of Steel by Soft Solder and other Molten Metals at Temperatures of not over 400° C." (L. J. G. Van Ewijk); "Type Metal Alloys" (Frances D. Weaver, B.Sc.); "The Constitution and Properties of Cadmium-Tin Alloys" (Professor D. Hanson, D.Sc., and W. T. Pell-Walpole, B.Sc.); "Some Properties of Tin Containing Small Amounts of Aluminium, Manganese or

Bismuth" (Professor D. Hanson, D.Sc., and E. J. Standford, B.Sc.).

On Wednesday evening the annual dinner and dance will be held at the Trocadero Restaurant, Piccadilly Circus, at 7 p.m, for 7.15 p.m.

Scottish Section : Manufacture of Alloys

SPEAKING before the Scottish section of the Institute of Metals on November 12, Mr. W. C. Devereux described the methods of manufacture of aluminium alloys and their influence on design. He stressed the co-operation that is necessary between the designer and the material supplier to effect good results and the necessity for the foundryman, foreman and supplier of the material to make themselves familiar with the requirements of the designer to satisfy the latter's needs. This calls for a great deal of specialising on the part of the supplier, and the requirements of the aircraft industry, in particular, are so important, and the results of design so dependent upon the quality of the material that there is no branch of industry where co-operation is so necessary and important.

Institute of Chemistry

January Examinations

THE Institute of Chemistry has issued its pass list for the January examinations as follows:

Examination in general chemistry for the Associateship: F. Duckworth, B.Sc., Technical College, Bradford; F. W. Elliston-Erwood, The Polytechnic, Regent Street; E. M. Gibbs, B.Sc., Battersea Polytechnic; J. Griffiths, B.Sc., Wigan and District Mining and Technical College; K. G. Haig, B.Sc., Sir John Cass Technical Institute; C. Hall, B.Sc., Wigan and District Mining and Technical College; W. T. Lunt, B.Sc., Central Technical College, Birmingham; F. Sealey, Central Technical College, Birmingham; E. Taylor-Austin, Central Technical College, Birmingham; W. P. Thistlethwaite, B.Sc., Northern Polytechnic; T. W. Tibbetts, Central Technical College, Birmingham.

Examinations for the Fellowship:—In general analytical chemistry: R. C. Chirnside, A. Winstanley, A.M.C.T.

Chemical Engineering Group

Visit to Paper Mills at Bristol

A JOINT meeting of the Chemical Engineering Group and the Bristol Section of the Society of Chemical Industry will be held on Thursday, February 7, when there will be a visit to the new mills of Keynsham Paper Mills, Ltd. (2.30 p.m.), followed by a meeting in the Chemical Department of the University (6.30 p.m.) when a paper on "Protective Metal Coatings" will be presented jointly by Mr. Stanley Robson, M.Sc., D.I.C., M.I.Chem.E., and Mr. P. Stacey Lewis, Ph.D., B.Sc., F.I.C. The paper will deal with protection against corrosion of industrial structures and containers, methods of appplying metal coatings, and their suitability.

Society of Chemical Industry

Jubilee Memorial Lecture

THE Jubilee Memorial lecture of the Society of Chemical Industry was delivered at Newcastle-upon-Tyne on January 15 by Dr. C. T. J. Cronshaw to a joint meeting of the local section of the Society and the Institute of Chemistry on "In Quest of Colour," the title used for a description of the history of the dyestuffs industry in this country.

The story of the original discovery of mauve and the more recent development of the vat dye have been frequently told, the speaker dwelt rather upon the decline of the British industry before 1914 and upon the more technical details of its resurrection. Allied to this, the lecturer presented a chronological account of the successive introductions of classes of dyestuffs, and traced the growing diversities of colour obtainable.

Wholesale Commodity Prices

Board of Trade Analysis

THE "Board of Trade Journal" for January 24 gives data for the construction of the new index number for wholesale commodity prices. The construction of an index number of wholesale prices involves the selection of a representative series of commodities and the assignment to these of "weights," in other words, the relative importance of each commodity represented in the index has to be settled according to some plan. The present Board of Trade index number of wholesale prices dates from the year 1920, and the weighting assigned to the various commodities is based upon the results of the First Census of Production.

In the chemicals and oil group, petroleum, which was assigned in 1920 a weight of 2, has shown a further expansion and is now assigned a weight of 3 on the old basis. Chemicals, oils and fats, and paint increased in relative importance between 1907 and 1924 from 7 to 9, and that increase was substantially maintained in 1930. The new index numbers for the chemicals and oils group show a fall in prices in 1931-33 compared with 1930 less than that of other industrial groups except coal and iron and steel.

Below are given the price indices for 1931 to 1934 in respect of chemicals and oils on the two plans of weighting:—

1931		1932		1933		1934	
1907	1930	1907	1930	1907	1930	1907	1930
85.3	89.8	77.7	90.7	81.9	90.3	85.0	87.4

New Index Numbers

The following table shows the new index numbers, averages for the the years 1930-34:—

	Jan.	Feb.	Mar.	Apr.	May	June
1930. Chemicals and oils	103.2	103.1	102.9	103.0	102.6	101.6
1931. ,, ,, ,,	93.5	91.8	90.1	89.6	89.8	88.6
1932. ,, ,, ,,	91.5	93.1	92.9	91.1	89.3	88.7
1933. ,, ,, ,,	91.5	90.7	89.9	88.8	90.6	90.8
1934. ,, ,, ,,	88.8	88.6	87.5	86.6	87.1	86.5

	July	Aug.	Sept.	Oct.	Nov.	Dec.
1930. Chemicals and oils	100.7	99.7	98.5	95.5	95.1	94.9
1931. ,, ,, ,,	88.5	86.5	87.2	89.7	91.0	91.4
1932. ,, ,, ,,	88.8	88.9	90.2	91.3	91.5	91.8
1933. ,, ,, ,,	90.9	90.0	89.9	89.6	90.4	90.0
1934. ,, ,, ,,	86.7	87.2	87.3	87.2	86.7	88.2

Dispute in the Salt Industry

Vote on Strike Action

THE Federation of Trade Unions of Salt Workers has decided to organise a ballot among the members to decide whether strike action shall be taken in connection with a dispute over the demands for the restoration of wage cuts made in 1931. More than two thousand salt workers are involved. Mr. R. D. Hodges, the secretary of the Salt Manufacturers' Association, stated on Wednesday that the principal manufacturers are already giving rates and conditions which the men's representatives have admitted are in some instances better than those of our competitors.

Mr. T. Bratt, secretary of the men's federation, stated that each of the branches represented in his federation had decided unanimously in favour of a strike ballot. That action was the only course open to them. The Salt Manufacturers' Association was formerly affiliated with the Chemical and Allied Industries Joint Industrial Council, but had seceded from that body, so that negotiations through the Joint Council were impossible. A request for a restoration of the cuts had been refused. The cuts meant a reduction of 2s. 6d. a week to time workers and 5 per cent. for piece workers.

In addition to the national dispute a local dispute has arisen at Winsford, and 118 employees of George Hamlett and Sons, Ltd., salt manufacturers, of Winsford, came out on strike on Wednesday demanding a week's holiday with pay and the reinstatement of four men who have been dismissed. Negotiations have taken place between the secretary of the Winsford Salt Makers' Association, Mr. T. Bratt, and the firm.

Continental Chemical Notes

Switzerland

A NEW PHARMACEUTICAL MANUFACTURING FIRM has been formed at Nyon, under the name of Zyma S.A., with a capital of 100,000 Swiss francs.

Germany

NUCLEAR SUBSTITUTION OF FLUORINE in aromatic organic compounds can be effected by diazotisation and decomposition in the presence of an excess of anhydrous hydrofluoric acid (German Pat. 600,706).

A NEW PROCESS FOR PREPARING GRAPHITE FOIL and mirrors is based upon a special colloidal solution of graphitic acid, which is gradually transformed into graphite at a temperature of 100 to 200° C. under certain conditions which ensure the formation not only of lustrous layers but also of a mirror-like surface (" Chemiker-Zeitung ").

THE STATE MATERIAL TESTING INSTITUTE at Berlin-Dahlem has recently examined the possibility of sulphur present as sulphide in blast furnace slag rendering this material unsuitable as a concrete ingredient, particularly for under-water structures. These tests showed that blast furnace slags do not impart any appreciable weight of sulphide to water in which they are in contact and that oxidation under these conditions is also negligible. The risk of damage to mortar and cement by oxidation of the sulphide present in blast furnace slag is therefore regarded as improbable.

IN CONNECTION WITH THE GRANT OF A LICENCE by the Bergin A.G. for Wood Hydrolysis to the State Alcohol Monopoly, the former has received permission to produce 120,000 hectolitres of alcohol during the next six years, the whole of which will be taken over by the Alcohol Monopoly. A similar contract has been concluded between the Bergin A.G. and the I. G. Farbenindustrie in respect of wood sugar. In view of these developments the proposed enlargement of the Mannheim works will now be pushed forward with a view to completion by the middle of this year. An initial capacity of 6,000 to 7,000 tons of alcohol and crystallised grape sugar is anticipated (" Chemische Industrie ").

France

AS A SEQUEL TO THE AGREEMENT between the Compagnie des Mines de Béthune and the French Government in connection with coal liquefaction, a new company has been formed with a share capital of 3.8 million francs under the name of Carburants Synthetiques des Mines de Béthune.

NEGOTIATIONS ARE IN PROGRESS between the Air Liquide and the Consortium des Lampes Electriques with a view to producing xenon- and krypton-filled lamps which are believed to be more economical in use than existing gas-filled lamps.

Poland

THE BORUTA CO. OF ZGIERZ, already a large producer of beta-naphthol, has now embarked upon the manufacture of alpha-naphthol.

LITHOPONE FOR THE OILCLOTH INDUSTRY is now being made by the Hugo Smelting Co. According to the " Chemische Industrie," Poland now produces a complete range of lithopone grades.

STATE-CONTROLLED OPIUM MANUFACTURE is to be commenced this year by a new process already tried out in Hungary.

Personal Notes

MR. GEORGE HAROLD WINTERBOTTOM, of Horton, Northampton, a director of British Enka Artificial Silk Co., who died on November 15, left estate valued at £1,049,482.

MR. ROBERT PURVES ADAM, of Galashiels, who for many years carried on an ammonia manufacturing works at Galashiels Gasworks, has died at the age of 70.

LORD MELCHETT has been elected joint Master of the Oakley Hunt in succession to Capt. E. Arkwright, who died in the hunting field a few months ago.

MR. JAMES CRAIG, of Uddingston, managing director of John S. Craig and Co., Ltd., oil and paint manufacturers, Glasgow, has died at the age of 86.

MAJOR GEOFFREY H. KITSON, a director of the Monk Bridge Iron and Steel Co., Ltd., was unanimously elected president of Leeds Chamber of Commerce on January 29.

MR. WILLIAM JAMES PARKER, general manager for the Salt Union, Ltd., at Winsford, died on January 27 in a Manchester nursing home, aged sixty-three.

PROFESSOR ARTHUR LAPWORTH has resigned the Sir Samuel Hall Professorship of Chemistry and the Directorship of the Chemical Laboratories at the University of Manchester as from September next.

MR. ARTHUR T. MOORHOUSE, of the University of London, who holds the diploma for bio-chemical analysis of the Pharmaceutical Society, has been appointed assistant lecturer in Pharmacy at Bradford Technical College.

MR. THOMAS WATSON, who joined the metallurgical department of Lukens Steel Co., Coalsville, United States, in August, 1931, has been appointed development and service metallurgist.

MR. J. S. LAKE, F.C.A., has been elected chairman of the board of R. W. Greeff and Co., Ltd., and Messrs. A. J. Thompson and A. F. Butler have been appointed joint managing directors.

MR. F. K. KIELBERG has accepted the invitation of the directors to be a member of the boards of the Ely Beet Sugar Factory, Ltd., the Ipswich Beet Sugar Factory, Ltd., and the King's Lynn Beet Sugar Factory, Ltd.

MR. PHILIP SLIGH WOOD, merchant and chemical manufacturer, of South Shields, who died on September 23, left £27,762.

MR. THOMAS HALBERT, of Saltcoats, Ayrshire, analytical chemist, who died on November 11 last, left estate valued at £12,798.

DR. F. I. PITT-TAYLOR, an acknowledged authority on chemistry, and widely known for his extreme purist attitude towards the use of the English language, has died at Blackpool.

PROFESSOR FRITZ HABER, the German chemist, died twelve months ago. A ceremony in commemoration of the anniversary of his death was held in Berlin this week in defiance of an official prohibition.

Alkali Works Regulation Act

Public Inquiry into Draft Order

BY the Public Health (Smoke Abatement) Act, 1926, power is given to the Minister of Health to make Orders extending the provisions of the Alkali, etc., Works Regulation Act, 1906. In the exercise of this power an Order was issued in 1928 (the Alkali, etc., Works Order, 1928) extending the list of noxious or offensive gases mentioned in the Act of 1906, and extending the list of scheduled works requiring registration under the Act. A draft Order has now been prepared further extending the list of such gases and works. Copies of this draft Order may be seen at the Offices of the Ministry of Health, Whitehall, London, S.W.1, or they may be purchased from H.M. Stationery Office.

A public inquiry will be held into the subject matter of the draft Order by Mr. W. A. Damon, Chief Inspector, Alkali, etc., Works, at the Offices of the Ministry of Health, Whitehall, London, S.W.1 (St. James's Park Entrance, Office of Works) on Wednesday, February 6, at 11 a.m. Any person interested in the subject matter of the inquiry may attend and give evidence.

Weekly Prices of British Chemical Products

Review of Current Market Conditions

THERE are no price changes to report in the markets for general heavy chemicals, rubber chemicals, wood distillation products, pharmaceutical and photographic chemicals, perfumery chemicals, essential oils and intermediates. In the coal tar products section B.S.I. specification creosote shows a slight increase in price. Unless otherwise stated the prices below cover fair quantities net and naked at sellers' works.

LONDON.—Prices continue steady and firm, and there is a fair general demand. There is no change to report from last week in coal tar products. Prices continue firm.

MANCHESTER.—In most quarters rather dull conditions have been reported during the past week regarding the demand for chemicals on the Manchester market. Fresh buying interest in respect of the majority of products has been on a restricted scale, and the business placed this week has, in most instances, been confined to deliveries over comparatively short periods and has not amounted to a great deal in the aggregate. On the other hand, whilst there has been little appreciable expansion, there has been no falling away in the quantities of the leading heavy chemicals covered by delivery specifications against contracts, and the general steadiness of the market has been fully maintained, indications of even slight easiness affecting only a few sections. Apart from creosote oil and one or two other lines, business in which continues fairly active, conditions in the case of the by-products are disappointing, and the fear of lower prices is effectively limiting transactions to what is virtually a hand-to-mouth scale.

SCOTLAND.—The Scottish heavy chemical market continues to show considerable improvement with a greater demand for bulk quantities.

General Chemicals

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

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

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

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

ACID, CITRIC.—11¾d. per lb. less 5%. MANCHESTER : 11¾d.

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

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

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

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

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

ACID, OXALIC.—LONDON : £47 17s. 6d. to £57 10s. per ton, according to packages and position. SCOTLAND : 98/100%, £48 to £50 ex storee. MANCHESTER : £48 10s. to £55 ex store.

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

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

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

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

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

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

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

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

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

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

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

ANTIMONY SULPHIDE.—Golden, 6¾d. to 1s. 2d. per lb.; crimson, 1s. 5d. to 1s. 7d. per lb., according to quality.

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

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

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

BARYTES.—£6 10s. to £8 per ton.

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

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

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

CADMIUM SULPHIDE.—2s. 5d. to 2s. 9d.

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

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

CARBON BLACK.—3⅝d. to 4⅞d. per lb. LONDON : 4½d. to 5d.

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

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

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

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

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

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

DIPHENYLGUANIDINE.—2s. 2d. per lb.

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

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

LAMPBLACK.—£45 to £48 per ton.

LEAD ACETATE.—LONDON : White, £34 10s. per ton; brown, £1 per ton less. SCOTLAND : White crystals, £33 to £35; brown, £1 per ton less. MANCHESTER : White, £34; brown, £31 to £32.

LEAD NITRATE.—£27 10s. per ton.

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

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

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

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

METHYLATED SPIRIT.—61 O.P. industrial, 1s. 5d. to 2s. per gal.; pyridinised industrial, 1s. 7d. to 2s. 2d.; mineralised, 2s. 6d. to 3s. Spirit 64 O.P. is 1d. more in all cases and the range of prices is according to quantities. SCOTLAND : Industrial 64 O.P., 1s. 9d. to 2s. 4d.

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

NICKEL SULPHATE.—£49 per ton d/d.

PHENOL.—7¾d. to 8¼d. per lb. for delivery up to June 30.

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

POTASSIUM BICHROMATE.—Crystals and Granular, 5d. per lb. less 5% d/d U.K. Discount according to quantity. Ground, 5¼d. LONDON : 5d. per lb. less 5%, with discounts for contracts. SCOTLAND : 5d. d/d U.K. or c.i.f. Irish Ports. MANCHESTER : 5d.

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

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

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

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

POTASSIUM PERMANGANATE.—LONDON : 9¾d. per lb. SCOTLAND : B.P. crystals, 9d. MANCHESTER : B.P., 10¼d.

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

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

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

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

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

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

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

SODIUM BICHROMATE.—Crystals cake and powder 4d. per lb. net d/d U.K. discount according to quantity. Anhydrous, 5d. per lb. LONDON: 4d. per lb. less 5% for spot lots and 4d. per lb. with discounts for contract quantities. MANCHESTER: 4d. per lb. basis. SCOTLAND: 4d. delivered buyer's premises with concession for contracts.
SODIUM BISULPHITE POWDER.—60/62%, £18 10s. per ton d/d 1-cwt. iron drums for home trade.
SODIUM CARBONATE (SODA CRYSTALS).—SCOTLAND: £5 to £5 5s. per ton ex quay or station. Powdered or pea quality 7s. 6d. per ton extra. Light Soda Ash £7 ex quay, min. 4-ton lots with reductions for contracts.
SODIUM CHLORATE.—£32 10s. per ton.
SODIUM CHROMATE.—4d. per lb. d/d U.K.
SODIUM HYPOSULPHITE.—SCOTLAND: Large crystals English manufacture, £9 5s. per ton ex stations, min. 4-ton lots. Pea crystals, £14 10s. ex station, 4-ton lots. MANCHESTER: Commercial, £10 5s.; photographic, £15.
SODIUM META SILICATE.—£16 per ton, d/d U.K. in cwt. bags.
SODIUM IODIDE.—B.P., 6s. per lb.
SODIUM NITRITE.—LONDON. Spot, £18 to £20 per ton d/d station in drums.
SODIUM PERBORATE.—LONDON: 10d. per lb.
SODIUM PHOSPHATE.—£13 per ton.
SODIUM PRUSSIATE.—LONDON: 5d. to 5½d. per lb. SCOTLAND: 5d. to 5¾d. ex store. MANCHESTER: 5d. to 5½d.
SULPHUR.—£9 15s. to £10 per ton. SCOTLAND: £8 to £9.
SODIUM SILICATE.—140° Tw. Spot £8 per ton. SCOTLAND: £8 10s.
SODIUM SULPHATE (GLAUBER SALTS).—£4 2s. 6d. per ton d/d SCOTLAND: English material £3 15s.
SODIUM SULPHATE (SALT CAKE).—Unground spot, £3 12s. 6d. 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, £8 15s. d/d station in bags.
SULPHATE OF COPPER.—MANCHESTER: £14 to £14 5s. per ton f.o.b.
SULPHUR CHLORIDE.—5d. to 7d. per lb., according to quality.
SULPHUR PRECIP.—B.P. £55 to £60 per ton according to quantity. Commercial, £50 to £55.
VERMILION.—Pale or deep, 3s. 11d. to 4s. 1d. per lb.
ZINC CHLORIDE.—SCOTLAND: British material, 98%, £18 10s. per ton f.o.b. U.K. ports.
ZINC SULPHATE.—LONDON: £12 per ton. SCOTLAND: £10 10s.
ZINC SULPHIDE.—11d. to 1s. per lb.

Coal Tar Products

ACID, CARBOLIC.—Crystals, 7¾d. to 8¼d. per lb.; crude, 60's, 1s. 1½d. to 2s. 2½d. per gal. MANCHESTER: Crystals, 7¾d. per lb.; crude, 1s. 11d. to 2s. per gal. SCOTLAND: 60's, 2s. 6d. to 2s. 7d.
ACID, CRESYLIC.—90/100%, 1s. 8d. to 2s. 3d. per gal.; pale 98%, 1s. 6d. to 1s. 7d.; according to specification. LONDON: 98/100%, 1s. 4d.; dark, 95/97%, 1s. SCOTLAND: Pale, 99/100%, 1s. 3d. to 1s. 4d.; dark, 97/99%, 1s. to 1s. 1d.; high boiling acid, 2s. 6d. to 3s.
BENZOL.—At works, crude, 9d. to 9½d. per gal.; standard motor, 1s. 3½d. to 1s. 4d.; 90%, 1s. 4d. to 1s. 4½d.; pure, 1s. 7½d. to 1s. 8d. LONDON: Motor, 1s. 5½d. SCOTLAND: Motor, 1s. 6½d.
CREOSOTE.—B.S.I. Specification standard, 5¼d. to 5½d. per gal, f.o.r. Home, 3¾d. d/d. LONDON: 4½d. f.o.r. North; 5d. London. MANCHESTER: 4½d. to 5¼d. SCOTLAND: Specification oils, 4d.; washed oil, 4¼d. to 4¾d.; light, 4½d.; heavy, 4¼d. to 4½d.
NAPHTHA.—Solvent, 90/160%, 1s. 6d. to 1s. 7d. per gal.; 95/160%, 1s. 7d.; 99%, 11d. to 1s. 1d. LONDON: Solvent, 1s. 2½d. to 1s. 3½d.; heavy, 11d. to 1s. 0½d. f.o.r. SCOTLAND: 90/160%, 1s. 3d. to 1s. 3½d.; 90/190%, 11d. to 1s. 2d.
NAPHTHALENE.—Purified crystals, £10 per ton in bags. LONDON: Fire lighter quality, £3 to £3 10s.; 74/76 quality, £4 to £4 10s.; 76/78 quality, £5 10s. to £6. SCOTLAND: 40s. to 50s.; whizzed, 70s. to 75s.
PITCH.—Medium soft, 48s. per ton. LONDON: 45s. per ton, f.o.b. East Coast port.
PYRIDINE.—90/140, 6s. 9d. to 2s. 6d. per gal.; 90/180, 2s. 3d.
TOLUOL.—90%, 1s. 10d. to 1s. 11d. per gal.; pure, 2s. 2d. to 2s. 3d.
XYLOL.—Commercial, 1s. 11d. to 2s. per gal.; pure, 2s. 1d. to 2s. 2d.

Intermediates and Dyes

ACID, BENZOIC, 1914 B.P. (ex Toluol).—1s. 9½d. per lb.
ACID, GAMMA.—Spot, 4s. per lb. 100% d/d buyer's works.
ACID, H.—Spot, 2s. 4½d. per lb. 100% d/d buyer's works.
ACID NAPHTHIONIC.—1s. 8d. per lb.
ACID, NEVILLE AND WINTHER.—Spot, 3s. per lb. 100%.
ACID, SULPHANILIC.—Spot, 8d. per lb. 100% d/d buyer's works.
ANILINE OIL.—Spot, 8d. per lb., drums extra, d/d buyer's works.
ANILINE SALTS.—Spot, 8d. per lb. d/d buyer's works, casks free.
BENZALDEHYDE.—Spot, 1s. 8d. per lb., packages extra.
BENZIDINE BASE.—Spot, 2s. 5d. per lb., 100% d/d buyer's works.
BENZIDINE HCL.—2s. 5d. per lb.
p-CRESOL 34-5° C.—2s. per lb. in ton lots.
m-CRESOL 98/100%.—2s. 3d. per lb. in ton lots.
DICHLORANILINE.—1s. 11½d. to 2s. 3d. per lb.
DIMETHYLANILINE.—Spot, 1s. 6d. per lb., package extra.
DINITROBENZENE.—8d. per lb.
DINITROTOLUENE.—48/50° C., 9d. per lb.; 66/68° C., 01½d.
DINITROCHLORBENZENE, SOLID.—£72 per ton.
DIPHENYLAMINE.—Spot, 2s. per lb., d/d buyer's works.
α-NAPHTHOL.—Spot, 2s. 4d. per lb., d/d buyer's works.
β-NAPHTHOL.—Spot, £78 15s. per ton in paper bags.
α-NAPHTHYLAMINE.—Spot, 11½d. per lb., d/d buyer's works.
β-NAPHTHYLAMINE.—Spot, 2s. 9d. per lb., d/d buyer's works.
o-NITRANILINE.—3ss. 11d. per lb.
m-NITRANILINE.—Spot, 2s. 7d. per lb., d/d buyer's works.
p-NITRANILINE.—Spot, 1s. 8d. per lb., d/d buyer's works.
NITROBENZENE.—Spot, 4½d. to 5d. per lb.: 5-cwt. lots, drums extra.
NITRONAPHTHALENE.—9d. per lb.; P.G., 1s. 0½d. per lb.
SODIUM NAPHTHIONATE.—Spot, 1s. 9d. per lb.
o-TOLUIDINE.—9½d. to 11d. per lb.
p-TOLUIDINE.—1s. 11d. per lb.

Wood Distillation Products

ACETATE OF LIME.—Brown, £9 to £10. Grey, £12 to £14. Liquor, brown, 30° Tw., 8d. per gal. MANCHESTER: Brown, £11; grey, £13 10s.
ACETIC ACID, TECHNICAL, 40%.—£17 to £18 per ton.
AMYL ACETATE, TECHNICAL,—95s. to 110s. per cwt.
CHARCOAL.—£5 15s. to £10 per ton.
WOOD CREOSOTE.—Unrefined, 3d. to 1s. 6d. per gal.
WOOD NAPHTHA, MISCIBLE.—2s. 6d. to 3s. 6d. per gal.; solvent, 3s. 6d. to 4s. per gal.
WOOD TAR.—£2 to £4 per ton.

Nitrogen Fertilisers

SULPHATE OF AMMONIA.—Feb., £7 3s. 6d. per ton; Mar./June, £7 5s.; for neutral quality basis 20.6% nitrogen delivered in 6-ton lots to farmer's nearest station.
CYANAMIDE.—Feb., £7 2s. 6d. per ton; Mar., £7 3s. 9d.; Apr./June, £7 5s.; delivered in 4-ton lots to farmer's nearest station.
NITRATE OF SODA.—£7 12s. 6d. per ton for delivery to June, 1935, in 6-ton lots, carriage paid to farmer's nearest station for material basis 15.5% or 16% nitrogen.
NITRO-CHALK.—£7 5s. per ton to June, 1935, in 6-ton lots carriage paid for material basis 15.5% nitrogen.
CONCENTRATED COMPLETE FERTILISERS.—£10 5s. to £10 17s. 6d. per ton according to percentage of constituents, for delivery up to June, 1935, in 6-ton lots carriage paid.
NITROGEN PHOSPHATE FERTILISERS.—£10 5s. to £13 15s. per ton, for delivery up to June, 1935, in 6-ton lots carriage paid.

Latest Oil Prices

LONDON, Jan. 30.—LINSEED OIL was quiet. Spot, £22 (small quantities 30s. extra); Feb., £20 10s.; March-April, £20 15s.; May-Aug., £21 5s.; Sept.-Dec., £21 12s. 6d., naked. SOYA BEAN OIL was steady. Oriental (bulk), Jan.-Feb. shipment, £23 per ton. RAPE OIL was quiet. Crude extracted, £32; technical refined, £33 10s., naked, ex wharf. COTTON OIL was steady. Egyptian crude, £26 10s.; refined common edible, £31; and deodorised, £32 10s., naked, ex mill (small lots 30s. extra). TURPENTINE was quiet. Spot, 47s. 6d. per cwt.
HULL.—LINSEED OIL, spot, quoted £21 15s. per ton; Jan., £21 5s.; Feb.-April, £21 10s.; May-Aug., £21 15s.; Sept.-Dec., £22. COTTON OIL.—Egyptian, crude, spot, £27; edible, refined, spot, £29 10s.; technical, spot, £29 10s.; deodorised, £31 10s., naked. PALM KERNEL OIL, crude, f.m.q., spot, £20 10s. naked. GROUNDNUT OIL, extracted, spot, £33 10s.; deodorised, £36 10s.. RAPE OIL, extracted, spot, £31; refined, £32 10s. SOYA OIL, extracted, spot, £25; deodorised, £28 per ton. CASTOR OIL, pharmaceutical, 42s.; firsts, 37s.; seconds, 34s. per cwt. TURPENTINE, American, spot, 49s. 6d. per cwt.

New Chemical Trade Marks

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

Opposition to the registration of the following trade marks can be lodged up to February 23, 1935.

Derminol. 555,043. Class 1. Chemical substances used in dyeing leather in the course of manufacture. I. G. Farbenindustrie, Gruneburgplatz, Frankfort-on-Main, Germany. October 25, 1934. Address for Service in the United Kingdom is c/o Abel and Imray, 30 Southampton Buildings, London, W.C.2. (By consent).

Redonite. 555,837. Class 1. Paints, varnishes, enamels, distempers, japans, lacquers, paint and varnish driers, wood preservatives, wood stains, anti-corrosive and anti-fouling compositions, and anti-corrosive oils. Pinchin, Johnson and Co., Ltd., 4 Carlton Gardens, London, S.W.1. November 23, 1934.

Fumatol. 551,322. Class 2. Chemical substances used for agricultural, horticultural, veterinary, and sanitary purposes. Burgoyne, Burbridges and Co., Ltd., High Street South, East Ham, London, E.6. May 23, 1934.

From Week to Week

THE IMPORT DUTIES ADVISORY COMMITTEE has decided not to make any recommendation in respect of the recent application for the addition to the Free List of oxalic acid.

M. GEORGES CLAUDE, the French scientist, who is well known for his discoveries in liquid gas, has abandoned his attempts at Rio de Janeiro to utilise sea power for practical purposes.

THE NOMINAL CAPITAL of Phil-Sano, Ltd., manufacturers of essential oils, perfumery, etc., has been increased by the addition of £1,000 beyond the registered capital of £100.

BRITISH PLASTER BOARD, LTD., has arranged to take over on terms of amalgamation the Gotham Co., Nottingham and Carlisle, gypsum quarry and mine owners, plaster and brick manufacturers.

LIEUT.-COL. SIR ARNOLD WILSON, speaking at the annual dinner of the Falmouth Chamber of Commerce, on January 23, said that exports of china clay and ball clay were reviving, and would improve still further.

PROFESSOR KLAUS HANSEN, a Norwegian doctor of medicine, has drunk ten grams of a 99 per cent. solution of "heavy" water at the Oslo University, before several of his medical colleagues, without suffering any adverse after effects.

RAYON OUTPUT last year reached the record total of 93.1 million pounds. Production in 1933 amounted to 84.1 millions. The output for December was 7.9 million pounds, against 8.7 millions in November and 7.1 millions in December, 1933. Acetate production showed a marked decline on the year, but that of viscose increased by approximately 12 per cent.

THE ROYAL COMMERCIAL TRAVELLERS' SCHOOLS at Pinner again report successful results in the Cambridge Local Examinations. In those held in December, 14 boys and 10 girls have been awarded the School Certificate. On the boys' side the number of Higher School Certificates and School Certificates obtained in the July and December examinations constitutes a fresh record in the history of the schools. On the girls' side, from which candidates are presented for the Junior Examination also, 21 passed out of 22 sent up.

E. I. DU PONT DE NEMOURS, of Wilmington, announce the discovery of a new high explosive, which is 20 per cent. stronger than T.N.T. To test its "foolproof" qualities, it has been shot at with rifles, thrown into fires, bored with red-hot irons, subjected to blow-torches and beaten with 50 lb. trip hammers, without exploding; only a full-size dynamite cartridge detonates it. The technical name of this new nitro-ammonia explosive which contains 40 per cent. oxygen is nitramon.

SIR ARTHUR EDDINGTON'S new book, "New Pathways in Science," is announced by the Cambridge University Press for March 1. This is Sir Arthur's first book of any size for six years and has arisen from the Messenger Lectures which he delivered at Cornell University last year. The same publishers are also issuing early in February "Electrons, Protons, Photons, Neutrons and Cosmic Rays," by Professor R. A. Millikan. This comprises a revision of his book on "The Electron" but the length has been almost doubled by the addition of six new chapters, based also on recent Messenger Lectures.

THE FINAL INAUGURAL CEREMONY in connection with the opening of the £10,000,000 pipeline from Iraq to the coast took place at Amman, Transjordan, on January 29, in the form of a cèremonial luncheon, which was attended by the Emir Abdulla of Transjordan. At the outset the Emir invested Sir John Cadman, chairman of the Iraq Petroleum Co., with the title of Pasha, First Class. The construction of the pipe-line has brought over half a million sterling in wages to the people of the distressed areas of Transjordania, whose employment on this work was the means of averting the crisis of 1933.

JUDGMENT HAS BEEN ISSUED in Glasgow Sheriff Court in an action relating to the production of smokeless fuel in Glasgow by the Maclaurin process. Mr. Robert Maclaurin, technical chemist, the assignee of Maclaurin Carbonisation, Ltd., sued the Corporation of Glasgow for £208, representing royalties unpaid for 1925, 1926, and part of 1927. Sheriff Bartholomew, in his decision, granted a decree against the defenders for payment to the pursuer of the sum mentioned, with interest at the rate of 5 per cent. per annum from the date of citation until payment. He found the pursuer entitled to expenses. The grounds of the Corporation's defence were that they had made no agreement with the pursuer, or, if so, they claimed that there was a tacit understanding that no royalties would be paid until the plant was functioning properly. The Sheriff found that there was an agreement by which the Corporation undertook to pay a royalty on every ton of coal carbonised by the Maclaurin process, and that the plant erected, which was brought into use in 1925, fulfilled the promises which were made for it. Experiments no doubt were made in order to ascertain the coal which gave the best results, but this did not mean that the process was being conducted on a purely experimental basis.

MR. C. L. HAMER, of Middlesbrough, has been appointed receiver to Coloquid, Ltd., under powers contained in debenture dated January 8, 1934.

THE NOMINAL CAPITAL of Frajon, Ltd., manufacturing chemists, Manchester, has been increased by the addition of £2,000 in £1 shares beyond the registered capital of £3,000.

MR. M. C. SPENCER, of 3 Frederick's Place, Old Jewry, E.C., has been appointed liquidator, with a committee of inspection, of the T. and R. W. Bower (Illingworth) Carbonisation Co., Ltd.

COLLOIDAL TREATMENT OF BOILER-FEED WATER was the subject of a paper read by Mr. J. S. Merry at a meeting on January 25, of the Manchester Association of Engineers.

THE RESEARCH AND STANDARDISATION COMMITTEE of the Institution of Automobile Engineers has presented an experimental petrol engine to the Engineering Department of the University of Manchester.

THE BIRMINGHAM FEDERATION OF THE LEAGUE OF INDUSTRY held its annual general meeting at the Birmingham Chamber of Commerce on January 24, when Mr. R. F. Paget, area combustion engineer of the Coal Utilisation Council lectured on "The Utilisation of Coal."

THE GOLDSMITH'S COMPANY has made a grant of £5,000 to Cambridge University for defraying the expenses of an investigation of the alloys of silver to be carried out in the metallurgy laboratory under the auspices of Mr. R. S. Hutton, Goldsmiths' Professor of Metallurgy at Cambridge.

THE NAME OF R. AND H. LEIGH AND SONS, LTD., of Bolton, has been changed to Leigh and Sons. The former company has been wound up voluntarily, and the change has been made for purely family reasons. The business will continue on precisely the same lines as previously.

MR. H. W. SMITH has retired from the Brighton Chemical Co., Heckmondwike, manufacturing chemists, and the partnership between him and Mr. J. S. Riley, and Mr. H. Dennison has been formally dissolved so far as Mr. Smith is concerned. The business will continue to be carried on in the same name by the remaining partners.

A LORRY, carrying 20 barrels of lamp-black, was involved in a fire at Dunchurch, Rugby, on January 25. The fire caused quantities of fine black soot to descend on the village, and people unfortunate enough to be out of doors were swiftly coloured black. So "fast" was the colour that it was only with difficulty that it was washed off.

A THIRD DEATH resulting from the explosion on January 18 at the Ardeer factory of Imperial Chemical Industries, Ltd., near Stevenston, on the Ayrshire coast, occurred on Sunday. Robert Hargreaves, 24, a chemist, died in the Glasgow Western Infirmary from severe burns on the face, chest, arms and legs. Another chemist, Elwyn Jones, who is in the infirmary, is reported to be still in a serious condition.

THE LEIPZIG SPRING FAIR is to be opened on Sunday, March 3. Following are the dates of the various sections of the fair at which over 8,000 manufacturers will exhibit:—March 3-9, General Samples Fair; March 3-6, Textile Fair; March 3-9, "Bugra" Machine Fair; March 3-10, Great Engineering and Building Fair. Fair vouchers can be obtained from the London office of the Leipzig Fair, 34-36 Maddox Street, London.

AT AN EXTRAORDINARY MEETING of Murex, Ltd., held on January 28, proposals for the capitalisation of £270,000, part of the general reserve, and the issue of a bonus of one fully-paid ordinary share of 10s. for every ordinary share held, were unanimously approved. Resolutions were also approved providing for the consolidation of each two ordinary shares of 10s. into one ordinary share of £1, and amending the articles in relation to directors' remuneration.

ON MONDAY in the Chancery Division, Mr. Justice Bennett had before him a petition by the British (Non-Ferrous) Mining Corporation, Ltd., for the confirmation of the reduction of its capital from £500,000 to £120,000. It was stated that the reduction was to be effected by writing off 19s. per share off the issued shares. The reduction formed part of a scheme by the four companies who were the sole shareholders, the object being the provision of further working capital. His lordship confirmed the reduction.

REPRESENTATIONS HAVE BEEN MADE to the Board of Trade under Section 10 (5) of the Finance Act, 1926, for the exemption of dupropyl malonic acid from Key Industry Duty under Section 1 of the Safeguarding of Industries Act, 1921, as amended by the 1926 Act. The ground of the representations is that the product is not made, and is not likely to be made, in any of the British Dominions in substantial quantities, having regard to the requirements of the United Kingdom. Communications on the subject should be addressed to the Principal Assistant Secretary, Industries and Manufactures Department, Board of Trade, Great George Street, S.W.1, not later than February 11.

THE RUBBER POWDER CO., LTD., has successfully carried out a series of demonstrations in Amsterdam with the latest type of machine for the production of rubber powder from liquid latex by the de Schepper process. The powder is produced by means of spraying latex on to a heated endless belt moving in a long tunnel, and the rubber when dry is removed from the belt in the form of a fine powder.

A VIOLENT EXPLOSION, followed by fire, occurred at the Wapping works of the Commercial Gas Co. on January 26. In an official statement the company said the fire, arising from a large volume of gas suddenly bursting into flame, was caused by the collapse of one of a set of three ammonia scrubbers, due to some settlement or defect of the foundation, the precise cause of which has not yet been ascertained.

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.

Lubricants

HYDROCARBON lubricating oils are improved by the addition of 0.1-0.25 per cent. by weight of a saturated fatty acid having at least 16 carbon atoms. Stearic, arachidic and cerotic acids are specified. For example 0.1 per cent. of cerotic acid or 0.2 per cent. of stearic acid is added to a mineral lubricating oil. See specification No. 412,101 of Germ Lubricants, Ltd., J. E. Southcombe, and M. A. Shenton.

Making Emulsions

DISPERSIONS of chlorinated rubber are obtained by stirring finely divided solid chlorinated rubber in a liquid consisting of water and a solvent for the chlorinated rubber, such as toluene. The three components may be introduced simultaneously into the stirring apparatus, or the chlorinated rubber may be introduced into, and stirred with, a mixture of water and the solvent. See specification No. 412,525 of Chemische Fabrik Buckau.

Distilling Glycerine

IN distilling high boiling-point products such as crude glycerine, fatty acids, Yorkshire grease, etc., under high vacuum by means of the apparatus described in the parent specification, a relatively small proportion of steam (up to 30 per cent. reckoned on the weight of the distillate obtained) is introduced at such a temperature that it does not heat the distillation mass, or is formed in the mass by vaporisation of water therein. See specification No. 412,080 of G. W. Riley, and Scott and Son (London), Ltd.

Cleaning and Polishing

SURFACES coated with cellulose-ester lacquer are cleaned and polished by rubbing with *o*-dichlorbenzene. A solvent or polishing agent may be added. For example, spots of tar or pitch are removed from a cellulose lacquered surface by rubbing with a woollen pad impregnated with crude *o*-dichlorbenzene obtained as a by-product in the manufacture of *p*-dichlorbenzene; the surface is then rubbed with a dry pad and, if necessary, is repolished. Specification 413,254 is referred to. See specification No. 413,256 of Soc. of Chemical Industrie in Basle.

Catalytic Agents

CATALYSTS for the hydration of olefines are rendered mechanically stable by the incorporation therewith of a carbonizable organic substance capable of forming true or colloidal solutions in water. Suitable substances are sucrose, glucose, fructose, molasses, starch, gelatine, pectin, and higher alcohols such as glycerol and mannitol. The invention is particularly applicable to catalysts containing phosphoric acid in excess of the amount required to form the orthophosphates of the elements employed. See specification No. 413,043 of Distillers Co., Ltd., W. P. Joshua, H. M. Stanley and J. B. Dymock.

Complete Specifications Open to Public Inspection

DIBENZOTHIAZYLDISULPHIDE, preparation.—Silesia Verein Chemischer Fabriken. July 18, 1933. 16431/34.

HIGHER LACTONES containing at least 11 carbon atoms in the lactone ring, methods of preparing.—Soc. Anon. M. Naef et Cie. July 17, 1933. 18432/34.

CELLULOSE DERIVATIVE COMPOSITIONS.—E. I. du Pont de Nemours and Co. July 15, 1933. 19126/34.

VALUABLE PRODUCTS such as lubricating oils resistant to oxidation, transformer oils, and the like, manufacture.—Naamlooze Vennootschap de Bataafsche Petroleum Maatschappij. July 15, 1933. 19159/34.

DEWAXING OIL.—Union Oil Co. of California. July 17, 1933. 19451/34.

CONVERSION OF UNSATURATED ALCOHOLS and/or ethers to their saturated isomers.—Naamlooze Vennootschap de Bataafsche Petroleum Maatschappij. July 17, 1933. 20149/34.

TAR ACIDS, purification.—Barrett Co. July 19, 1933. 20368/34.

METAL OXIDES colloidally soluble in water, manufacture and production.—I. G. Farbenindustrie. July 15, 1933. 20793/34.

COMPOSITE PIGMENTS containing titanium, preparation.—Titan Co., Inc. July 18, 1933. 20969/34.

CELLULOSE-COATED MATERIALS and their manufacture.—E. I. du Pont de Nemours and Co. July 19, 1933. 21153/34.

CARBAZOLE DERIVATIVES, manufacture.—Soc. of Chemical Industry in Basle. July 20, 1933. 21272/34.

DERIVATIVES OF NUCLEOTIDES, manufacture.—Soc. of Chemical Industry in Basle. July 21, 1933. 21273/34.

ORGANIC SULPHO COMPOUNDS, manufacture of water-soluble.—Deutsche Hydrierwerke A.-G. July 20, 1933. 21328/34.

CONDENSATION PRODUCTS containing nitrogen, manufacture.—Soc. of Chemical Industry in Basle. July 21, 1933. 21474/34.

POLYMETHINE DYESTUFFS and intermediate products, manufacture and application.—I. G. Farbenindustrie. July 21, 1933. 21476/34.

HYDROCYANIC ACID, manufacture.—E. I. du Pont de Nemours and Co. July 21, 1933. 21571/34.

Specifications Accepted with Dates of Application

TEXTILE ASSISTANTS, manufacture.—Soc. of Chemical Industry in Basle. Nov. 26, 1932. 422,242.

LACQUERS FROM CELLULOSE ESTERS, manufacture and production. I. G. Farbenindustrie. Dec. 21, 1932. 422,302.

ACTIVE CARBON, production.—E. Hene. Dec. 11, 1933. 422,521.

AZO DYESTUFFS insoluble in water, manufacture.—I. G. Farbenindustrie. May 23, 1933. 422,317.

REMOVING IRON FROM ACID SOLUTIONS of aluminium sulphate, process.—J. R. Geigy, A.-G. May 19, 1933. 422,318.

SEPARATION OF OIL from oil-containing substances.—K. Sohler. May 26, 1933. 422,530.

CARBIDE CAKES, manufacture.—Carbic, Ltd. Dec. 30, 1933. 422,397.

SYNTHETIC RESINS and methods of manufacturing the same.—British Thomson-Houston Co., Ltd. Aug. 25, 1933. 422,456.

SOLID PRODUCT CONTAINING AVAILABLE CHLORINE and highly insensitive to the influence of temperature.—I. G. Farbenindustrie. Oct. 21, 1933. 422,540.

DISPERSIONS, preparation.—Dr. H. Hunsdiecker and Dr. E. Vogt. Dec. 14, 1932. 422,461.

SILICEOUS ALUMINIFEROUS MINERALS, decomposition.—T. Goldschmidt A.-G. Oct. 14, 1933. 422,463.

STRIPPING DYED TEXTILES.—Imperial Chemical Industries, Ltd., J. G. Evans and L. G. Lawrie. April 7, 1933. 422,556.

AZO DYESTUFFS and intermediate products, manufacture.—Soc. of Chemical Industry in Basle. July 9, 1932. 422,843.

ALIPHATIC AMINES, manufacture and production.—J. Y. Johnson (I. G. Farbenindustrie). July 10, 1933. 422,563.

MONOMETHYLAMINE AND DIMETHYLAMINE, apparatus for the manufacture and production.—J. Y. Johnson (I. G. Farbenindustrie). July 10, 1933. 422,564.

SYNTHETIC RESINS, production.—E. I. du Pont de Nemours and Co., and M. M. Brubaker. July 13, 1933. 422,845.

ELECTROLYTIC CELLS.—I. G. Farbenindustrie. July 19, 1932. 422,790.

YELLOW ACID SULPHURIC ACID ESTERS of leuco derivatives of vat dyestuffs, process for the manufacture.—I. G. Farbenindustrie. July 20, 1932. 422,791.

PREPARATIONS FOR COMBATING ANIMAL PESTS, manufacture.—A. Carpmael (I. G. Farbenindustrie). July 19, 1933. 422,856.

CHROMATES, production.—W. V. Gilbert. July 20, 1933. 422,860.

CATALYTIC HYDRATION OF OLEFINES.—Distillers Co., Ltd., W. P. Joshua, H. M. Stanley and J. B. Dymock. Aug. 24, 1933. 422,635.

HIGHER ALIPHATIC TERTIARY ALCOHOLS, manufacture.—W. J. Tennant (Henkel et Cie Ges.). Sept. 13, 1933. 422,804.

REMOVAL OF HYDROCARBONS from fuel gases, dehydration.—Whessoe Foundry and Engineering Co., Ltd., A. G. Grant and A. E. Taylor. Sept. 14, 1933. 422,636.

INDIGOID DYESTUFFS, manufacture.—Soc. of Chemical Industry in Basle. Jan. 4, 1933. 422,595.

SEPARATION OF OILS from mixtures thereof with solid matter and asphalts, obtained as residues in the destructive hydrogenation of distillable carbonaceous materials.—International Hydrogenation Patents Co., Ltd. March 24, 1933. 422,742.

CHROMIFEROUS AZO DYESTUFFS, manufacture.—Soc. of Chemical Industry in Basle. March 31, 1933. 422,605.

INDIGOID DYESTUFFS, manufacture.—Soc. of Chemical Industry in Basle. Jan. 4, 1933. 422,595.

RUBBER-LIKE PRODUCTS from olefine halides and polysulphides of the alkali or alkaline earth metals, manufacture and production.—I. G. Farbenindustrie. May 31, 1933. 422,826.

PURIFYING SULPHURIC ACID, processes.—Mansfeldscher Kupferschieferbergbau A.-G. June 21, 1933. 422,880.

ESTERS, process for the manufacture.—Dr. N. Moskovits. March 14, 1934. 422,764.

CAUSTIC SODA LYE, poor in sodium chloride, and of Glauber salt, joint production.—I. G. Farbenindustrie. Aug. 19, 1933. 422,689.

INDIGOID DYESTUFF, manufacture.—A. G. Bloxam (Soc. of Chemical Industry in Basle). July 18, 1934. 422,690.

DESTRUCTIVE HYDROGENATION of solid distillable carbonaceous material.—International Hydrogenation Patents Co., Ltd. Aug. 18, 1933. 422,892.

DEGASEFYING LIQUIDS, apparatus.—Soc. Italiana Pirelli. April 18, 1934. 422,773.

HYDROCARBONS, method for coking.—Brassert-Tidewater Development Corporation. June 24, 1932. 422,899.

Applications for Patents

(January 17 to 23 inclusive).

IRON, ETC., ALLOY.—Alloy Research Corporation. (United States, Jan. 20, '34.) 1714-6.

PHOSPHORISED COPPER, casting.—American Metal Co., Ltd. (United States, Feb. 1, '34.) 1764.

ACID-RESISTANT COMPOSITIONS.—C. R. Barsby. 1768.

CONVERSION PRODUCTS of acetylene, manufacture.—A. Carpmael (I. G. Farbenindustrie). 2122.

DYEINGS, treatment.—A. Carpmael (I. G. Farbenindustrie). 2123.

AZO DYESTUFFS, manufacture.—A. Carpmael (I. G. Farbenindustrie). 2124.

ARYLAMIDES of 9.10-benzo-β-hydroxy-phenanthrene-*o*-carboxylic acid, manufacture.—A. Carpmael (I. G. Farbenindustrie). 2127.

PREGNANE DERIVATIVES, production.—A. Carpmael (Schering-Kahlbaum A.-G.). 1805.

FOLLICLE HORMONE, production.—A. Carpmael (Schering-Kahlbaum A.-G.) 2009.

STABLE PREPARATIONS of compounds containing active halogen, manufacture.—Chemische Fabrik Von Heyden A.-G. (Germany, Jan. 19, '34.) 1859. (Germany, Feb. 19, '34.) 1860.

AZO DYESTUFFS, preparation.—Compagnie Nationale de Matières Colorantes et Manufactures de Produits Chimiques du Nord Réunies Etablissements Kuhlmann. (France, Feb. 2, '34.) 2236.

ALKYL HALIDES, manufacture.—E. I. du Pont de Nemours and Co., and H. W. Daudt. 2017.

DYESTUFFS, manufacture.—Durand and Huguenin A.-G. (Germany, Jan. 22, '34.) 2110.

ANTIHALATION LAYERS, ETC., manufacture.—W. W. Groves (I. G. Farbenindustrie). 1733.

PHOSPHATIC FERTILISERS, production.—Kali-Forschungs-Anstalt Ges. (Germany, Feb. 28, '34.) 1983.

MOULDED SALT MIXTURES, production.—Kali-Forschungs-Anstalt Ges. (Germany, Jan. 26, '34.) 1984. (Germany, Feb. 8, '34.) 1985.

FERTILISERS, production.—Kali-Forschungs-Anstalt Ges. (Germany, Jan. 27, '34.) 2098.

ALKALI, ETC., PHOSPHATES, recovery.—Kali-Forschungs-Anstalt Ges. (Germany, Feb. 10, '34.) 2099. (Germany, Feb. 15, '34.) 2100.

DI-CALCIUM PHOSPHATE, production.—Kali-Forschungs-Anstalt Ges. (Germany, Feb. 14, '34.) 2251. (Germany, Feb. 27, '34.) 2252.

ACTIVATED CARBON, manufacture.—F. Krczil. (Czecho-Slovakia, Feb. 12, '34.) 1900.

AZO DYESTUFFS, manufacture.—I. G. Farbenindustrie. (Germany, Jan. 19, '34.) 1621.

CONDENSATION PRODUCTS of totally-hydrolised protein material, manufacture.—I. G. Farbenindustrie. (Germany, Jan. 18, '34.) 1652.

2-METHYL-3-HYDROXY-QUINOLINE-4-CARBOXYLIC ACIDS, manufacture.—I. G. Farbenindustrie. (Germany, Jan. 19, '34.) 1959.

SOLID CHLORINATED RUBBER, manufacture.—Imperial Chemical Industries, Ltd., J. P. Baxter and S. Steele. 1766.

ETHYLENE, recovery.—J. Y. Johnson (I. G. Farbenindustrie). 1738.

ORGANIC SULPHUR COMPOUNDS, manufacture.—J. Y. Johnson (I. G. Farbenindustrie). 1739.

CONVERSION PRODUCTS of acetylene, manufacture.—J. Y. Johnson (I. G. Farbenindustrie). 1740.

SOLID CHLORINATED RUBBER, manufacture.—J. A. M. W. Mitchell, Imperial Chemical Industries, Ltd., and J. P. Baxter. 1767.

CASEIN, manufacture.—J. E. Pollak (Hanseatische Mühlenwerke A.-G.). 2264.

HYDROCARBONS, production.—H. E. Potts (International Hydrogenation Patents Co., Ltd.) 2037, 2038.

FOLLICLE HORMONES, isolating.—Schering-Kahlbaum A.-G. Jan. 26, '34.) 2012, 2013.

ALUMINA, manufacture.—W. Siegel. 2292.

DYESTUFFS, manufacture.—Soc. of Chemical Industry in Basle. (Switzerland, Aug. 11, '34.) 1735.

N-NITRAMINES of primary aromatic amines, manufacture.—Soc. of Chemical Industry in Basle. (Switzerland, Jan. 23, '34.) 2226.

HYDROCARBON OILS.—Standard Oil Development Co. (United States, April 7, '34.) 1798.

CYANHYDRINS, manufacture.—Triplex Safety Glass Co., Ltd., and J. Wilson. 1867.

Company News

Harringtons and Goodlass Wall Co.—The payment is announced of a dividend at the rate of 10 per cent. per annum, on the ordinary shares, plus a bonus of 2½ per cent., both tax free. To reserve is placed £500, to contingency reserve, £500, and the amount carried forward is £4,763.

Snia Viscosa.—The directors of Snia Viscosa, the Italian rayon manufacturers, have decided to distribute a dividend of 16 lire per share, against 14 lire in 1933. The company's net profits for 1934 were 26,000,000 lire, compared with 23,047,920 lire for 1933. Cash in hand at the end of the year was 162,000,000 lire. The company's capital is to be increased from 300,000,000 lire to 345,000,000 lire by the transfer of certain special reserves and by increasing the value of the shares to 260 lire.

Metallgesellschaft A.G., of Frankfurt.—It is announced that the company have resumed dividends with the payment for the year ended September 30, 1934, of 4 per cent. on its Rm.33,400,000 ordinary shares. Gross profits have advanced from Rm.14,355,377 to Rm.17,408,374, while the Rm.1,318,097 extraordinary profits and Rm.2,535,090 realised from the redemption of the outstanding sterling loan were used for extraordinary writings-off and for building up a reserve. Net profits have increased to Rm.1,524,569 from Rm.816,267.

Gas Light and Coke Co.—The accounts for the past year show that the balance to the credit of the net revenue account will enable the directors to recommend the payment of a dividend for the half-year to December 31, 1934, of £2 16s. per cent. on the ordinary stock. With the interim at the same rate paid in August last the total dividend for the year is again £5 12s. per cent., or 5 3/5 per cent., which has now been forthcoming for six consecutive years on unredeemed ordinary stock, rising from £18,629,125 in 1929 to £19,373,992 in 1932. At December 31, 1933, the total was £19,342,763. The carry-forward is down from £186,128 last year to £183,068.

Broken Hill South.—A third interim dividend of 7½ per cent. for the year to June 30, 1935, has been declared. Two interims of 7½ per cent. each have already been paid on account of the year. Last year four interims were paid, totalling 25 per cent. for the year.

Friedrich Krupp Co., of Essen.—It is reported that for the first time for three years the Friedrich Krupp Company, shows a profit. For the year to September 30, 1934, the profit amounts to Rm.6,652,000, against last year's loss of Rm.3,069,000. Although the profit is sufficient to pay a 4 per cent. dividend on the Rm.160,000,000 share capital, the dividend is again passed, and the profits used to strengthen reserves.

English Velvet and Cord Dyers' Association.—The directors announce that, with the aid of a transfer of £35,000 from reserve, they are able to pay a dividend on the 5 per cent. cumulative preference shares for the half-year to December 31, 1934. An amount of £3,626 is to be carried forward, against £7,494, after payment of this dividend. Last year there was a loss of £7,300 before providing for the preference dividend. No dividend has been paid on the ordinary capital of £435,125 since 4 per cent. for 1931.

Borax Consolidated.—Dividends have been resumed on the deferred £1 shares after a five years' lapse, with the payment of 2½ per cent. for the year to September 30, 1934. The last distribution on the £1,150,000 of deferred shares was 7½ per cent. for 1928, when the net profit, after debenture interest and redemption, was £166,723. For the year to September 30, 1933, there was a net profit of £49,743, and after payment of the preference dividend, an increased amount of £207,934 was carried forward. The net profit for 1932 was £47,768, including £9,616 profit on sale of investments. The full 6 per cent. is also to be paid on the non-cumulative preferred ordinary £5 shares, of which there are 120,000 issued. These shares last received a dividend for the year to September 30, 1929.

Forthcoming Events

LONDON

Feb. 4.—Society of Chemical Industry (London Section and Plastics Group). "Lac Research." A. J. Gibson, Dr. Verman and Dr. Bhattacharya. 8 p.m. Burlington House, Piccadilly, London.

Feb. 6.—Royal Society of Arts. "The Study of Human Nutrition—the Outlook To-day." Sir Frederick Gowland Hopkins. 8.30 p.m. John Street, Adelphi, London.

Feb. 6.—Society of Public Analysts. 8 p.m. Burlington House, Piccadilly, London.

Feb. 7.—The Chemical Society. Discussion on "Intermetallic Compounds," opened by Professor C. H. Desch. 8 p.m. Burlington House, London.

Feb. 8.—British Association of Chemists (London Section). Concert. 7.45 p.m. Broad Street Station Restaurant, London.

BIRMINGHAM

Feb. 7.—Institution of the Rubber Industry (Midland Section). Discussion—"Is the Factory a better training ground than the University?" opened by A. T. Roberson. James Watt Memorial Institute, Gt. Charles Street, Birmingham.

Feb. 7.—Oil and Colour Chemists' Association. "Shellac." A. J. Gibson. Joint meeting with the Birmingham Paint and Lacquer Club. Grand Hotel, Birmingham.

Feb. 8.—Electrodepositors' Technical Society. Discussion on "Metal Cleaning," opened by B. J. R. Evans. 7.30 p.m. James Watt Memorial Institute, Gt. Charles Street, Birmingham.

BRADFORD

Feb. 4.—Society of Dyers and Colourists (Bradford Junior Branch). "The Desizing of Silks and Cottons." J. E. Evans. Bradford.

Feb. 7.—Society of Dyers and Colourists (West Riding Section). "Some Oxidations of Cellulose." F. Scholefield. Bradford.

BRISTOL

Feb. 5.—Institute of Chemistry (Bristol and S. Western Counties Section). Joint meeting with the Bristol University Chemical Society. "Some Recent Developments in Solid Chemistry." N. F. H. Bright. 5.30 p.m. University, Bristol.

Feb. 7.—Chemical Engineering Group. Joint meeting with the Bristol Section of the Society of Chemical Industry. "Protective Metal Coatings." Stanley Robson and P. Stacey Lewis. 6.30 p.m. University, Bristol.

GLASGOW

Feb. 6.—Oil and Colour Chemists' Association (Scottish Section). "Titanium Pigments." D. Wait. 7.30 p.m. Mackay's Hotel, Glassford Street, Glasgow.

MANCHESTER

Feb. 8.—Oil and Colour Chemists' Association (Manchester Section). "Fastness to Light." (Members' evening). College of Technology, Manchester.

NEWCASTLE-ON-TYNE

Feb. 8.—North of England Institute of Mining and Mechanical Engineers. Annual Dinner and Dance. Newcastle-on-Tyne.

Feb. 8.—The Bedson Club. "The Biochemistry of the Thyroid Gland." Dr. C. R. Harington. 6.30 p.m. Chemistry Lecture Theatre of Armstrong College, Newcastle-on-Tyne.

PRESTON

Feb. 4.—Institution of the Rubber Industry (Preston and District Section). "Some Little Discussed Properties of Rubber." B. L. Davies. The Victoria and Station Hotel, Preston.

SHEFFIELD

Feb. 8.—Institute of Metals (Sheffield Section). "The Manufacture of Pewter." Captain F. Orme. 7.30 p.m. University, Sheffield.

SWANSEA

Feb. 9.—Swansea Technical College Metallurgical Society. Annual Dinner. Swansea.

TROWBRIDGE

Feb. 6.—Institution of the Rubber Industry (West of England Section). "The Mechanisation of Sales and Accounts' Records." E. H. Lovell. Town Hall, Trowbridge.

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).

Canada.—A firm of manufacturers' agents at Winnipeg is prepared to represent United Kingdom manufacturers of moulded products, presumably on a commission basis, in Western Canada. (Ref. No. 104.)

Holland.—An agent established at Amsterdam wishes to obtain the representation, on a commission basis, of United Kingdom manufacturers of bakelite products. (Ref. No. 114.)

Holland.—An agent established at The Hague wishes to obtain the representation, on a commission basis, of United Kingdom exporters of whale and other oils used in the manufacture of margarine. (Ref. No. 117.)

Brazil.—A firm of engineers and constructors, who are also dealers for materials for railways and public works, established in Brazil, wishes to obtain the representation of United Kingdom manufacture s of jute, shellac, industrial machinery in general, heavy chemicals (industrial), copper tubes, etc. (Ref. No. 123.)

New Companies Registered

N. A. Arnold & Co., Ltd.—Registered January 28. Nominal capital £1,500. To acquire the business of a paint grinder and manufacturer carried on by N. A. Arnold at Wellco Works, Ashley Lane, Shipley, Yorks. Directors: Norman A. Arnold, Septimus I. Murray.

Belvedere Development Co., Ltd., Westinghouse Road, Trafford Park, Manchester.—Registered January 26. Nominal capital £25,000. To carry on any business carried on by the Rubber Regenerating Co., Ltd., or the Belvedere Chemical Co., Ltd., to adopt an agreement with the Rubber Regenerating Co., Ltd., and to carry on, develop and turn to account the properties transferred to the company pursuant thereto. A subscriber: Francis N. Pickett, 40 New Cavendish Street, W.1.

Durham Paint Co., Ltd.—Registered January 28. Nominal capital, £1,000. Manufacturers of and dealers in paints of all kinds, varnish, enamel, polish, lacquer, shellac, cellulose, etc. Directors: Robert P. Harland, "Brenchley," Caledonian Road, W. Hartlepool. Robert K. Parker, Joseph L. Wilson.

Sherwin-Williams Co., Ltd.—Registered January 25. Nominal capital £100. Oil and colour merchants, manufacturers of and dealers in oils, paints, varnishes, insecticides, cements, drugs, dyeware, etc. A subscriber: Cecilie M. Steggles, 44 Dacre House, Beaufort Street, S.W.3.

J. S. Williams, Ltd.—Registered January 23. Nominal capital £2,000. Manufacturers of and dealers in paints of all kinds, and varnish, enamel, polish, lacquer, shellac, cellulose, size, pigments, etc. Director: Wesley Drake, 12 Spinkfield Road, Huddersfield.

Books Received

Laundry Chemistry. By A. Harvey. London: The Technical Press, Ltd. Pp. 114. 4s.

Unit Processes in Organic Synthesis. By P. H. Groggins. London: McGraw-Hill Publishing Co., Ltd. Pp. 689. 30s.

Chemische Stofferklarung. By Dr. W. Tombrock. Leipzig: Otto Hillmann. Pp. 30. RM.1.