The Chemical Age

A Weekly Journal Devoted to Industrial and Engineering Chemistry

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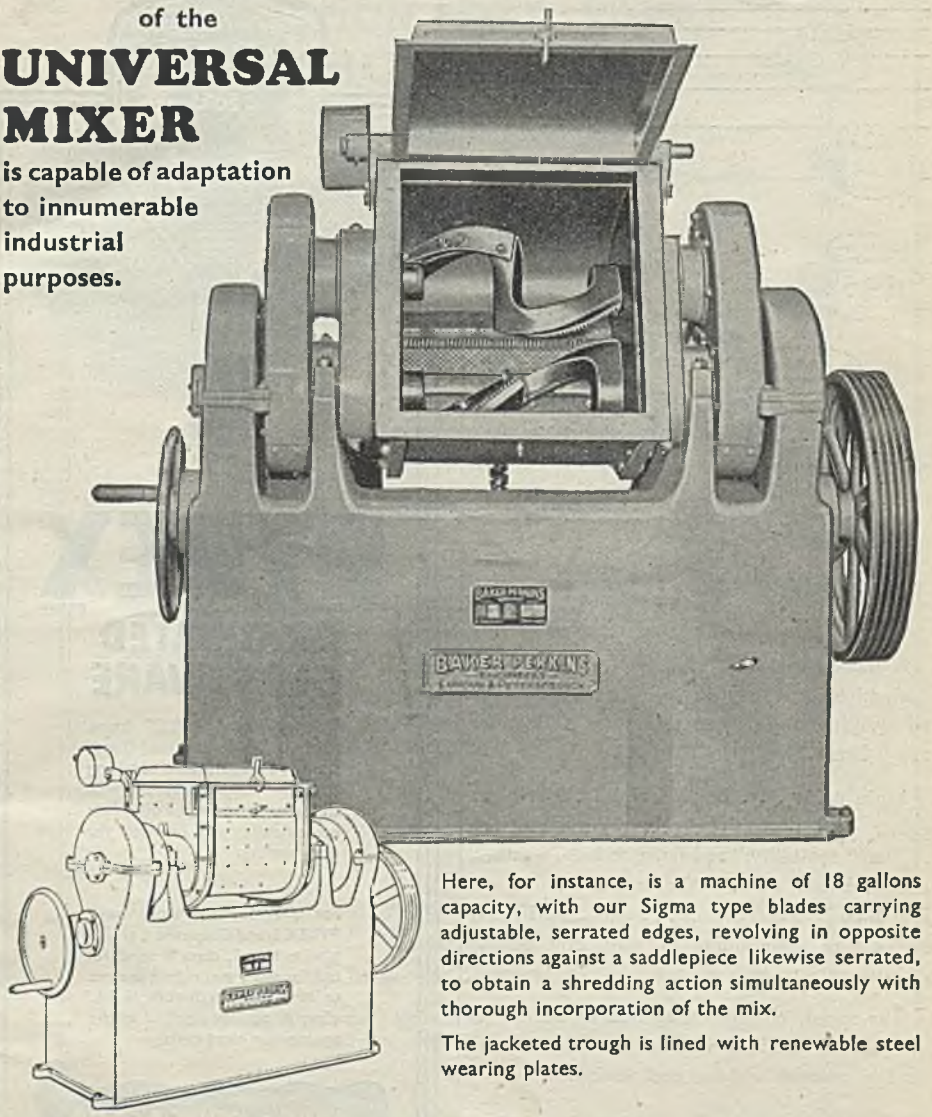

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The Chemical Age

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Telegrams: ALLANGAS FLEET LONDON Telephone: CENTRAL 3212 (10 lines)
GLASGOW: 116 Hope Street (Central 3970) BIRMINGHAM: Daimler House, Paradise Street (Midland 0784-5)

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Social Relations of Science

PROFESSOR J. D. BERNAL, who is professor of physics at Birkbeck College, is a well-known exponent of the application of science to social problems. As we understand it, his view is that science must no longer shut itself up in the laboratory but, in the persons of scientific men, must come forward to help in the social affairs of the world in the interests of humanity. It was accordingly with considerable interest that we listened to the Truman Wood lecture which was delivered by him in the early summer and which is now published in the *Journal of the Royal Society of Arts* (XCIII, 458). The essential point which Professor Bernal endeavoured to bring out was that science must adjust itself to knowledge in order to secure progressive development. In order that that might be brought about scientists must themselves take a hand in the application of their knowledge and discoveries and must submit to being organised in order that they may the better carry out this work.

There is inevitably a good deal in what Professor Bernal says with which we disagree and equally there must be a good deal with which we agree. Perhaps the greatest argument will take place among Professor Bernal's colleagues on the academic side about his thesis that science must be organised. He has pointed out that "we are passing out of a period during which progress was largely due to a fortuitous combination of individual activities. In the economic field there was free competition between small, independent firms; in the field of science individual investigators followed their private choice. That situation has already vanished in the economic field. Only the more backward parts of production are carried out in small, independent factories. One can hardly expect the great changes made in industry towards large-scale organisation to leave the individualist structure of science unaltered, and the drive towards organisation is already under way."

There are many arguments against organisation, some of which appear to be not very well founded. It has been suggested that organisation must tend to fix the forms of investigation and would thus destroy science integrally. It has been argued that science would be perverted, since governments would use it for destruction rather than human welfare. It has been

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objected, moreover, that since organised science would be part of the State every scientist would have to do what he was told and thus lose his freedom in investigation. We should agree with Professor Bernal that these objections are misapplied because of a misunderstanding of what is meant by "organisation." But before science is organised, even on the lines which Professor Bernal contemplates, must there not be a fairly exact definition of terms so that any value which is secured by organisation will not be lost through regimentation?

As we look back on the history of science in this country we find that the great discoveries have for the most part been made by individualists working alone or with a small team of their own choosing. Subject to two restrictions only, they have pursued whatever paths seemed good to them, and the world has been greatly the gainer. The two restrictions are, however, fundamental and could be removed by suitable organisation. One of these restrictions is time. Most of the great experimenters in the past have been teachers at our universities and they have been able to conduct their researches only as a spare-time hobby, or alternatively they must have neglected their primary work of teaching. The second limitation has been even more crippling. It has been that of finance. The research grants made by the D.S.I.R. can largely be used to overcome that limitation, but it is still present.

What, therefore, is meant by organisation is not the regimentation of scientists, but the organisation of funds to finance promising research workers in whatever line they may have chosen. It also involves the voluntary organisation of research workers into teams for investigating some particular problem. It is to-day open to a man to join a research team working for an industrial concern or for a research association, or he may stay outside and work by himself. The war has shown us that, when scientists are organised to a particular end, striking results may be obtained rapidly. We confess that we see a great deal of advantage to this country in an organisation of that character. Too often small research organisations have not the scientific advice and direction which enables them to give of their best, and it should be possible to evolve some organisation which would assist in the more rapid development of industrial processes. In discussing this problem we are in a sense thinking aloud and we have always in mind the reservation that some clear definition of terms and of the manner in which science may be organised should be agreed, between scientists and the Government, before organisation is put into effect. We do not forget that the Government and the medical profession do not by any means see eye to eye on the organisation of medicine for human needs. While organisation of the right kind directed by the right people may be fruitful indeed in its results, organisation of the wrong kind, conducted by the wrong people, may act as a severe brake upon progress, and, as has been seen in Germany, may destroy the scientific work of a nation within a decade.

We cannot altogether agree with Professor Bernal's statement that "the modern picture of an industrial process is that of a cycle which begins with the discovery of a need and ends with the satisfaction of that need." That is true sometimes, but very often the converse is true, as Lord Leverhulme pointed out in an address to the Society of Chemical Industry. When a need can be foreseen Professor Bernal's scientific organisation would clearly be the best method of satisfying it. During the war, for example, it was necessary (a) to find an answer to the new devices of the enemy and (b) to find a means of satisfying certain needs expressed by men of vision among the Allied statesmen and commanders. Under those conditions the best method of achieving rapid success was found to be to engage temporarily a team of men with the expert knowledge required. Thus we found a quick answer to the magnetic mine, and the developments known as Mulberry, Fido, Pluto, and the atomic bomb were all rendered possible. We are less sure whether Professor Bernal's suggestion of organisation would be the right way of dealing with the development of a new need resulting from a scientific discovery. We should, however, agree that once the fundamental discovery had been made and some of its possibilities had been visualised an organised team might well be the quickest means

of developing it to the industrial stage. Professor Bernal believes that there is far too little science in British industry and he trots out the socialist complaint that the cause lies with the employer. He demands, for example, "the abolition of the anti-scientific practices which have brought British industry to its present pass." He mentions "widespread obstruction," and believes that while part of this is traditional conservatism the more serious part of it is "the conscious obstruction due to vested interest and monopoly."

We just cannot agree. If there are firms—and we have no doubt that there are such companies—that deliberately refuse to admit science to their councils, those firms will quickly go to the wall. There is in British industry a mass of first-class concerns willing and able to use the resources of science fully, but prevented from doing so by taxation and by Government interference. What is really needed is the employment in industry of a much larger number of scientific men who are also trained to understand the finance of their proposals. This must be coupled with Government encouragement, which largely implies a new spirit animating the Treasury.

The plain fact is that the scientific men, the teachers and the leaders of scientific thought have failed in their duty of persuading either the Government or the public that an adequate supply of trained scientists should be made available. Professor Bernal himself says: "We have had an annual output from the universities of 3000 scientifically trained students, but the greater number of these do not go into science. They go into education. We shall need to step up that output to something of the order of 20,000 if we are going to get anything like the number of scientists we need."

NOTES AND COMMENTS

The Future of I.G. Farben

THE murky past of I.G. Farben is fairly well known to most chemists, and many of them are wondering about its future. This would appear to be, at the moment, in the hands of the American Control Commission, personified by Colonel Edwin Pillsbury, the officer in charge of I.G. affairs, as the headquarters of the combine, at Frankfort-on-Main, are in the U.S. area of occupation. Actually, reckoned on book values (according to a special correspondent of the *Manchester Guardian*), only about 9 per cent. of the I.G.'s plant is in the American zone, whereas 11 per cent. is in the British zone, 20 per cent. in the French, and 60 per cent. in the Russian. The last-mentioned proportion includes the Leuna works, the nitrogen and buna factory at Schkorau, and the Agfa works at Wolfen, all near Leipzig. Colonel Pillsbury has stated that he has found plenty of readiness to co-operate among the Russians, who have agreed to provide a complete survey of I.G. works in their area. One thing is certain about the future of I.G., and that is that such a combine will not be permitted to exist again. The present Allied policy is that plants which are essentially a part of German war industry shall be destroyed, and that after the demands of reparations have been met, what remains shall be split up and the combine dissolved. The doubt remains whether such a dissolution will secure the world against future danger from the German chemical industry. Should, *e.g.*, so large a concern as Bayer be allowed to remain intact, or should it be further subdivided? Questions of this nature are still under consideration, but it will be remembered that American public opinion is strongly against trusts and combines, and severe dismemberment would undoubtedly "go down well" in the States.

Federal Research

"THE development of atomic energy," President Truman has said, "is a clear-cut indication of what can be accomplished by the universities, industry, and Government working together." Vast scientific fields remain to be conquered in the same way. He has therefore urged upon Congress the early adoption of a Federal Research Agency, which might be regarded as a step towards the organisation of scientists, without regimentation. The

functions which it should discharge have been outlined as follows: (i) Promotion and support of fundamental research and development projects in matters relating to national security; (ii) Promotion of research in the basic sciences and social sciences; (iii) Support of research in medicine and public health; (iv) Scholarships and grants for young persons of proved scientific ability; (v) Co-ordination and control of diverse scientific activities now conducted by several Government departments; (vi) Making available to commerce, industry, agriculture, and academic institutions the fruits of research financed by Federal funds. It will be seen that these functions place few, if any, restrictions on the activities of the individual. It may be a quibble to draw a distinction between a "directive" and a "Statutory Rule and Order"; but there *is* a difference, even if only a psychological one; and who shall say that psychology is of no importance when individuals are concerned? If President Truman's plans are implemented, it will certainly be worth our while to keep an eye on their development, even if we go no further, which would be a pity.

Demobilising Chemical Workers

IN order to restore employment in civilian and export manufacture and in non-manufacturing services to the 1939 level, the Prime Minister has said that an increase of about 5,000,000 workers will be needed. Of these an estimate of 928,000 workers for the manufacture of metals and chemicals has been made. These figures have been extracted from the "interim statement" made by the Minister of Labour and National Service, Mr. George Isaacs, last week. He said that if the nation is to survive, our exports and civilian industries must be built up and re-established with speed, and, further, that export trade must be expanded to a level well above that of 1939. To meet these requirements to some extent, a million munition workers are to be demobilised by October, leaving 3,000,000 still engaged—a figure that will obviously soon be further reduced. A good number of these releases will not be available for civilian industry, however, as men aged 18 to 30 are being called up to the Forces unless they can be shown to be absolutely essential for reconstruction work (chemical and metal workers may well be included here), while many others will be older men and married women who will wish to retire. As Mr. Isaacs says with truth: "The needs of industry are very great, and we want everyone back that we can get." Before the end of the year, the numbers released from the Forces will be about 950,000 men and 145,000 women, the weekly rate of release being about 45,000. The problem is difficult enough, and Mr. Isaacs admitted that the sudden end of the Japanese perhaps took the Government a little by surprise. On the whole, Mr. Isaacs's statement does very well as an *interim* affair, but there were some rather loose reservations about "military requirements" and nothing at all about Class B releases. We shall expect something much more definite in a month's time, if not sooner.

An Empire Science Link

SCIENTIFIC liaison within the Empire, more desirable to-day than ever, is strengthened by a new bond which has just been formed, the informal "alliance" between the Imperial College of Science and Technology in London and the Indian Institute of Science at Bangalore. Professor Southwell, Rector of the Imperial College, in a letter to *The Times*, explains how this happy union has been consummated. The first proposal was made to Sir J. C. Ghosh, Director of the Institute, during his visit to this country last autumn—that fruitful excursion of a group of the most distinguished Indian scientists—but formal acceptance had to await his return to headquarters, postponed by a sojourn in America. Now the alliance has been sealed, and it will mean that students and staff who are able to "exchange" between South Kensington and Bangalore will find themselves received not merely as honoured visitors, but as actual colleagues. Readers of THE CHEMICAL AGE will not have forgotten that the two institutions were already linked by the personality of the late Sir Martin Forster, who was on the South Kensington staff in 1895-1913 and served as Director at Bangalore from 1922 to 1933.

FUEL EFFICIENCY IN THE CHEMICAL INDUSTRY

Fuel Economy Discussions

VI.—Inhibition of Corrosion of Metal in Contact with Water and/or Steam (Part II)

by W. MURRAY, A.M.C.T., F.R.I.C., F.C.S.

(*Continued from* THE CHEMICAL AGE, *September* 8, 1945, *p.* 219)

DISCUSSION

Q.—Are there not two factors in connection with corrosion—the external factor and the metal? The homogeneity of the metal has a considerable influence on the corrosion, and certain chemical plant has a liability to pit very much. Is Mr. Murray likely to expand his work to the protection of ordinary iron surfaces exposed to the atmosphere? It may sound fantastic, but could the labour of the men who are continually travelling backwards and forwards painting the Forth Bridge be cut out by arranging for this preformation of oxide film and then painting on to a good surface?

A.—The best example of lack of homogeneity of metal being responsible for corrosion is graphitic wastage. Carbon present in C.I. as graphite is quite distinct from the iron carbide in the rest of the metal. The oxygen and CO_2, but largely the oxygen, took the iron of the iron carbide into solution and left the graphite alone. There was a selective attack on the iron carbide. The protection of metal from atmospheric corrosion on a very large scale might seem to be a little fantastic. The significant thing was that if a piece of metal which had been planed and cleaned in a workshop was then put in a room which was fairly free from dust, at the end of about six weeks it would grow a sub-microscopic film of oxide. It was a protective film acting in a similar manner to the oxide film on stainless steels. It would not be as strong a film but it was present, and would be even. There should not be any difficulty experienced in building up phosphate or chromate paints on to a really good oxide film.

Q.—Has Mr. Murray any experience of the formation of phosphate films by secondary pickling of steel work after the removal of the mill scale? Has he any experience of the phosphoric film as a corrosion resistant?

A.—Phosphate films are good and serve as a very good base for protection.

Q.—What is the Hemmerdising method of treating an aluminium casting?

A.—Possibly the anodising method is referred to. If so, it has been demonstrated that anodising, a form of electrolytic oxidation, bestows marked corrosion-resistant properties because of this formation of a heavier aluminium oxide film on the parent metal.

Q.—It seems a little difficult at first sight to see how we can form the film, suggested by the author, on a large scale. Gasholder plates, for instance, are pickled to remove the oxide scale completely and then painted at once.

A.—Mill scale is not the type of oxide film required on a metal surface because it has been caused by high temperatures, and different oxides are formed at different temperatures. The type, adherence, and thickness of the oxide film are all of great importance, and the present practice of removing mill scale before painting is the right and proper way. In fact, it depends on the efficacy of removing the mill scale and cleaning the surface as to whether protection after painting is good or not.

Q.—We are thinking of polishing a small area of a gasholder and putting a temporary roof over to keep the rain off and leave it for, say, six weeks to see what happens.

A.—I do not think that will do, because you will have clean sheets of metal adjacent to dirty sheets. You could, however, use a bitumastic paint or some insulating material between the clean and the dirty sheets of metal, but there would be a potential difference between the two.

Q.—I would like to carry this question of muslin a little further. Air-borne dust goes down to about 1 micron in size at least. Is there some limiting minimum size of dust particles above which they must be kept from the surface or must all dust particles be kept out whatever the size?

A.—Vernon and I both use butter-muslin. At no point was the muslin nearer than ½ in., and never more than 2 in. away from the metal surfaces, and there was no visual evidence that any particles got through to the surface of the metal. It would seem that the size of the particle is material and there must be some critical size which starts the corrosion.

Q.—Might not the oxide film be unstable inside the muslin in a rainy atmosphere?

A.—If the specimen is completely surrounded by muslin, it is possible that there would be a difference in pressure inside and outside. An air current might be kept going through so that the temperature would be much lower inside than outside. It would be a very good idea to try that in a rainy atmosphere.

Q.—In an ordinary jet-condenser water-

cooling system using cooling towers, I have been exercised as to what is going to happen with water in constant circulation. Where the tower and the pipes are of concrete, is any deleterious action to be anticipated with a water which is kept at a high *p*H, using chromate?

A.—In the series of tests described, phosphates were used, which are the next best to chromate. Unfortunately, in laboratory experiments one of the great difficulties is to suspend the specimen in such a way that it is not in contact with any other material. In the experiments using phasphates, corrosion centres were set up where the specimen was in contact with glass; otherwise, the phosphate results would have been far better. I do not think we need worry about the effect of elevation of the *p*H value, because in many softening plants constructed in concrete the *p*H value of the water is 9.6-10.6, and after 20 years there is no evidence of the deterioration of the concrete.

Q.—What is the effect of chromate on non-ferrous alloys, *e.g.*, copper alloys? Does it protect them?

A.—I have tried the effect of chromate on copper and steel couples. In the platen press there were non-ferrous metals which became brittle before there was any treatment, but that has now been prevented by the use of chromate. With copper-steel couples, I have found protection in laboratory experiments. Chromate can be used with quite a number of non-ferrous metals, but I would not like to say, without reference, the precise effect. Dr. U. R. Evans read a paper before the Iron and Steel Institute about two years ago on the use of chromate and other inhibitors, and he dealt with the use of sodium chromate.

Q.—Is not normal chromate very stable?

A.—Yes, but when an electric current is passed through its solution, it is very different.

Metal Spraying

Q.—What is Mr. Murray's view with regard to metal spraying? Ten years ago I had all the wheels taken off my car and the metal was sprayed with zinc. Each wheel is now in just as good condition at the end of ten years.

A.—Similar considerations apply to that type of metal spraying as to protective paint. If the start is made with clean metal, and the protective metal is sprayed on evenly, the probability is that the job would be very good. Another consideration is to ensure that the coating itself is impervious to water. If there is one spot where the junction is not made right there would be the possibility of extreme local corrosion occurring.

Q.—Is it customary to get heavy corrosion in strong CO_2 concentration?

A.—A firm making machinery for bottling soda water gets over a great deal of trouble by using non-ferrous metal plant.

Q.—In 1933 or thereabouts very severe corrosion occurred in machinery handling wet CO_2. The gas was well scrubbed to remove the CO_2 and was then passed, supersaturated, through the compressing machinery.

Vernon has emphasised the rôle of the relative humidity of the gas or atmosphere surrounding the metal. With low concentrations of CO_2 and very much lower concentrations of SO_2, the action is very slow up to about 50 per cent. relative humidity, and from 50 to 80 per cent. the action is very much greater and at 100 per cent. relative humidity the curve rises almost vertically. The action is determined by the increased formation of the oxide film, and at 80 per cent. relative humidity the formation of the film is very rapid; so rapid that it becomes a discontinuous film, and once that forms corrosion can take place and all protection is gone.

We had a severe case of corrosion of well-water in condensers handling rectified spirit. There was the merest trace of SO_2 present and the corrosion again took the form of the very rapid formation of a discontinuous film. I put forward the theory that this was due to the fact that the whole system was completely free from any grease which, had there been a grease film, would have afforded protection against corrosion.

Importance of Relative Humidity

A.—I agree with everything that has been said. Relative humidity plays a large part under practical conditions, but under the conditions of the test in my laboratory, which were normal for this country, the six weeks' test was sufficiently long for the formation of an oxide film at normal temperatures. I agree that the greater the humidity the faster the formation of the oxide film and the less adherent and more discontinuous is the oxide film. I agree also that the oil in the well-water may have given rise to a partial cleaning of the surface of the metals.

Q.—I had well-water used for cooling which was very corrosive. After enemy action, some oil tanks containing refined petrol some distance away were discharged on to the ground and the oil seeped through the earth and, after a time, appeared in the well-water. Just after this occurred, the corrosion due to the well-water was very much increased, and although other factors are by no means ruled out, it was rather striking.

A.—I think that in some way or other parts of the pipe in the cooling system were being protected through having spirit on the metal surface, while other parts were not. Therefore, in some parts more oxygen was getting to the metal surface and creating differential aeration. A paper was recently published by the Iron and Steel Institute

on the effect of the oil in water (" Emulsions of Oil in Water as Corrosion Inhibitors " by P. Hamer,, L. Powell and E. W. Colbeck: February 1945).

Q.—If a cooler is designed to give maximum heat efficiency on a turbulent flow, is it possible to form a phosphate or a silicate film on the metal in order to stop corrosion, and is the film unaffected by the turbulence?

A.—The platen press is an illustrative example. There are here two circulating systems alongside one another working under similar conditions. Where water is going through to waste there is no corrosion, but when the cooled water is recirculated corrosion is rife, because the water supply has become thoroughly aerated and acidic through recirculation and air cooling. When this condition was corrected corrosion ceased.

This example refers more especially to pitting corrosion, particularly on the bends. This honeycombing process is obviated by elevating the *p*H value and by the presence of sodium chromate. The point may be put in the following manner: if the metal could first of all be allowed to stay in an atmosphere free of dust and soot so that the submicroscopic film formed, and then for the period of six months the film be fed with phosphate or chromate or something on those lines, it might be practicable to build up a film and to make it strong enough to withstand the turbulence and the erosive effects of impingement by water.

Q.—Would the sub-microscopic film form on the metal with a natural scale or is it necessary to machine it before the film can be formed?

A.—The original mill scale would probably have to be removed.

Q.—If the scale became injured would it not give rise to worse corrosion? It would be very important to have it mechanically stable.

A.—Yes. If the film were damaged and nothing was done about it, the corrosion would be worse in the sense that there would be, possibly, less general corrosion but more severe local corrosion. What would have to be done would be to feed the water in such a way as to repair any damage.

Austenitic Steels

Q.—Can the resistance of austenitic steels to corrosion be explained?

A.—These are protected by the development of the oxide film. If that is damaged in any way the film is repaired by the air itself and austenitic steels are more resistant to corrosion than plain carbon steels because of this self-healing effect. While austenitic steels score heavily in corrosion resistance, the drawback up to now has been fabrication and the cost of austenitic steel.

Q.—We have had mains carrying Manchester Corporation town water which have been attacked by corrosion at the end of two years. It is just possible that they may be subject to heat under static conditions; that is, when the water is static in the pipes—say, over the week-end.

" Aggressive " Carbon Dioxide

A.—The trouble is frequently experienced in Manchester and Liverpool and other towns which have soft water. There is a little carbon dioxide which, in a sense, is free, and which is referred to as " aggressive." CO_2 will attack the galvanised surface, which when ruptured will corrode very swiftly. One method of dealing with this problem is to pass water through lime so that there will remain in it a very small amount of lime which reacts with the CO_2 and produces a little chalk.

Q.—Could Mr. Murray give us some information regarding covering inside pipes, such as with graphite paint, or Dr. Watson Smith's method?

A.—The first thing to be careful about when applying a coating of any kind is to make sure that the metal itself is really clean. Next apply the graphite paint evenly. If the metal is not properly cleaned its subsequent condition will be much worse than if it had been untouched from the start because of the diference in potential.

Q.—In connection with the use of chromate and maintaining a fully aerated stream of water, if the current of water is very rapid so that there is a venturi effect in the pipe, a reduction of pressure will, consequent on the loss of oxygen from the solution, result in a differential oxygen concentration. Will there not be corrosion in the pipe just beyond the reduction in the diameter of the pipe? The oxygen concentration is due to release of air.

A.—I found quite definitely in the platen system I have mentioned, where heating and cooling takes place, that there were differences in oxygen solubility at points along the system, and particularly at the bends. There seemed to be some tendency for the oxygen concentration to rise at some parts and decrease again. You want to prevent the evolution of gas from one hot spot to a cooler spot. Therefore, you should try to get the most uniform rate of flow and keep the water reasonably well aerated. Then all you need to do is to determine the quantity of chromate required as a reserve to cover small differences in oxygen from point to point.

Q.—In the treatment of boiler feed, since the pressure of air is detrimental to heat transmission, the air should be blown out of the system. But will not the metal still be corroded because some air remains and it may vary in quantity throughout the pipe line?

A.—The difference in oxygen content from point to point must be remembered. If the whole system is completely aerated so that

there is no difference in oxygen content from point to point, corrosion will not proceed. If the surface of metal is protected from dust and soot particles, it will not tarnish. Vernon has shown that very clearly. Here is another argument in favour of smokeless fuels.

Q.—In atmospheric corrosion does the presence of SO_2 in the atmosphere matter in the concentrations in which it exists, if there is present no smoke to absorb it and keep it in contact with the metal, etc., of buildings?

Sulphur Oxides and Dust

A.—Vernon has shown that if SO_2 or SO_3 are present alone, there is formed, at certain temperatures, a continuous protective tarnish film on certain metals provided that the dust particles are kept from settling on the surface. I think that dust and soot particles are largely responsible because they set up centres of corrosion. The general wastage of metal starts with localised corrosion and then spreads.

Q.—Can you quote an actual case where corrosion by the condensate in the return mains has been reduced by de-aerating the boiler feed? If the feed-water is thoroughly de-oxygenated, the whole of the condensate system should be reasonably free from oxygen unless it is a vacuum system. Have you any cases in which you have really cut down corrosion in that way?

A.—No, I cannot mention any completed cases. At the moment there are two instances being experimented with by ourselves. We must for the moment accept the hypothesis that if we do oxygenate the water there will be no corrosion.

Q.—We have been able to prevent pitting round steam bonds, but pitting still occurs at the entry of the steam and/or water into our platens.

A.—It is possible you have released the oxygen in the steam at the point of entry. I would suspect the oxygen in the steam and/or water if the pitting cannot be put down to erosion due to the force of the steam and/or water.

Q.—Would the author agree that, below 400 lb./sq. in. pressure, de-aeration of boiler feed-water is not necessary.

A.—The best quantity of oxygen to have in a boiler is none at all, but in some installations working at 350 lb./sq. in., where no precautions were taken to remove oxygen, there has been little corrosion in the boiler. Sometimes I wonder whether we are not going too far in trying to inhibit corrosion by complicated methods when perhaps much more simple measures would give good results.

Q.—Would it be good to coat the boiler with an enamel?

A.—Of course, if you could get a 100 per cent. clean surface of metal and apply a graphite paint which was 100 per cent. continuous, 100 per cent. adherent and 100 per cent. impermeable to water, everything would be all right. But it is difficult to prepare a surface for graphite paint so that it is really continuous and even in thickness, and if the coating gets broken at any one point, most severe local corrosion is set up At one time it used to be the practice to lime-wash inside boilers. I believe that sea-going engineers always insisted upon doing that. In land practice it would be useful to apply a protective film which has 100 per cent. impermeability. However, unless the film were really continuous, I should be very chary of trying to paint the inside.

Q.—Are there not two problems in the industrial field of corrosion prevention? One is to try and get clean metal sheets such as you have mentioned protected against atmospheric corrosion; that problem has been solved by pickling and painting. The other problem is protection at higher pressures and temperatures.

Oxide Film

A.—I would rather like to think of it in another way, *viz.*, in a state of full aeration and a state of full de-aeration. There is full aeration in the case of gasholders and a state of de-aeration in many pressure plants. A great deal can be done by pickling, and the use of protective paints at low temperatures, but I still think that if, after pickling, you could protect that active surface—because it is very active—after you have cleaned it, and allow a normal oxide film to grow on it before the protection paint is put on, it would be much better as an anchorage for paint and the paint would last longer. At normal temperatures the film would grow in six weeks.

Q.—From the work of the Iron and Steel Advisory Committee in pickling and painting plates, it seems to me that that is all the commercially feasible protection we can hope for for a long time. Gasholder sheets are subject to both internal and external corrosion and at present the very best method appears to be the use of puddled iron.

A.—At the moment, yes. But I would recommend the formation of a film, in addition, as a very good idea.

Q.—I believe that sodium metaphosphate has been suggested for preventing corrosion. Also, sodium chromate has been suggested as useful in connection with river waters containing a fair amount of suspended mud. Some of us have to use these waters in our works and they are quite corrosive. Does mud interfere with the action of these reagents?

When we speak of feed-water corrosion, I think it is worth while mentioning the value of simple galvanising. I have a case in

mind in which this has been very successful. Zinc plates have also been used.

A.—I think mud would hamper the effect of metaphosphates and I would filter the water supply. Galvanising is no doubt very excellent, but trouble arises there if the coating is not continuous. Zinc plates have been found very useful but too much oxide must not be allowed to grow on the surface of the plates or there will be a reversal of polarity. Therefore, renew the zinc plates regularly.

Q.—It appears to be, bluntly, that we are getting no more forward. There are various compounds and compositions on the market which will keep down corrosion if the surface is treated. I have tried an innumerable number of these, including paint and boiler compositions, but I have not yet found one that will do the job perfectly. The great weakness is in being able to get a continuous film or protective surface. You can put skilled men on to brush and spray, but it seems to me that the dice are heavily loaded against a continuous protective surface. Therefore, I am inclined to feel that we must get back to protective metals.

I have three jet condensers working with a cooling tower at Liverpool. The water dropping to the bottom of the cooling tower took up sulphur from the atmosphere and the cast-iron bodies of the pumps corroded. We then went to stainless-steel shafts and phosphor bronze propellers and then the cast-iron bodies of the condensers went. We tried eight or nine different kinds of protective paint. We tried metal spraying, but the longest life was six months. Finally, we had to adopt acid-resisting metal right through, and until we can have some certainty of obtaining a continuous film throughout, it is a waste of time to use these things. Therefore, I think the solution of these troubles is non-corrodible metals. There may be instances where the trouble can be overcome by the methods we have been discussing, but non-corrodible metals, in my opinion, offer the only solution.

A.—Undoubtedly, you must find the best metal or alloy for the job, but I dispute the possibility of finding, *a priori*, a non-corrodible metal. The point is that as things are water will cause corrosion. I admit that alloys or metals can be found for particular jobs, regardless of cost, but you must find the best way of treating the water even when employing so-called corrosion-resistant alloys. The presence of SO_2 and SO_3 will lower the *p*H value, create acid conditions and promote corrosion.

Q.—We went into the question of water treatment for jet condensers I mentioned, and it was absolutely prohibitive in comparison with the cost of the acid-resisting metal which definitely cured the trouble.

A—It is all a matter of economics, of course.

Q.—In the case of a certain London power station working at a pressure of 2000 lb./sq. in. there was considerable difficulty with tubes going as the result of corrosion. Eventually, we had special fittings made for the high-pressure boilers and the trouble was overcome. This seems a strong point in favour of non-corrodible metals.

Q.—I do not think the average plant in this country should be made to last for 25 years, as is more or less the case now. Let us have austenitic steels or some good metal protection and do not let us be silly by using ordinary cheap metals and asking for something that will last 25 years. Let us have rusting away in six months and then replace. In the past we have made things ten times too heavy with the result that plant is out of date long before it is worn out. Let us get the economic view and not put up plants irrespective of plant cost.

A.—Economics undoubtedly enter into this, whether you treat the source of corrosion or eliminate corrosion, but you must provide something which will withstand the conditions without incurring unbearable expenditure on replacements.

Industrial Safety Gleanings

Escape Hatches

AT the new "Firestone" research laboratory building, at Akron, Ohio, which cost $2,000,000 and is sound-proof and air-conditioned, special safety devices have been installed. In every individual laboratory, in case fire or other accident should block the doorways, escape hatches have been provided so that workers can pass from one laboratory to the next.

Eye Protection

A new research programme has been inaugurated at the Battelle Memorial Institute, Columbus, Ohio, covering eye protection of industrial workers. It is sponsored by the American Society of Safety Engineers and the National Safety Council.

NON-FERROUS METAL PRICES

The Minister of Supply has issued a further list of selling prices of non-ferrous scrap metals for the period September 11-December 31 on the same terms as the previous list (*see* THE CHEMICAL AGE, June 16, p. 525). There are few changes in price, but the following additions should be noted: brass process scrap containing from over 58 to 62 per cent. copper, £38 10s. per ton; over 62 to 68 per cent., £43 10s. per ton; scrap cupro-nickel bullet envelopes (max. 0.08 per cent. antimonial lead), £67 per ton; scrap gilding metal bullet envelopes (max. 4 per cent. antimonial lead), £42 per ton.

Planned Stagnation

by SIR ERNEST BENN

EVERYTHING in life is now firmly fixed within what the pundits call an economic framework; nothing remains unplanned. Work is prohibited unless approved by a Labour Exchange; it is an offence to seek to employ or to be employed without the intervention of authority; shopkeeping is illegal except under licence; materials are unobtainable until bureaucratic "experts" have satisfied themselves that no more pressing priority can be invented; the chaotic freedom of the distributing trades—the most efficient service ever offered to man—has been abolished to make room for plans and pools; imports and exports have been reduced to what little can trickle through the closely woven mesh of licence and permission; millions of our people are forbidden to move out of their organised inactivity until innumerable overlapping authorities have co-ordinated policy. The energy released by the scientists from the atomic bomb is almost paltry when compared with the human energy nullified and rendered useless by the order of the planners.

The Rebuilding Muddle

The prospect of somewhere to live recedes daily into the dimmer future. Six or eight Ministers have presided over unnumbered inter-departmental conferences and struggled to shift the onus of another plan on to the shoulders of another authority. All private building has been stopped and the decay in the fabric of unbombed houses already exceeds the temporary patching and botching which is all that the experimental endeavours of unsuitable ability has been able to mobilise. The demoralisation of building labour is complete and the new recruits are to be trained by persons whose qualification to train may consist of no more than the receipt of an official salary.

The outside world is no less favoured. Dumbarton Oaks, Hot Springs, Bretton Woods, and San Francisco have elaborated and implemented the innocent unworldliness of the Atlantic Charter. Psychologists, experts, technicians, and "organised" scientists have joined the swollen ranks of international bureaucracy, and, with official privilege and priority, fly round the globe to confer and quarrel over the fate of masses of human beings, none of whom are presumed to have any brains of their own and all of whom are prohibited from acting otherwise than as decided by the rules of theory or the rgulations of the impossible. AMGOT, UNRRA and their opposite numbers in almost every country in the world parade themselves in uniforms, which notwithstanding the famine in clothes, are changed as rapidly as one stupid scheme or political trick succeeds another. From these overcrowded ranks thousands of self-respecting thwarted individuals, having discovered that *U Never Really Receive Anything*, are chafing to find a way of escape.

And all this and much more has been done, if you please, under the nose of a British Parliament which for ten years has been dominated by a substantial Conservative majority. That majority has deliberately sat back, maintained silence and allowed the planners to do their worst, rather than put the slightest hindrance in the way of the destructive work of war. Crass stupidity was never better backed by good intentions.

A very different situation has now arisen, for we have a much more substantial Parliamentary majority and the most powerful Government of recent times, who really believe in the theories and methods that have brought us to this pass. Four hundred M.P.'s and a hundred Ministers are pledged by all their gods to make a perfect world this way. Every obstacle to the achievement of that high purpose has disappeared. Profit—the very basis of the whole philosophy of Karl Marx—is repudiated with enthusiasm by the stupidest generation in our long history. Mr. Attlee's Government need not even pause to consider the lifeblood of all the progress of the past—the main spring, according to them, of all the ills they have so successfuly exploited. Competition—perhaps the first of Nature's laws—need give them no worry, for as Sir William Harcourt might say, "We are all trade unionists now." The practical processes of Supply and Demand have long ago been replaced by the statistical sophistries of Demand and Supply. For a full couple of generations, from thousands of platforms, Socialists have proclaimed that the economics of destruction, so successful in war, can be applied with equally satisfactory results to the piping times of peace. Nothing now stands between us and the complete realisation of these Utopian dreams—except that they are mad.

Paper for Pools

When, in my die-hard way, I have from time to time advocated the total abolition of control, I have been derided as an anarchist, but could only anarchy be as bad as organised suicide—for nothing less is in question. Witness the grave significance attaching to one of the first practical steps taken by the new Government. Whole shiploads of paper have been released for

football pools, in the hope, no doubt, that nationalised education has left the populace in well planned ignorance of the history of bread and circuses.

I do not myself believe it possible that forty-six million can all be good judges of practical economics, but I do protest against the iniquity of those who, knowing better, devote themselves to the deliberate encouragement of ignorance. When America a short while ago took the very exceptional course of acting in strict accordance with the terms of an international agreement, the public was alarmed, and rightly so. Thereupon, setting a new low standard of conduct on the part of British Premiers, Mr. Attlee professed a surprise, the less said about which the better.

It cannot be long before a hungry people will turn again to the business man as their only hope, and it is imperative that the business men should themselves understand, and make it clear to the people, that they can only function to the best advantage of society in freedom from bureaucratic interference. For the meantime our sense of humour is the only refuge left to us, and perhaps not left for long, for one of these New World M.P.'s has already demanded the international control of research!

The Miracle of Britain—six hundred and eighty-four souls, and mouths, to the square mile—is the work of Capitalism with all its inequalities and even hardships. We now have a Government pledged to find another and a better way. We shall see.

SAFETY FIRST

Annual Report of RoSPA

Lord McGowan on the Prevention of Accidents

AT the annual meeting of the Royal Society for the Prevention of Accidents, Lord McGowan, who presided, said that the annual report, like its immediate predecessors, revealed how the organisation had adapted itself to the conditions of war. They must now face the new conditions created by a return to peace, when accident problems were likely to be intensified rather than made less serious. The outstanding issue was how far they could adapt their organisation, and the lessons they had learned in the hard school of war, to the new needs.

From the beginning, the Society had put the utmost faith in local organisation. It believed now, as always, that local ingenuity and resource were essential supplements to any campaign, no matter how ably and enthusiastically it might be developed centrally.

Industry's Interest

The best proof of the growing practical interest which industry was taking in the subject was shown by three examples: the steadily increasing number of Area Industrial Groups formed all over the country—already there were 23 actively functioning, with a membership covering 1350 works, and others would shortly be formed; the interest taken in the special section for Industrial Safety Officers, formed temporarily within the Society, but which later might have its own separate entity on the lines originally evolved by the Birmingham committee; and the success attending the training courses for Industrial Safety Officers. Had suitable accommodation been available, these could have been multiplied almost indefinitely. They were also experiencing a growing demand for technical information of all kinds bearing upon industrial accidents.

I.C.I. and Safety in Works

"I am much interested in industrial accident prevention," Lord McGowan continued, "and take pride in the fact that my company is among the leaders in its attitude to organised accident prevention in its factories. It will be readily realised that manufacturers of chemicals and explosives have some rather special problems to face in time of war, particularly in the early stages of making new products of which no large-scale experience—and sometimes no experience at all—is available. You will understand, therefore, the special pleasure of my colleagues and myself in knowing that the pre-war work of our safety organisations has borne good fruit in these last difficult years."

"You will all be aware of the tremendous handicaps—losses of young skilled men to the Forces, reduced supervisory staffs, very great expansion of production, the employment of large numbers of workers new to industrial conditions, long hours of labour, the dangers of the black-out, the fatigue of travelling under adverse conditions, and all the other inconveniences of war. In spite of all that, our average frequency rate, counting every single accident which caused a worker to lose time, was 2.3 accidents per 100,000 man-hours for the whole period of the war."

"You will agree that that is a fairly good rate for heavy industry, especially when I emphasise that the statistics are

scrupulously maintained on the approved international standard and include many more than the reportable accidents for which frequency rates are often quoted."

A Notable Achievement

"One of our largest divisions, whose products were of vital importance to the war, and in which the numbers of employees rose approximately from 15,000 to 45,000, achieved successive diminutions in its accident rate throughout the war years to a total of 35 per cent. In a heavy chemical factory, an entirely accident-free record of more than 2,000,000 man-hours was achieved, and in a light munitions components factory, almost wholly staffed by women and girls, a period of more than 1,600,000 hours without an accident of any kind. I say this in no boasting spirit, but to show what can be done."

"Our total accident rate to-day, with our greatly increased numbers and the difficulties which we share with all manufacturers, is approximately 40 per cent. of what it was when we first started to organise on the Society's principles."

Continuing, the president said that even so, I.C.I. still had deplorable accidents which might have been prevented if care and forethought had been exercised. They realised that attention to safety must be unremitting and intensified, and they were now formulating proposals to strengthen their safety department. He had no doubt that many progressive industrial concerns were giving equally close attention to this aspect of factory management. They would, he hoped, share their experience through the Society and lend their influence to the establishment of the highest possible standards of safety in British industry.

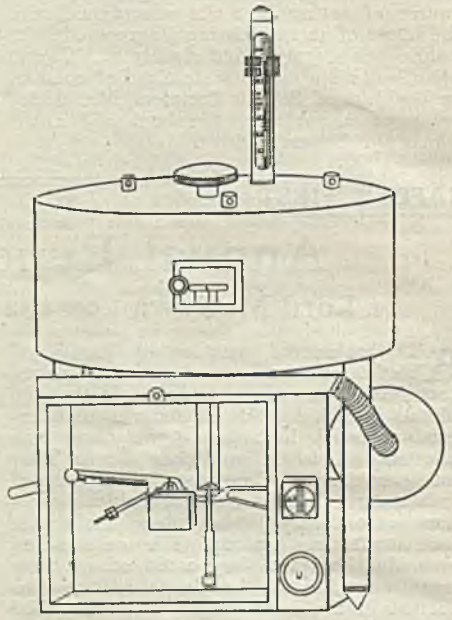
Reverting to the Society's report, he made reference to the fact that on both industrial and public safety sides, they had been required to carry out programmes approved by the Government departments. The latter had provided the necessary extra funds to permit of these programmes being carried out. Negotiations were in progress as to the transition from war to peace. The Society hoped to continue to receive Government support, but not such as would unduly tie its hands, or make it into a Government machine.

In moving the re-election of Lord McGowan as president, Mr. W. B. Phillips said that for some years Lord McGowan had been asking to retire from the position, but on this occasion he had insisted and would not consent to re-election for longer than three months. They all regretted this decision and were grateful to him for the services which he had rendered during his tenure of office.

Rapid Moisture Testing

New Apparatus Described

A QUICK simple method for moisture test has always been needed which can be used by unskilled attendants, but yet guaranteeing accurate results. The best principle is obviously the elimination of the water by heat. The illustrated moisture tester, made by Voss Instruments, Ltd., London,



N.W.10, consists essentially of a circular electrically-heated drying chamber, a circulating fan, temperature control, and a precision balance.

A maximum of 10 samples can be dried in the oven. The samples rest on a rotating disc which is operated by a hand wheel outside the oven. A small fan circulates the air in the oven and removes the moisture through some air-ducts. The temperature is controlled by a Voss Patent Contact Thermometer which can be adjusted to operate at any temperature on a given range. When the sample has been dried for a certain time, it is weighed in the oven by pressing the balance lever down. The balance then indicates the loss of weight as a percentage on an illuminated scale. Each sample is weighed successively by rotating the hand-wheel.

No analytical weighings and no calculations are required, and the result is a real one; this overcomes the disadvantages and discrepancies of electrical testing methods. In addition, many different materials can be tested without recalibration.

The Mineral Wealth of Bihar

Vast Future Possibilities

BIHAR is one of the poorest provinces of India, from the point of view of individual wealth, but as far as her mineral wealth is concerned, she is the richest. The present industrial civilisation is fundamentally based upon mineral products, and this poor province is at present playing, and should continue to play, an important part in the industrialisation of India. Just as the Punjab is regarded as the "Wheat Granary" of India, so may Bihar be termed the "Mineral Storehouse" of the country. Bihar has been able to establish some important mineral industries like iron and steel, copper, ceramics, and cement, and to utilise some of her minerals, but considering her mineral wealth, there is ample scope for the development of many other industries.

There are about 60 important minerals which are found in India. Some of them, however, occur in negligible quantities. With the exception of about half a dozen minerals like petroleum, strontium, cobalt and gypsum, which have not been found in Bihar, all the other Indian minerals occur here. There is a remarkable diversity in the mineral wealth of the Province, and this wealth is mostly limited to the southern half. separation of some of the States from Bihar and their inclusion under the Eastern States Agency has decreased the number and the quantities of the minerals worked in this Province. In 1938, Bihar was producing only a dozen minerals, but the province could easily produce an equal number of other minerals which occur locally in workable quantities.

Bihar is the only copper-producing province of India, though copper ore occurs in many other regions. She is the chief producer of mica, coal, and iron-ore. About 80 per cent. of the world's supply of high-grade mica comes from Bihar. Mica being a strategic mineral, this province has contributed a major share towards the winning of this war.

More than 50 per cent. of India's coal comes from Bihar, which is thus responsible for the growth of innumerable industries, especially in Northern India. The proper utilisation of coal and coal-tar should lead to the development of a by-products industry, and the establishment of the National Fuel Research Laboratory in the Jheria coalfield under the guidance of the Council of Scientific and Industrial Research is likely to help greatly in this direction. As

MINERAL PRODUCTION OF BIHAR FOR THE YEAR 1938, AS COMPARED WITH THAT OF INDIA.†

Mineral		*Production in* *Bihar*	*Production in* *India*	*Percentage of Bihar Production to Indian Production*	
				Quantity	*Value*
Coal	Tons	15,364,079	28,342,906	54.2	
	Rs.	53,710,370	106,423,835		50.5
Mica	Tons	4,218	6,158	68.5	
	Rs.	3,412,315	4,204,633		81.2
Copper ore	Tons	288,127	288,127	100.0	
	Rs.	3,240,640	3,240,640		100.0
Iron ore	Tons	1,421,090	2,743,675	51.8	
	Rs.	2,689,996	4,556,974		59.0
Building stone and road metal	Tons	1,301,600	8,767,340	14.8	
	Rs.	1,549,408	11,085,354		14.0
Manganese ore	Tons	24,469	992,795	2.5	
	Rs.	986,387	40,051,488		2.5
Clays	Tons	19,872	318,835	6.2	
	Rs.	158,360	377,595		41.9
Chromite	Tons	5,194	44,149	11.8	
	Rs.	99,928	682,502		14.7
Kyanite	Tons	830	28,385	2.9	
	Rs.	19,819	680,169		2.9
Steatite	Tons	692	18,590	3.7	
	Rs.	3,985	168,580		2.4
Gold	Ozs.	16	321,138	0.005	
	Rs.	996	30,475,397		0.003

† Compiled from *Records, Geological Survey of India*, 1939, 74, Pt. 3.

The Province produces minerals worth about 40 per cent. of the total value of minerals produced in India. In the appended table appear figures of production of the minerals which were worked in Bihar in the year 1938, as compared with the corresponding figures for the whole of India. The pointed out in THE CHEMICAL AGE of September 8, p. 213, the coal resources of Bihar will have an important part to play in the development of the Damodar River Valley.

Bihar contains one of the richest iron deposits of the world and through the famous Tata iron and steel works situated at Jamshedpur, she is helping in the rapid industrialisation of India. The iron and steel

* From an article by N. L. SHARMA, of the School of Mines, Dhanbad, in *J. Sc. and Ind. Res.*, 1945, *3*, 12, 566.

industry is likely to expand further with the manufacture of machinery required for Indian industries and also with the manufacture of different types of steels. The Province contains excellent deposits of limestone, which are being used for the manufacture of lime and cement. The cement industry is likely to expand enormously in the post-war period.

Though Bihar is not rich in clays, the quality of those that occur is excellent as will be evident from the abnormal differences in the two percentages—six in quantity and 42 in value—of the Bihar and Indian productions. There is no dearth of suitable glass sand and quartz in Bihar. The ceramic and the glass industries of the Province can thus be easily expanded. There are very good deposits of bauxite, but the works for its utilisation have been established outside the boundaries of the Province.

Belgian Chemical Notes

Financial Results for 1944 — National Chemical Exhibition

THE Ministry of Economic Affairs has published statistics showing the results of Belgian firms in 1944. (Figures in francs.) In the chemical industry, out of 278 companies with an aggregate capital of 2,485,508,000 and reserves of 380,707,000, 203 firms reported aggregate profits of 112,199,000, and 75 aggregate losses of 35,232,000, giving a net profit for the industry of 76,967,000, or 3.1 per cent. on the paid-up capital, from which 61,298,000 was distributed in dividends. The amount of fixed-interest capital rose during the year from 437,688,000 to 464,593,000, and 17,948,000 were paid in the form of interest.

In the various sections of the industry, 26 out of 36 firms in the mineral chemical industry reported profits amounting to 8,552,000, while 10 reported losses of 6,935,000, giving a net profit of 0.3 per cent.; seven out of nine firms in the nitrogen and allied industries reported profits totalling 956,000, while two reported losses of 3,874,000, giving a net loss of 0.3 per cent.; 23 out of 29 firms in the distillation and organic chemicals industry reported profits of 11,973,000, while six reported losses of 1,343,000, giving a net profit of 0.7 per cent.; 28 out of 30 firms in the fats and oils industry reported profits of 6,551,000, while two reported losses of 17,000, giving a net profit of 4,763,000, and six losses of 253,000, thus leaving a net profit of 13.6 per cent.; and two out of three firms in the match industry reported profits of 5,224,000, and one a loss of 86,000, giving a net profit of 2.7 per cent.

The appended table gives the picture of the present financial state of the Belgian chemical industry:

A National Chemical Exhibition is being held at Charleroi from September 12 to 22, under the ægis of a patronage committee headed by the Prime Minister, M. Achille van Acker, and containing M. de Smaele, Minister of Economic Affairs, and Senator Tirou, burgomaster of Charleroi. M. Albert Debecq, managing director of the S.A. des Produits d'Auvelais, is chairman of the management committee. A strong committee of honour, under the chairmanship of M. Solvay, and a scientific committee, under the chairmanship of Professor Mathis, director of the A.C.E.C. central laboratory, has been set up. Each day of the exhibition will be dedicated to a specific branch of chemistry. Among the firms participating are, *inter alia*, Solvay et Cie, the Union Chimique Belge, the Société Belge d'Azote et des Produits Chimiques, the Carbochimique et Carbonisation Centrale, the Produits Gevaert, the Produits Chimiques d'Auvelais, the Produits Chimiques de Tessenderloo, the Produits Chimiques de Limbourg, the Produits Chimiques de Fontaine-l'Evêque, la Floridienne, Promial, Bougies de la Cour, Lever Frères, the Soc. Belge d'Electrochimie, and "Stif."

	Paid-up ordinary capital		*Reserves*		*Fixed interest capital*	
	'000 *frs.*	%	'000 *frs.*	%	'000 *frs.*	%
Mineral chemical industry	590,255	23.7	132,764	34.9	183,270	39.4
Nitrogen and allied industry	781,400	31.4	20,316	5.3	126,965	27.3
Distillation and organic	157,021	5.8	28,044	7.4	—	—
Fats and oils industry	69,434	2.8	11,451	3.0	13,591	2.9
Paints and varnishes	95,290	3.8	19,269	5.1	7,369	1.6
Pharmaceutical products	33,358	1.3	11,576	3.0	4,000	0.9
Match industry	192,000	7.7	11,545	3.0	—	—
Miscellaneous chemicals	566,750	23.5	145,742	38.3	129,398	27.9
	2,485,508	100.0	380,707	100.0	464,595	100.0

Rare Earth Fluorescence Spectra

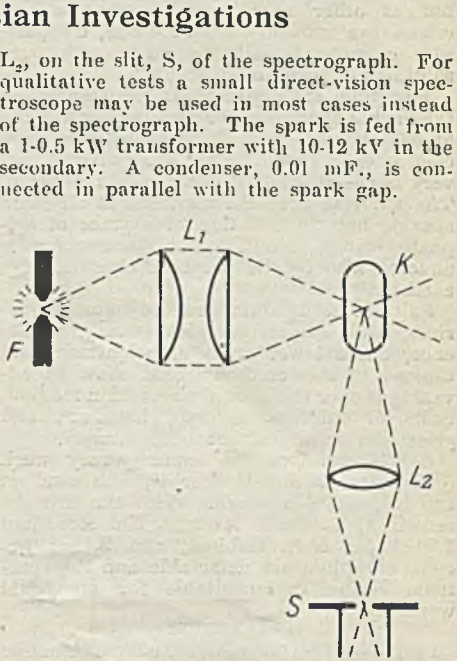
Development of Russian Investigations

THE metals of the rare earth group are so alike in their chemical behaviour that analytical determinations by chemical methods are exceedingly difficult and tedious, and, as a consequence, physical methods are being favoured; these include the examination of emission spectra in the visible, ultra-violet, and X-ray ranges, and also of absorption spectra. The possibility of using cathode luminescence and fluorescence has also been considered.

The results of studies of these methods by Zaidel and co-workers, which have extended over a number of years, have recently been summarised in a paper published in the *Transactions* of the 1943 All-Union Conference on Analytical Chemistry[1]. They show that the visible and ultra-violet emission spectra are difficult to use even for qualitative analysis, on account of their complexity, and almost impossible for quantitative analysis, since the lines of one element are in general superimposed upon those of another. On the other hand, X-ray spectra may be used for quantitative analysis of all the rare earth metals with an accuracy of 3-5 per cent., but they are not suitable for amounts of less than 0.01 per cent., and the cost and complexity of the apparatus required renders the method less useful. Absorption spectra are very widely used, since most salts of the rare earths give narrow bands which occur in the near infra-red, visible, and near ultra-violet. Nevertheless, considerable interference can take place when mixtures are present in solution and Zaidel states that, at present, it is impossible to carry out accurate quantitative analysis by means of the ordinary absorption spectra unless one has a standard solution which is of the same composition in respect of all the rare earth metals and other impurities as the solution which is to be analysed, a requirement which obviously invalidates the method.

Attention has therefore been paid to the possibility of using fluorescence spectra, and Zaidel's investigations have shown that solutions of a number of the rare earth salts have very characteristic spectra of this kind, and that they are suitable for analytical determinations, particularly in the case of very small concentrations, which are difficult, if not impossible to detect by any other method. The principle of the method employed is illustrated in the diagram.

A condensed spark, F, serves for exciting the fluorescence of the solution to be tested, which is placed in the quartz flask, K. Light from the spark is focussed inside the flask by the quartz condensing lens, L_1, and the fluorescent light is focussed by the lens, L_2, on the slit, S, of the spectrograph. For qualitative tests a small direct-vision spectroscope may be used in most cases instead of the spectrograph. The spark is fed from a 1-0.5 kW transformer with 10-12 kV in the secondary. A condenser, 0.01 mF., is connected in parallel with the spark gap.



Terbium salts show the most characteristic and bright fluorescence in the visible spectrum (yellow-green), with four narrow bands of high sensitivity at wavelengths 488, 544, 589, and 621 $m\mu$. The optimum excitation conditions (2100-2300 A.U.), occur with a spark between nickel electrodes. Quantitative determinations are possible. Regarding sensitivity, no pure preparations of terbium were available, but by working on the upper limit for terbium quoted for Hilger's S.P. Dy_2O_3, it was established that the lower limit of visibility was less than 10^{-6} per cent., an amount not detectable by other means.

Cerium salts give one wide but very intense band between 315 and 407 $m\mu$ (violet), obtained best by means of iron electrodes. The intensity does not depend upon the presence of relatively large quantities of other rare earths. Cerium in a concentration of 10^{-7} per cent. can be determined easily to an accuracy of 30-40 per cent. of its content. The accuracy can be raised by more careful standardisation of the sparking conditions, and by increasing the number of determinations. Cerium must be present as Ce^{3+} and as Ce^{4+}. The time of exposure is 5-10 minutes, and a complete determination may be made in two hours.

Gadolinium salts give one extraordinarily bright and very narrow band at 310 $m\mu$. Iron electrodes and a quartz spectrograph

are used. A content of 10^{-4} per cent. gadolinium in solution can be detected, and the method is suitable for quantitative purposes, but as other rare earths (sulphates) increase the intensity of the band, comparisons cannot normally be made with pure solutions of gadolinium sulphate.

Europium salts give a series of bands in the visible spectrum, the two brightest being at 593 and 616 $m\mu$. A spark between iron electrodes is used. The sensitivity is not very high—about 0.01 per cent. in solution. The chloride does not fluoresce at all (iron spark), but the addition of a trace of sulphate brings it out. The fluorescence is affected also by the presence of other rare earths.

Salts of neodymium, praseodymium, samarium, and dysprosium also cause fluorescence, but a lower order of brightness, and the use of this method would show no advantages over the normal absorption method. Salts of thulium, erbium, holmium, and ytterbium have not yet been studied.

Zaidel mentions the contemporary work of Tomaschek and Gobrecht[2], who used an arc instead of a spark. With the arc the sensitivity is much lower. Not less than 3.10^{-2} per cent. terbium, and 2.10^{-2} per cent. europium are detectable and the spectrum cerium is unsuitable for analytical work.

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[1] Zaidel and Larionov, *Trans.* of All-Union Conference on Anal. Chem., 1943, 2, 615 (In Russian).
[2] Tomaschek and Gobrecht, *Ann. Phys.*, 1937, 29, 324.

Silica Sand in Scotland

The Deposits at Loch Aline

THE valuable deposits of silica sand at Loch Aline, Morven, Argyllshire, have been worked since August, 1940, and have not only materially assisted the British optical equipment and allied glass industries in that period but also have laid the foundation for a permanent activity. The commercial value of the deposits was brought to the notice of the authorities by Sir Edward Bailey in 1925, but they were not worked until war stopped the import of foreign sands. Previously, the bulk of British requirements were supplied by Holland, Belgium, and Germany.

The primary value of these sands lies in their extremely low iron content, the selected grade used for high quality optical glass containing an average, before washing, of .015/.018 per cent. iron. Silica content is, on an average, 99.65 per cent. and there is no trace of chromite. Already the sand is being used for a great many purposes in the glass industry—for optical glass, domestic and decorative glass, crystal and instrument glass. It has also been used in scientific laboratory ware, in the manufacture of food containers, and for many other purposes, some of which are still on the secret list. The volume of inquiries received by C. Tennant, Sons & Co., Ltd. (who control the workings through Charles Tennant & Co., Ltd., of Glasgow, who work the deposits), shows that the demand will fully take up an increased output above that already available.

At present some 30,000/40,000 tons per annum are being extracted by a small labour force of some 40 workers. When it is possible to improve the present housing, catering, and entertainment difficulties, which limit the attractiveness of the site, it is hoped to increase this labour force. Over the period of working some 150,000 tons of sand have been moved by sea to the consuming centres, and undoubtedly the sand has been a material factor in encouraging the development of the British glass industries.

The sand is white sandstone of the greensand bed of the Cretaceous system, which is fairly widespread in this area of Scotland. It is mined, as the upper roof of basalt makes open-cut quarrying impossible. The sandstone, when blasted, disintegrates easily, but it forms a strong enough rock, in the solid, to permit mining to be carried out without propping or pillaring. Nor is there any serious seepage of water or gas to combat the process.

Scrape loaders lift the sand and it is then hand-trammed to assembly points where small Diesel locomotives pull the trucks to a processing plant at the pier head. Sand is tipped into a 40-ton hopper and then fed by conveyor over a series of screenings and washings before being delivered into a storage bunker taking about 1500 tons. Under the bunker is a trough with a shuttle-girder at the discharge end which can be extended over the holds of ships.

PENICILLIN RESEARCH FUND

Fifteen U.S. penicillin producers have completed the research fund pledged to Sir Alexander Fleming on the occasion of the dinner in his honour in New York on June 25. The fund, which is to be known as the Alexander Fleming Fund, amounting to more than £20,000, will be placed in a trust, and the income and principal will be devoted to scientific research under the direction of Sir Alexander Fleming at St. Mary's Hospital Medical School, University of London. Sir Alexander is being given the widest latitude in the use of the fund for scientific purposes, and the results of the research will be free for use by anyone with no restrictions whatsoever. The University of Pennsylvania is to administer the fund.

New Control Orders

Relaxations in Import Licensing

WITH effect from September 8, the importation of the following further goods from all countries is now authorised: bauxite, felspar, fireclay, fluorspar, gypsum (unburnt, including alabaster), kelp, kyanite, monazite sand, nickel ores, concentrates, residues and matte, seaweed (raw, unground, dried, or bleached, but not further prepared or treated), sillimanite, slag (other than basic).

Trade with Italy

Three Orders made under the Trading with the Enemy Act were signed on September 5, authorising persons in the United Kingdom to resume trade in goods with Italy (S. R. & O., 1945, Nos. 1098-1100). Italian property in the United Kingdom at the date of the Order, and income arising therefrom, continue to be under Board of Trade or Custodian control.

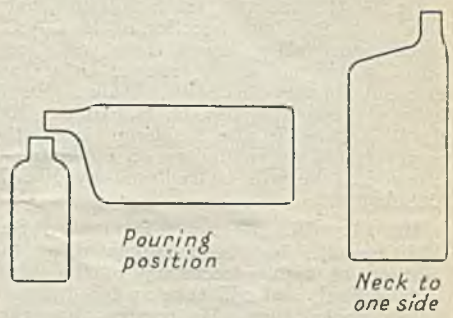
From now on U.K. traders will be free to negotiate contracts with the appropriate agencies of the Italian Government. Traders who wish to import goods from Italy should first ascertain from Italian suppliers whether there are goods available for export from that country, and their price and terms of sale, and should then approach the Import Licensing Department, 1-6 Tavistock Square, London, W.C.1, to find out whether an import licence will be issued. Import licences will not, in general, be granted for goods not, for the time being, licensed from other countries. If and when the import licence has been granted, the recipient should write to the Instituto Nazionale per il Commercio Estero, 107 Via Torino, Rome, with whom contracts will be completed. The Instituto will be responsible for the payment in lire to the Italian supplier and for arranging necessary shipping and supervising packing. Payment by the U.K. trader in accordance with the contract terms should be made to an Italian sterling account.

Traders who wish to export goods to Italy may correspond with intending Italian clients, for the purpose of providing information about types and prices of goods. It will then be for the Italian importer to make arrangements with the Italian Government for the inclusion of his requirements in the programme of goods which the Italian Government wish to purchase in the United Kingdom. Contracts will be made on behalf of the Italian Government by the Italian purchasing agent established in London at 14 Three Kings Yard, Davies Street, W.1 (MAYfair 9791), who will also be responsible for payment in cash and for shipping facilities. He or the trader acting on his behalf will also be responsible for obtaining an export licence where necessary. Traders are advised that so far as practicable they should accept orders only against irrevocable credits opened by the banks against cash transfers by the Italian Government.

LETTER TO THE EDITOR

Suggested Design for Winchesters

SIR,—Although I have had many years' experience in chemical laboratories I find it almost impossible to pour liquids out of a Winchester bottle (4-pint size) and avoid splashing of the contents, until the Winchester is about one-quarter empty. This is mainly due to air not being able to enter freely to replace the outgoing liquid. I suggest that if Winchesters were made according to the design illustrated this difficulty would be entirely obviated. I realise that an inlet and outlet tube could be fitted, but this would necessitate a cork, or rubber bung, and with acids the life of these would be very short.



I approached a well-known manufacturer with the suggestion and the reply was, "The suggestion will not commend itself to the trade generally. The Winchester pattern bottle has been adopted by the British Standards Institution as its standard in the present pattern, and we feel confident they would not favour the alteration. To obviate spilling, when pouring out, it is only necessary to have a lip or spout on the bottle neck, as in the latest types of ink bottles."

I do not see how a lip would overcome the splashing, as I feel this is entirely due, as I state, to air not being able to enter freely. I realise that new moulds would be necessary to manufacture this type, but users would, I feel certain, not object to paying a little more for a Winchester if this difficulty could be obviated.

I wonder whether the suggestion commends itself to the laboratory workers, who must be continually meeting this difficulty. —Yours faithfully,

C. G. DURDEY.

Personal Notes

MR. J. STEWART COOK has been appointed as organising secretary of the British Association of Chemists.

MR. L. P. B. MERRIAM, M.C., has been released by the Minister of Supply from his post as Controller of Plastics.

MR. ROY INNES, B.Sc., has received the appointment of general secretary to the Association of Scientific Workers, and takes over his duties this month.

MR. NORMAN NEVILLE, director of the British Chemical Plant Manufacturers' Association and of the Food Machinery Industrial and Export Group, is leaving for India to discuss with Government Departments and Industrialists their long-term requirements for chemical plant and food machinery.

DR. G. H. WHITING, the foundation chairman of the St. Helen's section of the B.A.C., has resigned after almost three years' service, on account of his transfer to a Government factory in South Wales. He is being succeeded by MR. G. H. RILEY. MR. J. T. ABRAMS is also resigning from the secretaryship on taking up an appointment elsewhere; he will be replaced by MR. J. PENDLETON.

MR. R. W. REYNOLDS-DAVIES, B.Sc., M.I.Chem.E., has been appointed to the position of deputy secretary of the Institute of Fuel, and will take up his duties in a few weeks' time. He received his technical education at University College, Cardiff, and at the South Wales School of Mines. He has had a wide experience as a chemical engineer and fuel technologist, obtained, first of all, as chemist on the coke-oven plant of the Cambrian Combine, now merged with the Powell Duffryn Associated Collieries. Later on, he was engaged as assistant with the late Dr. Ormandy on power alcohol and petroleum products. This work was followed by nine years as one of the chemical plant managers with the British Industrial Solvents. For the past three years he has held the position of manager of the development department of the Royal Ordnance Factory, Bridgend.

Obituary

MR. DAVID N. R. MCEWAN, who died in an Edinburgh nursing home on September 4, was chief chemist of Patons & Baldwins, Ltd., Alloa, Clackmannanshire.

DR. DAVID PRENTICE, Ph.D. (Heidelberg), technical chemist, formerly of Lymm, Cheshire, died at Uddingston, near Glasgow, on September 5, aged 72.

MR. ERNEST LANCASTER-JONES, B.A., who died at Maidenhead, Berks., on September 9, aged 53, after a short illness, was well known to chemists of all grades as Keeper of the Library at the Science Museum. He served in the Royal Engineers in 1916-19, and became assistant-keeper at the Museum in 1920.

PROFESSOR WALTER HEINRICH FRAENKEL, who died on July 14 at Perth Amboy, N.J., at the age of 66, was an internationally known metallurgist. Born in Silesia, he was educated at Leipzig and Heidelberg. He eventually became associate professor of metallurgy at Frankfurt University. An exile from Germany, he spent a year at Cambridge, and left for the U.S. in 1940, where he worked for the American Smelting and Refining Co. His special subjects were precipitation hardening alloys.

DR. H. K. SEN, M.A., D.Sc., who died at Calcutta on June 3, aged 56, had been director of the Lac Research Institute, Ranchi, Bihar, since 1936. By his death, India loses one of her most brilliant chemists, a man who had achieved equal fame in the laboratory, in the lecture-room, and in industry, and whose work revolutionised the technique of organic and physical chemistry in India. A native of Eastern Bengal, he went to London in 1912 after obtaining the M.A. degree at Calcutta University, and, working as a research student at the Imperial College, he received the D.Sc. degree in 1915, the degree being awarded for the first time to an Indian candidate working as an internal student of the University of London. At the end of 1914 he was chosen as leader of a team of research workers from the Organic Chemistry Department to evolve a process for the preparation of β-eucaine, an anæsthetic until then obtained only from Germany and urgently needed for war purposes. His successful production of the drug was received with acclamation by the Chemical Society. A year later he returned to India, and after an attempt to start a chemical industry in Calcutta, he found employment as an industrial chemist.

In 1920, however, he was appointed to the new Chair of Applied Chemistry in Calcutta University, a post which he held with great distinction, and greatly to the benefit of the chemical industry in India, until his transfer to the Lac Research Institute in 1936. During his leave periods from the University he carried out researches on biochemistry with Neuberg and others at the Kaiser Wilhelm Research Institute, Dahlem, and on the technique of high-pressure reaction experiments with Bone and others at Imperial College. Sen was twice married, first to a compatriot, and later to the daughter of Professor Emich, of Graz, Austria.

In 1927, Dr. Sen was elected president of the Indian Science Congress at Lahore; in 1930 and 1935 he was president of the Indian Institute of Chemistry, and in 1940 of the Indian Chemical Society.

General News—From Week to Week

The public telegraph service between Britain and Poland has now been restored.

Palestine, Canada and Newfoundland are countries that have recently been added to the "Hints to Business Men" series (H.M.S.O., 6d.).

Limited supplies of nylon yarn, hitherto used in this country for parachute fabric and cords exclusively, are to be released shortly for the manufacture of civilian goods.

Fuel Efficiency Bulletin No. 42, issued by the Ministry of Fuel and Power, is entitled "The Recovery of Waste Heat from Flue Gases." A particularly interesting section covers the application of waste heat boilers to specific industries.

A committee, on which Mr. F. L. Barrett, F.R.I.C., represents the interests of chemistry, is now engaged in arranging a programme of meetings for the new Bolton Section of the Textile Institute, the formation of which was resolved upon in July. It is expected that monthly meetings will start in October.

I.C.I. are reported to be contemplating the purchase of the M.A.P. factory on the outskirts of Swansea. Besides continuing the industry now established there, I.C.I. may develop the site for industrial purposes. It is hoped to find employment for 1400 people in the next twelve months.

Latest reprints issued by the London Shellac Research Bureau include "Lac Derivatives as Resin Plasticisers for Cellulose Lacquers," by Dr. B. S. Gidvani and Mr. N. R. Kamath (from *Paint Manufacture*), and "The Hot-Spray Method of Coating Paper with Plastic Material," by Mr. N. N. Murty (from *Plastics*).

The Imperial Institute is starting a series of lectures on recent progress and developments in Colonial geology and mineral production to make up some of the leeway which has been occasioned by war-time restrictions on publicity. Each lecture will be devoted to a particular territory and will be given by a recognised authority, such as the director or a senior officer of the Geological Survey or Mines Department of the country concerned.

Eire's Emergency Scientific Research Bureau, now closed down, cost £19,250 during the financial year 1944-1945, according to statistics just issued in Dublin. The cost of the State Laboratory was a further £10,652. It is expected that the Government will take steps to introduce legislation for a Research Bureau to replace the Emergency Bureau, which was set up directly under the Department of the Prime Minister for the war years.

In connection with our note on the production of *o*-phenantholines in the U.S. (*see* THE CHEMICAL AGE, August 18, p. 144), L. Light & Co., Ltd., Wraysbury, Bucks, inform us that they are the sole manufacturers in Great Britain of this substance which is being distributed by Hopkin & Williams.

An authoritative statement has been issued by Mr. Robert Crichton, of Scottish Oils, Ltd., indicating that the company does not intend at present to increase the facilities at their Westwood Works, Broxburn, in order to provide additional fuel. This intimation follows earlier reports that a considerable development was being planned.

The wholesale prices of industrial materials and manufactures showed only one change in August as compared with July, according to the Board of Trade index figures. The index for chemicals and oils dropped 0.5 per cent., from 150.7 to 150.0, the reduction being entirely due to the fall (as from August 21) in the prices of petroleum products, most of which had remained unchanged since February, 1942.

Foreign News

A new sulphuric acid plant is under construction in the Caicona region of Bolivia.

Substantial developments occurred in Brazil's plastic-moulding industry last year, and plans have been under consideration for the production of cellulose acetate moulding powder.

The chlorine-caustic soda plant, which is part of Basic Magnesium, Inc., at Las Vegas, Nevada, has been taken over by the Stauffer Chemical Co. The plant, which has been supplying the magnesium unit with chlorine, will continue chlorine production for industry now that magnesium metal manufacturing has ceased.

By agreement between London and Washington, the British-American Co-ordinating Committee in Ankara has ceased to operate in its present form on September 8. The committee set up in 1941 has been responsible for making recommendations to H.M. Government and the United States Government as to the quantities of essential civil supplies required to maintain the Turkish economy. It played a valuable part in assisting Turkey to resist German penetration. The end of the war and changes in the supply and shipping position have now rendered the committee's work unnecessary, and in future control over the export of scarce commodities will be exercised directly by London and Washington, says an announcement by the Board of Trade.

The Celanese Corporation of America has established at Princeton University the Celanese Corporation Fellowship in Chemical Engineering, tenable for a term of five years from the time of the appointment of the first recipient.

Finnish superphosphate plants will use apatite, the first consignment of which has now arrived in the country. Several ten thousand tons are to be supplied this year, and the superphosphates produced from it is to be distributed for the spring campaign.

Belgian rock-phosphate imports since the liberation have amounted to 52,000 tons, and another 150,000 tons are expected before the end of this year. The bulk of the superphosphate output will be needed for the current requirements of Belgian agriculture.

To increase production of sulphuric acid in Brazil, a new plant is being established in Pernambuco, with a daily capacity of 20 metric tons; part of the output will be used in making superphosphates for sugar plantations.

An agreement between the Lebanese Government and United States oil companies for the building and working of two oil refineries at Tripoli, in Northern Lebanon, will shortly be submitted to the Lebanese Chamber for ratification.

A shaft more than 14,000 ft. deep has been drilled in search of oil off the coast of Prince Edward Island, constituting a record for the British Empire. So far, no oil has been struck, but the drilling will be continued, says Reuter from Montreal.

To arrive at a decision regarding a research programme for an arrowroot industry in St. Vincent, Mr. A. R. Williamson, a starch technologist selected on the advice of the Ministry of Food, has carried out a special investigation.

Under a trade agreement with Denmark, Norway is selling to that country fertilisers, wood pulp, calcined sodium, rare ores, pig iron, zinc, aluminium and whale oil. Denmark will sell Norway butter, pork, barley, sugar, molasses, seeds, pharmaceutical products and machine tools.

The Dominion Magnesium Co., Ltd., reports that it has been operating at capacity and, in addition to new Canadian business for peace-time purposes, the company has just received a very substantial order from Russia which assures capacity operations for some time.

A new process for strengthening aluminium by heat treatment, devised by several Pacific North-West firms, has been put to work for the first time by the Oregon Brass Works at Portland. The process generally involves heating the aluminium by gas, frequently almost to its melting point, and cooling it by water or blasts of air.

To make a study of the chemical possibilities of Peru, Mr. C. C. Concannon, chief of the chemical division of the U.S. Department of Commerce, has left Washington. In the first half of last year he carried out a similar investigation in Chile. It is reported that his next destination is to be China.

The vanadium content of the Frickthaler iron ores might, according to the *Neue Zürcher Zeitung*, form the basis of a new Swiss industry. However, the Jura Bergwerke A.G. (Frick) maintains that the smelting possibilities of the Frickthaler ores depend on whether or not the price of electric power can be lowered.

Ceria has been developed, as an abrasive for polishing optical glass, by Research Enterprises, Ltd., Toronto, and has proved highly satisfactory, especially on account of its extreme insolubility and cleanliness. At present its cost is considerably greater than that of rouge, but a little goes a very long way.

The Swedish Advertising League has issued the first number of a quarterly review, *The Swedish Market* (*Den Svenska Marknaden*), intended to inform customers of significant developments and special tendencies on the Swedish market. Counsellor Bertil Ohlin, author of "Propaganda for Freedom in Earning a Living," is one of the contributors.

Owing to the acute shortage of imported cement in Kenya, it is likely that a substitute will be made from local materials. According to the secretary of the East African Industrial Research Board, this substitute can be made from local lime, and the volcanic tuffs and pumices widely occurring in the country. The manufacture of "Pozzolime" is said to be simple and economical.

Flat window glass was manufactured for the first time in Brazil when a new company, located in the State of Rio de Janeiro, began operations during 1944. The plant, with a production capacity of 9000 metric tons, produced 4200 metric tons. Another glass factory, also having a production capacity of 9000 metric tons, is being constructed in the city of S. Paulo and is expected to begin operations this year.

The Director of the Biological Institute of Portugal, Dr. Cándido Anca, has succeeded, according to *Afinidad*, the journal of the Chemical Institute of Sarriá (Barcelona), in obtaining a yield of penicillin, from *Penicillium notatum*, ten times greater than that obtained in Britain or the U.S., by employing a special catalyst. He also claims to have produced an artificial serum, with remarkable therapeutic properties, by means of a filtrate of ascomycetes, without having recourse to the infection of animals in the laboratory.

Forthcoming Events

September 19. British Association of Chemists (London Section). Assembly Hall, Royal Empire Society, Northumberland Avenue, London, W.C.2 (entrance in Craven Street), 6.30 p.m. Open meeting: "Social Security for Chemists."

September 21. British Association of Chemists (St. Helens Section). Y.M.C.A. Buildings, 7.30 p.m. Dr. H. Moore: "Research in the Post-War World."

September 21. International Society of Leather Trades' Chemists. Lecture Theatre, New Chemistry Building, Leeds University, 2 p.m. Professor A. C. Chibnall: "The Contribution of the Analytical Chemist to the Problem of Protein Structure."

September 27. Association for Scientific Photography. Alliance Hall, 12 Caxton Street, Westminster, London, S.W.1. 6.30 p.m. Mr. R. Peel: "Recording Engineering and other Work by Stereoscopic Photography."

Commercial Intelligence

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

Mortgages and Charges

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

ALFRED BISHOP, LTD., London, E.C., manufacturing chemists. (M., 15/9/45.) August 11, charge, to Westminster Bank, Ltd., securing all moneys due or to become due to the bank; charged on land and factory at Garden Walk, Chesterton, with fixtures. *Nil. August 14, 1944.

J. BARCHAM GREEN, LTD., Maidstone, paper manufacturers. (M., 15/9/45.) August 21, mortgage, to National Provincial Bank, Ltd., securing all moneys due or to become due to the bank; charged on Hayle Mill and adjoining land at Loose, with plant, utensils, etc. *Nil. July 29, 1944.

UTILITY FERTILIZERS, LTD., Grays. (M., 15/9/45.) August 20, £500 debenture, to R. B. Asplin, Grays, and another; general charge.

Satisfactions

SILEXINE PAINTS, LTD. (formerly SILEXINE, LTD., SILEXINE DECORATORS, LTD., & RESTOR, LTD.), London, W. (M.S., 15/9/45.) Satisfaction August 24, of debenture registered September 15, 1941.

LANDLIMES, LTD., Bridlington, fertiliser manufacturers. (M.S., 15/9/45.) Satisfaction August 23, of debenture registered November 2, 1942.

Company News

The Leeds Fireclay Co., Ltd., for the year to June 30, after crediting £12,201 profit on realisation of an investment, reports a loss of £10,830 (profit £16,893). Ordinary dividend is again nil.

New Companies Registered

Classic Chemicals, Ltd. (398,083.)—Private company. Capital, £3000 in £1 shares. Manufacturers of and dealers in chemicals and chemical products. Directors: A. E. Stoney, J. G. Stoney, partners in Stoney Bros., and W. S. McBay. Solicitor: Alan Ashcroft.

Parke, Davis & Company, Ltd. (F.3708.)—Particulars filed August 9, 1945, pursuant to Section 344 of the Companies Act, 1929. Capital, $50,000 in $1 shares. Incorporated in Colorado, U.S.A., on May 14, 1945. Manufacturers of and dealers in drugs, medicines, chemicals, etc. The British address is 50-54 Beak Street, Regent Street, W.1. Directors: E. Brier (president), N. H. F. McLeod, C. Thurber, N. T. Viger, A. W. Lescohier. All U.S.A. citizens, but the two first named are of British origin. Principal office: Denver, Colorado.

Chemical and Allied Stocks and Shares

STOCK markets have continued quiet, attention being centred on the important Washington talks, and movements in most sections were small and indefinite. British Funds eased, but later responded to the suggestion that interest rates may be further reduced. Following their recent advance, foreign bonds reacted on profit-taking, including Greek and other European stocks which came in for attention at the end of last week.

Imperial Chemical remained firm at 38s. 7½d., with Turner & Newall 78s. 9d., Distillers 114s., and Dunlop Rubber 51s. 6d. Elsewhere, Lever & Unilever continued to attract attention on market hopes of an improved dividend, and strengthened further to 51s. 9d., with Lever N.V. also higher at 52s. 6d. United Molasses eased to 41s. 6d., and Radiation to 56s. 6d. Selective buying of iron and coal shares raised prices moderately, Dorman Long being 26s. 3d., Hadfields 30s. 3d., South Durham Steel 28s. 9d.,

Thomas & Baldwins 12s. 4½d., and United Steel 24s. 3d. Yields in many cases are attractive, and the prevailing market view is that there seem reasonable prospects of dividends being maintained. In many instances war-time dividends have been conservative, a good proportion of profits having been used in building up reserves. Staveley were 45s. 9d. xd, and Tube Investments £5 11/32, while on the company's important contract in connection with the new Iraq oil pipeline, Stewarts & Lloyds deferred moved up to 52s. 6d. Babcock & Wilcox were 57s., and elsewhere Projectile & Engineering rallied to 28s., while on further consideration of the results and chairman's annual statement, Davy Engineering moved up to 34s. Guest Keen, however, eased to 39s. 3d., and Whitehead Iron to 80s.

Triplex Glass rallied further to 41s. 10½d., awaiting the full results. Wall Paper Manufacturers deferred firmed up to 41s.; yield on the last-named is small, but the market assumption is that there are reasonable prospects that, as time proceeds, the dividend will regain pre-war levels. International Paint shares were higher at 118s. 9d., and paint shares generally were firm, with Pinchin Johnson 38s., and Goodlass Wall 10s. ordinary 24s. Nairn & Greenwich moved higher at 78s. 9d. This is another case where it is being assumed there are good possibilities of the restoration of dividends to pre-war levels in due course. Amalgamated Metal shares firmed up to 18s. 3d. and, in other directions, Fisher & Ludlow rose strongly to 42s. 3d. on the results. British Aluminium, however, fell 2s. 6d. to 41s. 3d. on the reduction of the interim dividend from 3 to 2 per cent. This follows the cut in the metal price and the chairman's warning, at the last meeting, of the difficult transition period ahead.

Quiet buying of textile shares was reported, sentiment being aided by hopes that good progress will be made in rebuilding and expanding export trade. Calico Printers were 20s. 6d., Fine Spinners 25s. 9d., Bradford Dyers 26s. 10½d., and Bleachers 14s. 6d. Elsewhere, Borax Consolidated eased slightly to 44s. 6d. General Refractories 10s. shares were 16s. 4½d., Imperial Smelting 15s. 9d., and Metal Box 89s. 4½d. B. Laporte were again around 87s., and firmly held, W. J. Bush 73s. 9d., Burt Boulton 26s., British Drug 39s. 6d., and Cellon 5s. ordinary 26s. Greeff-Chemicals 5s. shares have been maintained at 9s., and Monsanto Chemicals 5½ per cent. preference at 23s. Murex held their recent rise to 102s., and De La Rue were £10¾. Barry & Staines were favoured and moved higher at 54s. 3d., while Ruston & Hornsby rose to 57s. 6d. Qualcast were firm at 40s. xd on the results and the company's latest acquisition. Boots Drug have been steady around 54s. 3d., with Timothy Whites 41s. 10½d., Sangers 31s., and Beechams deferred 19s. 3d.

Oil shares recorded small movements, the tendency being to await the impending Anglo-Iranian results. Mexican Eagle Oil rallied to 12s. 4½d. on a revival of hopeful rumours.

British Chemical Prices

Market Reports

TRADE in general chemicals on the London market is reported to be steady and a fair weight of new business has been transacted, while contracts are being steadily drawn against by consumers. There are no price changes to record and the tendency throughout the market remains firm. In the soda products market such items as industrial refined nitrate of soda remain steady, with quotations on a firm basis, while a good demand is reported for bicarbonate of soda, soda ash, and caustic soda. Salt cake and Glauber salt are strong items. There is a fair pressure for supplies of hyposulphite of soda which are well maintained so far as values are concerned. Short supplies and strong market conditions are the dominant features of the potash section, with the pharmaceutical and commercial grades of permanganate of potash finding a steady outlet. Interest is well maintained in both bichromate of potash and caustic potash, while a steady business continues to be reported in acid phosphate of potash. There is little to report from the coal-tar products market this week. Trade in pitch has been on a moderate scale and a fair movement of both crude and refined tar has been reported. All descriptions of light distillates are in good request, especially the benzols and toluols, with no fresh movement in quotations to report.

MANCHESTER.—Values of heavy chemicals on the Manchester market during the past week have displayed few movements of consequence and the general undertone is steady, with traders disposed to look for a stiffening in some directions before long. Contract deliveries to textile and other industrial users are going forward steadily and the position in this respect has shown some improvement during the week now that the holiday season is near its end. Shipping inquiries have figured among the moderate number that have been dealt with since our last report. Home trade users of the alkalis are taking up fair supplies and the demand for the potash chemicals in most cases exceeds the quantities available. The lead compounds, including the white and red leads, are an active section.

GLASGOW.—In the Scottish heavy chemical trade activity has been moderate during the past week for home business. Export inquiries are quite numerous but shipping space is still rather limited.

SITUATIONS VACANT

None of the situations advertised in these columns relates to a man between the ages of 18 and 50 inclusive or a woman between the ages of 18 and 40 inclusive, unless he or she is excepted from the provisions of the Control of Engagement Order, 1945, or the vacancy is for employment excepted from the provisions of that Order.

PATENTS & TRADE MARKS

KING'S PATENT AGENCY, LTD. (B. T. King, A.I.Mech.E., Patent Agent), 146a, Queen Victoria Street, London, E.C.4. ADVICE Handbook, and Consultation free. Phone: City 6161.

NOTICE IS HEREBY GIVEN that F. Hoffmann-La Roche & Co. Aktiengesellschaft seek leave to amend the Specification of the application for Letters Patent No. 570,240 entitled "A process for the manufacture of thiophane-3-one-carboxylic acid esters and of thiophane-3-one."

Particulars of the proposed amendment were set forth in the Official Journal (Patents) No. 2054 dated September 5th, 1945.

Any person may give Notice of Opposition to the amendment by leaving Patents Form No. 19 at the Patent Office, 25, Southampton Buildings, London, W.C.2, on or before the 5th October, 1945.

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