WITH METALLURGI[CAL] SECTION

The Chemical Age

A Weekly Journal Devoted to Industrial and Engineering Chemistry

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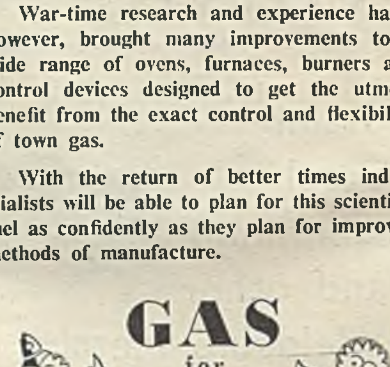

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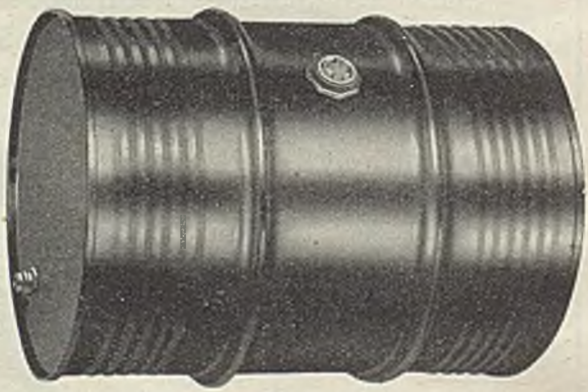

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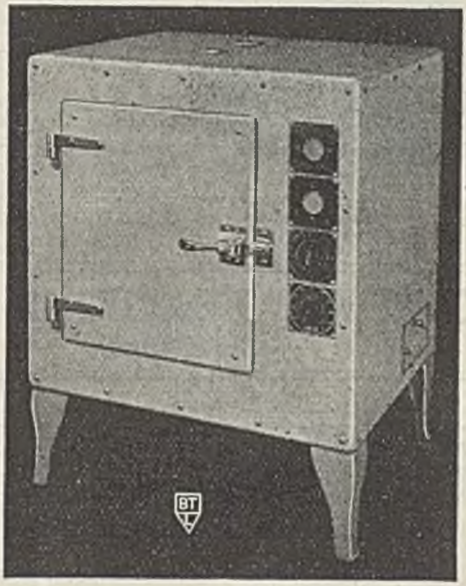

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The Chemical Age

A Weekly Journal Devoted to Industrial and Engineering Chemistry

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Oxidation and Weathering

THE subject of oxidation has received a great deal of attention since C. J. and H. B. Baker demonstrated, in 1887-88, that carbon cannot be readily oxidised even at a red heat. This work proved difficult of explanation, but it was found to be widely true that oxidation reactions of many types require the presence of water, even though it be in traces only, before they can occur. The Jubilee Memorial Lecture by Professor Townend contained much additional information on recent discoveries, while the work of Professor Egerton has further extended our knowledge of the mechanism of oxidation and combustion. The factors determining slow oxidation, slow combustion, and spontaneous ignition have become of increasing importance in problems connected both with the internal combustion engine and oxidation processes in general. They may lead to new processes of chemical synthesis.

Townend has demonstrated that the simple view of combustion and ignition is no longer tenable. This was that ignition temperature was that temperature to which the medium must be raised so that the heat lost from the system by conduction through the walls of the enclosure is more than counterbalanced by the rate at which it is evolved by the reaction. The temperature then rises until ignition occurs and a flame appears. The occurrence of inhibitors and promoters, of long induction periods, and so forth, caused abandonment of this simple view and led to the development of the chain theory of chemical reactions, from which it follows that oxidation and combustion reactions depend upon the encounter between reactive bodies, these "bodies" being probably atoms of free radicals.

The behaviour of the paraffins is apparently the key to the door of this particular storehouse of knowledge. With the higher paraffins there may occur under certain conditions what are known as "cool flames." While slow combustion reactions can be initiated at 150-200° C., they become sufficiently active at higher temperatures to cause the products to be luminescent, while at still higher temperatures weak explosions occur, synchronising with the passage of "cool flames." At higher temperatures again, cool flames are no longer formed and the combustion becomes less rapid. At still higher temperatures normal combustion (explosion) will occur.

"Cool flames" are slow-moving, pale bluish flames of incomplete combustion

On Other Pages

giving rise to products strongly aldehydic and peroxidic in character. The type of combustion or oxidation set up depends not only on the temperature, but also on the pressure. We do not propose to describe the various types of combustion or the ranges over which they occur in detail. They have been eminently well dealt with by Professor Townend in his Jubilee Memorial Lecture (*Chem. Ind.*, Nov. 10, p. 346). The important point to which attention is here drawn is the occurrence of peroxides in the products of the reaction which leads to cool flames. Should we be far from the truth if we considered cool flames as being the first stage of complete combustion in the normal way, a stage which always occurs, even though it may be masked? In saying this we do not forget that there are two types of ignition: in the normal flame range combustion is initiated by spark ignition: in the cool flame range spark ignition is of no avail, " cool flames being satisfactorily initiated only by means of a source of controlled temperature, *e.g.*, a heated wire." Townend's comments on this seem to suggest that such combustion is always a two-stage process, but that unless the conditions are right, the first stage does not pass into the second stage.

Quite clearly, the formation of cool flames is governed by the adequate formation and survival of an intermediate product. We quote from the Jubilee Lecture: " It is known that peroxides are concerned, but in view of the fact that cool flames can be propagated through cold media, it is doubtful whether they can be determined merely by the spontaneous decomposition of peroxides; although this would be the simplest explanation. The second stage flames do, however, occur at pressures which enable the building up in the cooling products from cool flames of critical concentrations of peroxide material." Professor Egerton is perhaps less cautious than Professor Townend, and is of the opinion that ignition is essentially a matter of the formation and decomposition of peroxides. If that is so, there must be present the substances from which peroxides can be formed, and there must be the right conditions for the formation and subsequent decomposition of these peroxides. That would seem to be an explanation of the curious behaviour of the higher paraffins, a behaviour which may well be general for all substances, but masked by the very small, or overlapping, areas of pressure and temperature within which one class of reaction is favoured greatly.

The matter has been carried further in a paper entitled "The Mechanism of the Oxidation of Coal," lately read before the Institution of Gas Engineers by R. E. Jones and Professor Townend. Here it has been shown that the weathering of coal is a reaction of the same type as the gaseous reactions studied hitherto. The first reaction between coal and the atmospheric air appears to involve chemisorption of oxygen by the coal, which, in the presence of water, is followed by the formation of a carbon-oxygen-water (or coal-oxygen-water) complex. It has been found that water is essential for the formation of the " peroxygen " both in coal and in carbon, and that the course of slow oxidation of carbon follows the same path as that of weathering of coal. The rôle of water in combustion—so long a puzzle—is now regarded as clear: it is to provide one of the specific reaction materials necessary for the formation of peroxides, without which the oxidation apparently cannot take place. These peroxides in coal and carbon break down quite rapidly at and above 70° C.; at that temperature, which is critical in coal weathering and spontaneous combustion, coal will, under proper conditions, begin to heat up rapidly, leading to overall oxidation. Thus, for the first time, all combustion and oxidation processes are beginning to appear as essentially similar types of reaction, apparently depending on the prior formation of peroxides.

The work at Leeds University on coal oxidation may have a practical bearing, since it would appear that combustion and the weathering of coal can be inhibited by preventing the formation of the peroxides. It is pointed out that substances are known which prevent certain autoxidation reactions by combining with the peroxides. These substances are not yet applicable to coal weathering, but the authors remark that " if the most important single agency in the spontaneous heating of coal is the formation of a coal-water-oxygen complex, it should not be a difficult matter to find a compound which will destroy it, thereby inhibiting those reactions which lead to the general breakdown and heating of coal."

NOTES AND COMMENTS

The Dislocation of Industry

ONE of the most urgent problems of 1946, assuming that we are intending to return to something like our pre-war economic structure, will be the re-transfer of war workers to their original jobs. Some figures recently issued by the Ministry of Labour show the changes in the numbers of workers employed in various branches of industry, comparing mid-1945 with mid-1939; and some of the alterations are indeed striking. The chemical industry—listed under the heading "chemicals, explosives, paints, etc.,"—is one of half-a-dozen categories that show an increase in the number of workers employed. The others are engineering, vehicle construction, shipbuilding, transport, and "miscellaneous" trades and services. Some of the biggest decreases are shown in mining and quarrying (other than coal), brickmaking, textiles, paper and printing, and building and public works. The increase in the number of chemical workers is comparatively small, from 269,590 to 427,980, so that it might be considered that there was but little adjustment to be made. No account is taken in these figures, however, of changes inside the industry, and we should surmise that the number of workers on explosives (for example) was considerably larger in 1945 than in 1939, and that other sections of the chemical industry had to suffer in consequence. The switch back to civilian employment has already started, of course, but these figures do give a good idea of the dislocation which British industry has suffered, and the amount of adjustment that will have to be made.

French Potash

THE condition in which the French potash mines in Alsace were left by the Germans was much worse than that indicated by the first reports. The amount of necessary repairs and replacement work was found to increase enormously as operations proceeded. This state of affairs resulted not only from sabotage and looting by the enemy but from sheer neglect of upkeep of the underground equipment. The diversified damage involved such vital accessories as conduit-pipes, water boilers and tanks. Although these at first appeared to be in good order, they would break down suddenly in course of operations. Another factor which has impeded recovery has been the irregularity of the supply of electric power, arising from excessive local calls on a limited production. Although a certain priority of attention was naturally given to repair of the workmen's houses, the general reconstruction work has proceeded so efficiently that the quantity of raw material mined was increased nearly fourfold between July and October, 1945. Probably a better indication of the progress made is afforded by the fact that two factories which resumed operations on July 15 produced over 13,000 tons of muriate of potash in August and over 16,000 tons in September. Two more factories have recently been put into operation.

Daily Improvement

TRANSPORT has, of course, been a trouble, especially the scarcity of available trucks for inland freight. A daily improvement can be recorded, however, and water and road transport has been utilised to the greatest possible extent. A start has already been made with the export of potash to North Africa and the French colonies. In view of the fact that the mines were not liberated until the last days of the war, and that the Haut-Rhin ranked fourth in the list of the most-bombed departments of France, it is a matter for congratulation that the production has already reached 50 per cent. of its pre-war level. It should not be deduced from this statement that ample supplies of potash will soon be available for this country. Factors militating against this are the acute need for potash in all the liberated countries and the fact that many of the German mines are out of action.

A Saccharin Anniversary

THE centenary (1946) of Ira Remsen's birth in New York is a reminder that this organic chemist shared the discovery of saccharin with Fahlberg. Remsen was first a doctor of medicine, and wrote a thesis on the fatty degeneration of the liver—"a subject of which he was profoundly ignorant," according to that famous critic "H.E.A." But after a period in Germany, where he came under the influence of Volhard at Munich and Fittig at Göttingen (he would have preferred his own choice, Liebig), Remsen returned to America and established himself as a chemist, occupying the chair, first of physics and chemistry at Williams College (where no laboratory was available) and then of chemistry alone at Johns Hopkins, of which college he became president in 1901. He was a member of the board, appointed by Roosevelt in 1909, which retained benzoic acid as a permitted preservative after Remsen and other members had experimented on themselves. Remsen was an inspired teacher and a writer of textbooks often used in this country and translated into German. He also founded the *American Chemical Journal*, which was afterwards incorporated in the *Journal of the American Society*. It may be noted *en passant* that whereas the discoverers of saccharin are known, the proof that it is harmless was left to that small boy lost to history, who swallowed more than 100 tablets and suffered nothing worse than a coma and nettle-rash for his curiosity!

Atomic Commission

IT would appear that there is, in the atmosphere of Moscow, some quality that is conducive to getting on with the job, and it is important news that a proposal to establish a Commission for the Control of Atomic Energy should have emanated from the Conference of Foreign Secretaries, furthering the pious hopes of the Truman-Attlee statement. A resolution in five parts is to be submitted to the General Assembly of the United Nations, Part I establishing the Commission, while its terms of reference are included in Part V. It is interesting that Canada—even if not represented on the Security Council—is to be allotted a place on the Commission, along with Britain, China, France, the U.S.A., and the U.S.S.R. So far as we are concerned, it is the first of the terms of reference that is all-important, for this is a proposal to extend between all nations the exchange of basic scientific information for peaceful ends. If this proposal is *honestly* carried out, the others follow almost as inevitable corollaries—the control of atomic energy to ensure its reservation for peaceful purposes, the elimination of mass-destruction weapons, and the institution of safeguards by means of inspection. It is conceivable that one mad scientist could be found with an ambition to blow up the civilised world: to discover two would be a much more difficult task, while the coincident presence of three or more such is hardly to be thought of. Really, the proposals are not so revolutionary. Science is by nature international—its history provides an infinity of instances; it was only the insensate ambition of the Germans to dominate the world, by whatever means, that led to the walling-off of scientists into national compartments. The new scheme merely allows scientists to revert to their natural state.

Safety Literature

A KIND and candid friend has taken us to task for being perhaps a little too liberal, in our last week's issue, in the praise bestowed on the volume known as *Percy Verses*, and has surmised that we might have been writing with the tongue in the editorial cheek. Well, we do not suppose that any of our readers will really expect to get a "lavish production" for sixpence, but it is our honest opinion that the ridiculous adventures of "Percy Vere" do do a certain amount of good in the prevention of accidents in factories. A more serious accusation, which has been suggested by some, is that the production of this and similar publications is a waste of paper and of public money. As to paper, we could name a thousand other publications which were much less worth printing—no one has been more critical of the lavish use of paper on official publicity. On the economic side we have made extensive investigations, and though the Royal Society for the Prevention of Accidents informs us that this publication is, in fact, sponsored by the Ministry of Labour, we find that, like any other honest book, *Percy Verses* is expected to pay for itself. As the first edition is now practically exhausted, it does not look as though much of the cost would be added to the taxpayers' already heavy burden. One of these days we hope to have the opportunity of being really vitriolic about some of the publications that really do waste paper and have no justification whatever in being manufactured at the public expense.

1946

WE take this opportunity of wishing all our readers happiness, prosperity, and good health in the twelve months that lie ahead.

Recent Russian Work on Corrosion

Chemical Apparatus and Halogen Compounds

From a Correspondent

AMONG the many interesting papers read at the second Conference on Corrosion in Moscow, 1943, was one dealing with the work of the State Institute of Applied Chemistry (Leningrad) on the corrosion of chemical apparatus, by Professor Ts. A. Adjemyan, of which a slightly condensed version is given here.

The paper summarises some of the principal results obtained from research undertaken during a period of three years (1938-40) to test the corrosion resistance (stability) of different materials employed in the construction of apparatus destined for fundamental Russian chemical industries. Among these basic branches of the chemical industry may be noted: (a) production of halogen salts, such as chlorides; (b) sulphur compounds; (c) fluorine compounds; (d) halogen compounds of the iodo-bromine type; (e) general research on materials liable to corrosion.

Chloride Solutions

Special attention was devoted to behaviour of metals and other materials in evaporation processes, whether open or vacuum, particularly in treating calcium chloride and magnesium chloride solutions, and in the mother liquors containing ammonium chloride from soda manufacture.

The calcium chloride solutions ranged in concentration from 37 to 75 per cent. $CaCl_2$ at temperatures of 60-80° C., and these were not markedly corrosive. Iron, copper, brass, aluminium bronze (special Russian type), and silver showed only slight loss in weight. The same applied also to Russian chromium alloys (EJ-2, EJ-17, SEMCH-27), to chrome cast iron, and to chrome-nickel alloys (EYa-O and EYa-11). The one possible exception was EJ-2, which in some cases showed slight corrosion points. But at higher temperatures, up to 150-170°, corrosive action increased sharply. In iron this amounted to 1-1.5 g./m.^{2}/hr., and with copper and aluminium bronze (Bajm) it was 0.5-1 g. With brass (L-68) it was somewhat less, but here there was appreciable loss of zinc. The chrome alloys or steels (EJ-2, etc.) showed local corrosive action. The chrome-nickel steels stood up fairly well, but even here there was some localised pitting. With silver the weight-loss was about 0.2 g./m.^{2}/hr.

In vacuum evaporation of magnesium chloride the corrosion-resistance of the metals tested was about the same as with calcium chloride. Stirring the solutions usually increases their corrosive action on iron and coloured alloys (bronzes), but in laboratory tests with boiling solutions, agitating appeared to make little difference. Generally, for practical purposes, iron may be regarded as the acceptable material, but it is necessary to consider the effect of impurities in the product. Chromium alloys, except chrome cast iron, are to be excluded. With chemically pure products (solutions) and in the absence of welded joints, chrome-nickel steels can be used, especially if molybdenum is included in their composition (steel EI-183). Aluminium bronze (Bajm) might also be suitable, but some impurity in the product must then be expected.

Evaporation in Soda Manufacture

In the vacuum evaporation of mother liquors of soda manufacture, containing ammonium chloride, carbonate, and sulphate, as well as sodium nitrate, the rate of corrosion varies with the composition of the liquor during evaporation, and there is a marked difference between that in the gaseous phase and in the solution. Corrosion effects were studied at various stages of the process, the temperature being 80° and pressure 170-350 mm. At the start, with ammonium carbonate predominating, corrosive action was slight owing to the alkaline nature of the liquor (pH 8-9); but with the breaking up of the carbonate and formation of free ammonia and CO_2 the pH declined rapidly to 1.5-2, and corrosion of metal correspondingly increased. This was markedly the case with iron with which the loss in weight rose from 0.15 to 3.4 g./m.^{2}/hr. However, as evaporation proceeded, the loss, though still high, declined somewhat with increasing salt concentration (down to 1.5 g. for iron). The chrome alloys under these conditions exhibited slight loss of weight, though there was some localised action; but the nickel-chrome steels, especially with molybdenum, were totally unaffected in the liquid medium.

In the gaseous phase, however, at all stages of the process, corrosion was many times greater than in the liquid, and all the materials tested were affected in varying degrees. It was thus necessary to use some non-metallic protective lining for the metal, such as Asbovynil (asbestos with vinyl resin?) which is completely stable under these conditions. Chrome-nickel steels, however, appear to be excepted even if unlined; and if it is technically possible to maintain a high pH (about 8) iron also might be acceptable. Crystalline ammonium chloride with about 7 per cent. moisture is somewhat corrosive, and at 80° C. iron, grey cast iron, and copper show a weight loss of 2.5-6 g./m.²/hr.; and both chrome steel and nickel-chrome steel, though with less loss in weight. exhibit marked localised effects.

Some interest attaches to the work of the Institute on the cathodic protection of iron in chloride solutions. In those of potassium, sodium, and magnesium chlorides and mixtures thereof, corrosion of iron, of course, varies with concentration, temperature, and rate of stirring. In 1-10 per cent. solutions at 20° the weight-loss is about 0.04-0.05 g./m.²/hr., but with saturated solutions it is 0.01-0.017 g. At temperatures up to 100° in 1-10 per cent. solutions it is 0.3-0.6 g. Corrosion of iron with $MgCl_2$ is somewhat higher than with other chlorides; and stirring very appreciably increases the rate of loss, *i.e.*, with 50-60 r.p.m. at 20° with 1-10 per cent. conc. the loss increases from 0.04 to 0.5-0.6 g. With saturated solutions the effect of stirring is less marked. In every case with higher stirring rates (100-170 r.p.m.) corrosion increases. The relation between current density required for the cathodic protection of iron, ranging from 0.1-0.2 amp./m.² at 20° without stirring, to 1.5-2.5 amp./m.² at 100°, and to 1.5-3 amp./m.² with stirring (at 20°).

It is noteworthy that insufficient current density augments rather than decreases corrosion—with stirred solutions. In cathodic protection the anode material is naturally of primary importance. With static (non-flowing) electrolytes and certain types of apparatus requiring large currents the choice of insoluble anodes (graphite or carbon) limits the possibility of chlorine evolution at the anode. A soluble-anode such as iron, on the other hand, would obviously affect the purity of the electrolyte. Cathodic protection of iron gives a positive effect also in acid solutions containing chlorides ($FeCl_2$, $FeCl_3$, NaCl, and HCl, 0.4-0.7 g./lit.) at 90°. In this case, however, high current densities are needed, from 12 to 22 amp./m.².

Manufacture of Sodium Salts

Cast-iron vessels used for dealing with the evaporation, etc., of alkalis for production of commercial sodium sulphide, containing up to 30 per cent. or more of Na_2S together with some sodium sulphate and carbonate, are liable to severe corrosion. Metals tested included wrought iron, grey and chrome cast iron, and chrome and nickel-chrome steels in sulphide solutions at 106-110° in various concentrations. With increasing concentration the effect on grey iron increased from 2 to 13 g./m.²/hr., but there was no appreciable increase with chrome and nickel-chrome steels. With wrought iron the loss was about 1.5 g. Under evaporating conditions (up to 176°) corrosion of most materials increased markedly: wrought iron and grey iron losing 10-14 g. and 21-24 g. respectively; but with chrome iron and nickel-chrome steels it was much less (1-1.5 g) and fairly evenly distributed. Iron (presumably wrought iron is meant) can generally be used, except for the high temperatures of evaporating, when chrome cast iron and particularly high-chrome and nickel-chrome steels are recommended.

Lead for Bisulphite

For dealing with sodium bisulphite lead is generally recommended. Other materials, metallic and non-metallic, were also tested in the work of the Institute, in contact with soda solutions and in an atmosphere containing up to 0.5 per cent. SO_2; also with solutions resulting at various stages and containing bisulphite, sulphite, and sulphate of soda. Iron and non-rusting steels, with comparatively low loss in weight, exhibited uneven corrosion. In the non-metallic class various types of silicate linings stood up to the conditions very well, also certain forms of diabase.

In processes connected with the production of anhydrous sodium sulphite and ammonium chloride from common salt, hydrogen sulphide and ammonia are formed: on the one hand, solutions containing bisulphite, sulphite, ammonium chloride, and sodium chloride, of an acid nature, and, on the other hand, solutions of various salts of an alkaline nature are met with. Absorption towers and scrubbers are used for dealing with the hydrogen sulphide and mother liquors plus ammonia.

The apparatus is subjected to both acid and alkaline conditions. Under the former (acid) the previously-named irons, chrome and nickel-chrome steels showed a weight-loss of 1-7 g. according to temp. (20, 55, or 90°). Coloured metals and alloys (copper, brass, bronzes) suffered more severely (3-15 g.); while lead was still more seriously attacked (3-40 g.). This was attributed mainly to the presence of ammonium chloride. The most resistant material under these conditions was nickel-chrome molybdenum steel (EI-183) and an alloy of the Vortite class (Vortaidt) with 20 per cent. Cr, 25 per cent. Ni, 2.5 per cent. Mo, 3.5 per cent. Si, 1.5 per cent. Cu, and 0.07 per cent. C.

For solutions containing free ammonia (*p*H 8-11) at 75-90°C., wrought iron and grey cast iron proved satisfactory (0.3-1 g.). Certain other steels showed about the same loss, but more localised, while the Cr-Ni-Mo steel was only slightly affected (0.1-0.2 g.) without pitting. Lead and aluminium bronze (Bajm) lost 0.2 g./m.²/hr., and brass suffered considerable loss of zinc.

Fluorine Compounds

Dissolving or etching acid (40 per cent. hydrofluoric acid) was found much less corrosive than HCl of the same concentration. Loss with iron was 3-5 g., and with copper about 0.01 g. In the case of iron it was irregular (localised). The chromium alloys were seriously corroded (20-25 g.) and increased in proportion to the chromium content. With the nickel-chrome alloys it was rather less (5-7 g.), obviously, on account of the nickel, which is strongly resistant (loss 0.05 g.). Monel metal similarly stands up well (0.1-0.3 g.).

With 100 per cent. liquid HF at $-15°$ and $+15°$C., iron, copper, and Monel metal are fairly stable (0.1-0.2 g.). With chrome and nickel-chrome steels the loss is somewhat higher (0.3-0.9 g.), and this figure also applies to nickel, brass, and grey cast iron. With coloured metals and alloys, and especially lead, the loss is high (7-9 g.).

The behaviour of metals in gaseous HF was tested within the temperature range 40°-500°, a certain amount of water vapour being also present. At 100°, iron and some ferrous alloys, brass, nickel, Monel metal and aluminium proved satisfactory (loss 0.05-0.2 g.); not so lead and copper. At 40° loss in copper was 1.5 g., and in lead 7 g., but at 100° it was lower, this fact being attributed to the hygroscopicity of the corrosion products. Up to 300° there was increased corrosion of iron and chromium alloys, up to 9 g. in some cases, but that of the coloured metals was less. At 500° the corrosion of all materials tested showed a sharp rise. Copper, brass, Monel metal, nickel, and iron showed approximately the same loss in weight (2-3 g.). In nickel it was markedly intercrystalline, and with brass the usual loss of zinc occurred. The so-called black base (ferrous) alloys suffered an average loss of 5-10 g.

Nichrome Steels in HF Gas

The behaviour of nickel-chrome steels in gaseous HF at 300-500° was interesting. Here the extent of corrosion with rising temperature begins sooner (at 300°) than with other metals and alloys. This is apparently associated with the austenitic structural change of this steel when heated, disturbing its monophase state, with formation of carbides, similar to the changes produced by welding.

In the temperature range of 40-250°, in dry HCl and in HCl/HF mixtures, the stability of the materials tested is about the same as with pure HF; except that with copper and lead the weight-loss is less with HCl and HCl/HF than with pure HF. It is concluded that for gaseous HF, HCl, and their mixtures, the most suitable material is iron (iron being again used in a general sense without specific indication of the precise type intended).

Tests were also made with materials used in apparatus for the synthesis of Freon (CCl_2F_2) obtained by reaction of carbon tetrachloride with HF at 250°, using as catalyst MnF_2 deposited on activated charcoal. Corrosion was about the same as with HCl/HF mixtures at the same temperature. Localised corrosion was noticeable in the non-rusting steels. In contact with the charcoal and catalyst, corrosion of all materials was intensified. With iron the loss was 1.2 g., with chrome and nickel-chrome steels, copper and Monel metal, 0.2-1 g., all being localised except with Monel metal. Lead, grey cast iron, and brass showed a loss of 2.5-3.5 g., the two former being fairly localised. Monel metal proved the most resistant, although on economic grounds iron might be preferred.

In evaporating solutions of antimony trifluoride (50-70 per cent. strength) at temperatures up to 120°, lead proved quite stable (0.1 g.). Nickel-chrome-molybdenum steel and Monel metal were nearly as good (0.6-0.7 g.), and next to these chrome cast iron (1.3 g.). But iron, nickel, chrome steels and nickel-chrome steels (without Mo) were not sufficiently resistant. At higher concentrations (70-100 per cent.), and temperatures (up to 140°) corrosive action was much greater in most cases: the most anti-corrosive were Monel metal and Cr-Ni-Mo steel (0.3-0.8 g.). With lead the weight-loss was about 8 g., in marked contrast with its behaviour under lower concentrations and temperature.

In evaporating solutions of ammonium fluoride (20.7 per cent.) at 20° little corrosive action was noted on any of the materials under test. Most of these, except the chromium alloys (0.25 g.), showed little loss (0.005-0.05 g.); but at higher temperatures, up to 95-100°, and with changing composition, corrosion may increase considerably. Thus, with ammonium fluoride there is an increase of fluorine ions and a decrease of ammonium ions, and therefore higher acidity of solution; and the only satisfactory materials under these conditions are nickel (0.05 g.) and Monel metal (0.5 g.).

Silicofluoride Solutions

In solutions of silicofluoride (200 g./lit.) containing ammonium sulphate (about 60 g./lit.), ammonium fluoride (15 g./lit.), and sulphuric acid (1 g./lit.), iron, chrome steel, chrome cast iron, and aluminium are not resistant (loss is about 3-10 g.). The most suitable materials are nickel-chrome steel, copper (0.05 g.), and lead (0.3 g.). This does not, however, apply to the liquid/gas interface where corrosive action is particularly severe, especially on lead where the loss is 11 g. With rise of temperature to 60°, corrosive action becomes still more serious (7-60 g.), except with copper and lead (0.35-0.7 g.), but in this case there is no augmented corrosion at the interface. Nickel-chrome steel is completely resistant at 20°, but at 60° exhibits considerable corrosion (up to 10 g.). On neutralising the above-mentioned silicofluoride with ammonia (to a *p*H of 6), the corrosion resistance of all materials both at 20° and 60° increases, except copper (0.0-0.4 g., Cu 1-10 g.). On complete neutralisation with excess ammonia, the corrosion of copper increases still more owing to the formation of complex cuprammonium salts. The other metals and alloys remain completely stable. Generally, in acid media, copper and lead may be recommended at temperatures of 20°, except possibly lead at the liquid/gas interface. In other neutral or ammoniacal media iron or other materials can be used.

Iodo-Bromine Products

With iodo-bromine products, tests with neutral salt solutions, of various concentrations and at different temperatures, speeds of stirring or circulation, etc., indicated the loss in weight of iron, grey cast iron, coloured metals and alloys, as being very slight—not more than 0.1-0.2 g./m.²/hr. Chrome and nickel-chrome steels, though showing little general corrosion, have a tendency to local attack.

A lower *p*H of the solutions, down to 2.5-3, as one would expect, markedly affects the corrosion resistance of all the materials tested. At 20-25° iron, including grey cast iron, losses 0.5-3 g., and chrome steels 0.1-0.5 g. (localised). Nickel-chrome steel loss is somewhat lower, though there is some pitting. The coloured metals, especially brass and aluminium bronze (Bajm) show less loss than iron. At higher temperatures all materials showed greatly increased corrosion, except the silicon iron alloy EI-183.

The introduction into sub-acid salt solutions of free halides (of iodine, bromine and chlorine), even in very small proportions (10 mg./lit.), also strongly affects the stability of the metallic materials under test; and this increases with higher concentrations and temperatures. As before, the corrosion of the chromium steels depends to some extent on the percentage content of chromium. With the Cr-Ni-Mo steels under these conditions little change was noted. At still higher temperatures and concentrations, the corrosion was less localised. Such changes in the behaviour of passivated alloys is explained by the fact that, in rather highly aggressive or corrosive media (*p*H about 1.5), the solution of the metal at weak spots in the passive film (scaling) may proceed with considerable evolution of hydrogen, involving gradual reduction and decomposition of the film. The surface thus becomes more active and therefore more liable to corrosion.

The Value of Silicon

In the presence of oxidisers, *e.g.*, NO_2 in certain cases, despite the highly corrosive nature of the medium, passivation of the film is facilitated and corrosion is somewhat more localised. Somewhat similar effects are to be noted in halogen/air/moisture mixtures which have a strongly corrosive action on most metals and alloys, except those containing silicon. The general conclusion, indeed, from this section of the work of the Institute, is that these materials—the silicon cast irons—are practically the only metallic materials suitable for apparatus in this department of chemical industry. Even in the non-metallic materials, of which a large number has also been investigated, those with a silicate base are of considerable value and importance. Others include plastics, synthetic resins, wood, ebonite, special mention being given to Textolite, Asbovinyl, Faolit, and ebonite-lined iron.

Dyestuffs for India

New Joint Company Planned

IT is announced that I.C.I. and Tatas have come to an agreement for the establishment in India of an industry for the manufacture of the whole range of dyestuffs and the development thereof to meet Indian market requirements. For this purpose a public company will be formed in which both the capital and the directorate will be predominately Indian.

As a first step Tatas and I.C.I. will jointly form a development company under a chairman appointed by Tatas to undertake the necessary preliminary work and in due course to promote and manage the public manufacturing company. The arrangements made include the provision by I.C.I. of all the necessary technical information and knowledge at their disposal during the currency of the agreement, which is intended to run for a period of 20 years.

The agreement further provides that until such time as manufacture in India is capable of meeting the full demand of the country, dyestuffs made in India and those imported by I.C.I. will be sold jointly so as to make available to the consumer a full range of products at all times. By virtue of this agreement India will be able to establish a highly important and complex industry vital to the economic development of the country.

Local Criticism

The above-mentioned agreement has been severely criticised in the Nationalist *Bombay Chronicle*, says Reuter, as securing "a lasting entrenchment in key positions to the most formidable competitor of Indian industry." Indians directing the new company are stigmatised by the paper as presumably "selected as much for their complexion as for their complacency."

Parliamentary Topics

Penicillin

IN the House of Commons, in the week preceding the Recess, Sir H. Webbe asked the Minister of Supply whether, in view of the reduction in the Services' demand for penicillin now that the war was over, the supply of this drug now available could be freed for civilian use.

Mr. Wilmot: The demands of the Services for penicillin are still substantial and we are no longer receiving supplies under Lend-Lease. But production in this country is increasing and larger quantities are now being made available for civilian use.

DDT

Sir P. Hannon asked the President of the Board of Trade whether he would make possible the manufacture of DDT in those factories which had produced it during the war; if he would arrange facilities for production by former producers; and what conditions would attach to this important feature of post-war reconstruction.

Sir S. Cripps: The factories at which DDT was manufactured during the war are still in production. A small reduction in Ministry of Supply orders when the war ended enabled one firm to commence commercial distribution in September last. In view of a further substantial reduction in Service requirements, it is proposed to give the other producers, who have been operating Government-owned plants upon which they hold pre-emptive rights, an early opportunity of making DDT for their own account.

Physical Society's Exhibition

Sir Stafford Cripps's Opening Speech

OPENING the first post-war Exhibition of Scientific Instruments and Apparatus at the Imperial College of Science and Technology on January 1, Sir Stafford Cripps made vigorous reference to the necessity for maintaining our scientific progress We must not, he said, repeat the folly we committed after the last war, and slow down the drive in scientific research. Research was the life-blood of industrial progress and this in turn was the basis of our future prosperity as an exporting nation.

In order to attain the requisite degree of research activity we must first have enough men and women adequately trained. The status of such men and women will have to be raised—they have too long been regarded as rather superior craftsmen definitely inferior to the "leaders" of industry or the principal administrators. Both by salary and by status, Sir Stafford Cripps stated, scientists are still being kept in a position of inferiority.

The Exhibition, which contains the results of the remarkable progress made in scientific industry during six years, is a fine piece of work on the part of its organisers, the Physical Society. We hope to include a detailed description of some of its features in a later issue.

New Scientific Equipment

North-East Coast Exhibition

ONE of the most important exhibitions held in this country for many years is the North-East Exhibition of Scientific and Engineering Inspection Equipment, which will be held in Northumberland Road Drill Hall, Newcastle-on-Tyne, from February 12 to 22, 1946, daily from 11 a.m. to 8 p.m., under the auspices of the National Trades Technical Societies. The opening ceremony will be held in Newe House, Newcastle-on-Tyne, at 3 p.m. on February 12. The exhibition is under the charge of Mr. D. M. Slorach as hon. director, and the chairman of the exhibition committee is Dr. Edwin Gregory.

In addition to the public exhibition for the first time in the North of the British Electron Microscope (magnification 50,000 times), shown in operation, there will be "live" exhibits of optical and measuring equipment of the latest types. Magnetic, fluorescent, and radio-frequency methods of crack-detection will be demonstrated; appliances for measuring the thickness of metal coatings, hardness testing apparatus, the magnetic sorting bridge, the spectroscopic method of analysis and steel sorting, the electric stroboscope, the introscope, X-ray industrial units, glass thickness viewers and strainometers, are but a few of the exhibits.

The National Physical Laboratory Metrology and Engineering divisions will exhibit, among other items, the air-operated multi-gauge, the slip-gauge interferometer (measuring in terms of wave-lengths of light to an absolute accuracy of one-millionth of an inch). The Naval Ordnance Inspection Department will demonstrate other air-gauging methods, and the use of the photo-electric cell applied to the inspection of fuses. The Bragg Laboratory of the same department will demonstrate the photo-electric absorptiometer, showing its mode of operation and its application to macro and micro analysis of ferrous alloys. In addition, it will demonstrate the Tinsley recording polarograph, with accessories, showing some of its applications to the analysis of both ferrous and non-ferrous alloys. Time and motion study will be demonstrated by the Department of Aeronautical Inspection.

The Hungarian Government has decided to nationalise the mining industry.

Crude Oil in Trinidad

Reduced Asphalt Output

TRINIDAD'S figures for crude oil production from 1939 to 1944, so far withheld for security reasons, have now been given in a report from the Colony. Production during this period reached its peak in 1940 when wells yielded 22,226,876 barrels of crude oil. Figures released are: 1939, 19,741,616 barrels; 1940, 22,226,876 barrels; 1941, 20,505,980 barrels; 1942, 22,069,178 barrels; 1943, 21,385,240 barrels, and 1944, 21,634,965 barrels.

The asphalt industry, the report states, "did not in 1944 maintain the production of the previous year, the reduction in output amounting to 12,000 tons. Overseas shipments accounted for 35,477 tons, about 25 per cent. less than in 1943, representing a decrease of more than $1,000,000 in export value."

Pharmaceutical Exports

New Company Formed

THE following manufacturers: Allen & Hanburys, Ltd.; Antigen Laboratories, Ltd.; Armour & Co., Ltd.; Boots Pure Drug Co., Ltd.; The British Drug Houses, Ltd.; Evans Medical Supplies, Ltd.; and Vitamins, Ltd., have formed the British-European Pharmaceutical Co., Ltd., for the purpose of marketing medical products in certain countries in Europe. For the time being the countries selected are: Belgium, Bulgaria, Czechoslovakia, Denmark, Finland, Greece, Holland, Italy, Norway, Poland, Portugal, Rumania, Spain, Sweden, Switzerland, and Yugoslavia.

It will be appreciated that until her defeat Germany was the principal supplier of medical products to these countries, so that this proposed form of co-operative selling may be taken as indicative of the determination of certain British manufacturers to capture these markets.

Mr. F. C. Oscar Shaw, managing director of the British Drug Houses, Ltd., is the first chairman of the newly-formed company, and Mr. W. J. Williams, M.P.S., F.C.I.S., is its secretary. Mr. R. V. E. Humphrey, the general manager, expects to leace at an early date to make extensive market surveys in Europe.

Natural Soda Products Co. has installed a new unit at its plant in Keeler, Inyo County, for the recovery of sodium carbonate from the waters of Owens lake. The brine is pumped from the lake and subjected to natural evaporation in ponds, from which the enriched solution is pumped to evaporators and the products then recovered by differential crystallisation.

I.G. Plants in U.S. Zone

Senator Kilgore's Allegations

A SEVERE criticism of policy in the U.S. zone of Germany has recently been made by Senator Kilgore. He alleged that American control officers had failed to destroy German plant, although they were given orders to do so. In particular, he made reference to the plants of the I.G. Farben, the productive capacity of which the Senator describes as 80 per cent. intact. Orders to destroy the plants were given as far back as July last. Senator Kilgore ascribes this policy to the officers' contacts with "industrial and financial enterprises which maintained close contacts with the Nazis before the war." He adds that the officials in charge still maintained sympathies for their former cartel partners. It remains to be seen whether and in which way the U.S. administration will react to these serious allegations which, it must be emphasised, represent only the Senator's personal views.

Dyestuffs Famine

Lack of Labour Impedes Progress

EFFORTS of British industrialists to deal with the present world famine in dyestuffs and recapture the export market are being hindered by lack of labour. "If we could only find about 1000 more men," Mr. T. H. Hewlett, Controller of Dyestuffs, has stated, "we could send out hundreds of tons of dyestuffs. For instance, production at the Blackley factory of I.C.I. could be stepped up between 40 to 60 per cent.

The immediate needs is for about 1200 men, and existing plants could absorb 1500, he said. The Board of Trade had been appealed to for assistance, but results were "infinitesimal." Ultimately thousands of additional workers would be needed for factory extensions planned to capture for Britain the Indian market, possibly the largest in the world.

The contract for supplying machinery for what will probably be the first rayon-spinning and transparent-paper-making plant in India is to be shared by Dobson & Marlow, Ltd., Bolton, and Maurers, of Switzerland. The total value of the contract is said to be between £500,000 and £750,000. The order has been placed by Travancore Rayons, Ltd., a £1¼ million company incorporated in the State of Travancore. The Travancore Government has subscribed largely to the capital of the new company, and has afforded facilities for the supply of Eetta bamboo as raw material from the forests of Northern Travancore.

New Control Orders

Relaxation of Export Control

BY the Export of Goods (Control) (No. 8) Order, 1945 (S. R. & O. 1945, No. 1602), the Board of Trade has abolished after January 1 export licensing requirements on the following commodities, among others: plates and sheets of iron and steel; lacs; corundum and emery; vulcanised fibre and manufactures; linoleum on a jute fabric base; and a number of pharmaceutical preparations.

Sulphamerazine and its preparations will in future *require* export licences.

K.I.D. Exemptions

In accordance with the Safeguarding of Industries (Exemption) (No. 2) Order, 1945 (S. R. & O. 1945, No. 1581), the following articles are exempt from Key Industry Duty until August 16, 1946:

Fermentographs; integrators (planimeter type); arc-lamp carbons; sealed cylindrical X-ray tubes having four windows; oxides of rare earth metals; vanadium-silica compounds specially prepared for use as catalysts in sulphuric acid manufacture; and the following fine chemicals:

Acetamidosalol (acetylamidophenol salicylate); acid adipinic; acid dipropylmalonic; acid filicic; acid maleic; acid propionic; acid quinolinic (acid quinoleic); acid succinic, but not including acid *iso*succinic (acid methyl malonic); acid *iso*-butyl allyl barbituric; acid *iso*-propyl barbituric; *iso*-amyl ethyl barbituric acid; N-methyl ethyl phenyl malonyl urea; sodium ethyl methyl butyl barbiturate; sodium *iso*-amyl ethyl barbiturate; sodium propyl-methyl-carbinyl allyl barbiturate; alcohol amido-ethyl; alcohol dodecyl; alcohol furfuryl; alcohol propylene; allyl paracetaminophenol; amidoguanidine sulphate; amidopyrin; amidopyrin-barbitone; butyl methyl adipate; caesium bromide; ethyl cellulose; cocaine, crude.

Crystals, not optically worked, weighing not less than 2.5 grams each, consisting wholly of one of the following: barium bromide; R. barium chloride; barium fluoride; barium iodide; caesium chloride; caesium iodide; calcium bromide; R. calcium chloride; R. calcium fluoride; calcium iodide; lithium bromide; lithium chloride; lithium fluoride; lithium iodide; R. magnesium oxide; potassium bromide; R. potassium chloride; potassium fluoride; potassium iodide; rubidium bromide; rubidium chloride; rubidium fluoride; rubidium iodide; sodium bromide; R. sodium chloride; sodium fluoride; sodium iodide.

Cumenol, pseudo; methyl cyclohexanol methyl adipate; dicyandiamide; didial; *p*-diethyl ethenyl diphenylamidine and its hydrochloride; diethyl amino-ethanol; diethylamine; diphenyl; diphenyl oxide; dodecamethyl diguanidine hydrochloride; elbon (cinnamoyl) para-oxyphenyl-urea); emetine; emetine bismuth iodide; emetine hydrobromate; emetine hydrochlorate; ethyl abietate; hydrogenated ethyl abietate; ethyl benzoyl-benzoate; ethylene bromide; eukodal.

Furfurol; germanium oxide; diglyceryl tetra-acetate; glycol ethers; kryofin; lead tetra-ethyl; lipoiodin; maleic anhydride; R. mannite; menthyl ethyl glycollate; N-(oxy-aceto - mercuric - propyl) - ethylurethane; methyl amidoxybenzoate; hydrogenated methyl abietate; methyl abietate; oxymethyl *para*-oxyphenyl benzylamine methyl sulphate; methyl-sulphonal; methylene chloride; α-naphthyl isothiocyanate.

Nickel hydroxide; sodium dioctyl sulpho-succinate; copper methyl arsenate; 4-oxy-3-ethylamino-phenyl arsinic acid; N-methyl tetrahydro-pyridine β-carboxylic acid methyl ester.

m - Oxy - acetophenone; *o* - phenetidine; phenetidyl-phenacetin and its hydrochloride; phytin; piperazine; potassium ethyl xanthogenate; potassium guaiacol sulphonate; R. potassium hydroxide; quinine ethyl carbonate; sefrol; sodium phenyl dimethyl pyrazolone amino-methane sulphonate; sulphonal; theophylline; veratrine; *m*-xylol.

Industrial Alcohol

A new Order (S.R. & O. 1945, No. 1656) amends the Control of Molasses and Industrial Alcohol (No. 18) Order, 1945. It adjusts the maximum prices for methylated spirit and finish, acetates, butyl alcohol, and acetic acid as a consequence of changes introduced by the Finance (No. 2) Act, 1945. Under Section 11 of that Act, certain allowances in respect of spirits will cease as from January 1, 1946. The Order (The Control of Molasses and Industrial Alcohol (No. 19) Order, 1945) came into force on January 1.

Benzol and Allied Products

The Control of Benzole and Allied Products (No. 2) Order (S. R. & O. 1945, No. 1572) amends the No. 1 Order in certain respects. From the quarter beginning on January 1, 1946, 300 gallons of toluene may be disposed of and acquired during each quarter without the authority of a licence, subject to a limitation of 100 gallons as between the same supplier and buyer.

Article 8, which restricts the blending of certain controlled products where more than 2 per cent. by volume of toluene is involved, and Article 78, which restricts the disposal, acquisition, use or consumption of controlled products in excess of certain quantities which contain more than 2 per cent. by volume of toluene, cease to have effect.

For the purpose of calculating the maximum price per gallon at which abnormal crude benzol (classes II and III) may be sold or supplied, the price of refined solvent naphtha is reduced by 2d. (*see* Articles 29 (2) and 31 (1)). Maximum prices are substituted for fixed prices in relation to coal-tar naphtha and xylol and maximum prices have been substituted for such of the prices in relation to the sale or supply of toluene as are fixed prices. The Order is effective from January 1.

A CHEMIST'S BOOKSHELF

THE CHEMISTRY OF CELLULOSE. By Emil Heuser. New York: John Wiley (London: Chapman & Hall). Pp. 607. $7.50.

Heuser's *Textbook of Cellulose Chemistry* has been known and valued for more than 20 years. In the intervening years since it was first published, our knowledge of cellulose has increased to such an extent that new books have been called for; and during the last five years or so this demand has been met by so many treatises that one is tempted to wonder whether yet another volume is really necessary. For those who admire Heuser's method of presenting the subject, doubt on this score is soon dispelled. The present volume is thoroughly up to date and is a much more comprehensive treatise than the original. Students who are approaching cellulose for the first time, as well as those who wish to renew their knowledge, will find it a valuable text-book. It is written in a concise, clear, and objective manner and contains various pieces of information about cellulose which do not appear in some of its larger contemporaries.

The author presents a critical digest of the literature of the chemistry of cellulose with due consideration of the microscopic and submicroscopic structure of the cellulose fibre. Emphasis is laid on the scientific rather than on the practical application of cellulose chemistry, although here and there the author is tempted to digress into small print and press home a practical point with a skill which leaves the reader in no doubt that he is still one of the most knowledgeable of men in the applied as well as in the theoretical side of his subject.

The book is divided into fifteen chapters of which the first is introductory. Cellulose is defined as well as it is possible to define a complex natural material. Its occurrence, constitution, and isolation from plant materials are briefly described. Chapter 2 deals with the morphology of fibres and the composition of their cell walls. The text is liberally illustrated here with clear photomicrographs and diagrams. The section on the formation of cellulose in plants is worthy of note in that it brings to light some recent evidence suggesting that hitherto generally accepted views on photosynthesis may have to be modified. There is now a new hypothesis suggesting that starch and cellulose "may have to be regarded as the precursors rather than the products of the simple sugars."

In Chapter 3 cellulose/water relations are discussed in some detail. The importance of these relations in the conditioning and drying of textiles and in the formation of a sheet of paper is stressed. There then follows a chapter, comprising over 70 pages of text, on the reaction of cellulose with aqueous alkalis. The evidence for and against chemical combination with alkali is well presented. The nature of mercerised cellulose, its sorption and swelling, and absorptivity for bases, salts, and dyestuffs is also discussed and a section is included on the reactivity of mercerised and regenerated cellulose. The chapter concludes with a section on the mercerisation of cellulose with acids. Chapters 4-6 cover the reactions of cellulose with organic bases, ammonia, concentrated salt solutions, and cuprammonium hydroxide. The esters, xanthates, and ethers form the subject matter of the next three chapters. Amino cellulose and other nitrogenous derivatives (with the exception of the nitrites) receive a comparatively slight treatment by comparison, for example, with the treatment afforded in another recent book.

Chapter 10, on the oxidation of cellulose, comprises over 60 pages, and the subject matter is brought up to date so as to include reference to very recent work on the preferential conversion of primary hydroxyl groups into carboxyl groups by the action of nitrogen dioxide on dry cellulose at room temperature. This chapter also includes a long and interesting section on the action of ultraviolet light on cellulose. The decomposition of cellulose by acids forms the subject of Chapter 11. The formation and properties of hydrocellulose are discussed from the standpoint of the chemist and the microscopist. A very interesting section is included on the polymerisation (reversion) of the hydrolysis products of cellulose under the influence of hydrogen halides, and the chapter concludes with a discussion of the rate and kinetics of hydrolysis. The thermal decomposition of cellulose and its decomposition by biological processes are treated in separate and informative chapters.

Chapter 14 is an excellent brief review and summary of the facts which have led to the concept of the chain structure of cellulose. This will be appreciated by the student for revision purposes. Chapter 15 concludes the book with a well-sustained discussion on the molecular weight of cellulose and of the ways in which various investigators have sought to measure it. The section on end-group assay, based on the formation of tetramethylglucose, makes interesting reading as it reveals, perhaps more than any other section in the book, some of the uncertainties about cellulose which remain to be resolved.

POLAROGRAPHIC AND SPECTROGRAPHIC ANALYSIS OF HIGH PURITY ZINC AND ZINC ALLOYS FOR DIE CASTING. London: H.M. Stationery Office. Pp. ix + 117. 5s.

This book contains, in the form of four papers and three appendices, a full account of an investigation carried out over the years 1941-44, by a British Standards Institution Panel. The work arose from the fact that the physical methods generally in use for the analysis of zinc alloys in 1941 were not precise enough to permit of analysis to new specifications which had been drawn up.

The obvious methods to be investigated were the polarographic and the spectrographic. In the first paper, which deals with polarography, successful methods for the determination of iron, copper, lead, cadmium, and tin in high-purity zinc and zinc alloys for die casting are described. The second paper describes the use of a condensed A.C. spark source for the spectrographic determination of aluminium, magnesium, and copper in zinc alloys. This is followed by applications of the intermittent A.C. arc. The final paper deals with the D.C. arc method for the determination of lead, tin, and cadmium, using graphite electrodes and converting the sample to oxide. The appendices describe the method of preparing standard alloys, and detail the specification requirements for samples.

This collection of papers will be useful for those engaged in the analysis of non-ferrous metals and alloys, and will also be found important by anyone concerned with the application of physical methods to analysis of any type. In addition, it illustrates admirably the extensive investigation which is necessary before a new analytical method of this nature can be regarded as completely satisfactory for general adoption. Useful pointers are included towards problems which require further investigation.

STANDARD METHODS OF ANALYSIS OF IRON, STEEL AND FERRO-ALLOYS. Sheffield: The United Steel Companies, Ltd. Pp. vii + 93. 7s. 6d.

This book confines itself to standard methods of chemical procedure, developments in technique which have been made in the application of physical methods to ferrous analysis being reserved for a later publication. Part I deals with the analysis of iron and steel as practised in the laboratories of the United Steel Companies, with respect to the usual alloying elements and impurities, while Part II deals with the analysis of ferro-alloys. The text is completely up to date and the methods detailed are selected standard methods which have been well tested and are in practical use in the laboratories of the company's many constituent branches. The book will be of great help and utility to chemists and technicians engaged in ferrous metallurgy.

We deplore the revival of the bad old custom of sending books for review defaced with a heavy overprint "REVIEW COPY NOT FOR SALE."

Lead Oxide Quota

For Non-Empire Destinations

THE Board of Trade announces that a quota of lead oxides for the period January 1-June 30, 1946, for export to non-Empire destinations (including liberated territories in Europe and their colonial possessions, Egypt and Iraq) has been arranged. Exporters who desire to participate in this quota should apply in the first place by letter (receipt of which will be acknowledged), if they have not already done so, to reach the Export Licensing Department of the Board of Trade not later than January 26 next, stating: (a) the quantities for which each exporter has received firm orders (for which evidence may be called), giving separate totals for each of the above markets; and (b) the name of the manufacturer from whom it is proposed to obtain supplies in the event of an export licence being granted.

Distribution of the quota will be made on the basis of this information, and until a further communication is received from the Export Licensing Department exporters should refrain from making formal application for licences on the official Form D.

This quota is limited in quantity, and it is unlikely on present information that it will be possible to grant licences in respect of more than a small proportion of the total quantities for which orders have been received. Exporters will, however, be entitled to use their share of the quota to fulfil present orders or orders which they may receive during the period ending June 30 next, at their own discretion.

Exports to Egypt, Iraq and Allied colonial destinations will now fall within this quota. Exports to Palestine will, however, continue to be dealt with under the existing arrangements for Empire destinations.

The Aluminum Company of America has closed its Phœnix branch. This Government-owned plant represents an estimated investment of $65,000,000. The group also closed down the Government plant at Mead near Spokane, where monthly output totalled 6000 tons of pig aluminium, while production at the rolling mill at Trentwood, with a rated capacity of 120,000 tons annually, has been halved.

Patents in France

Post-War Regulations Established

A NOTE by Mr. S. Mittler, who has contributed numerous articles to THE CHEMICAL AGE on Patent Law, both domestic and foreign, calls the attention of readers to some interesting facts concerning practice in France.

While in Great Britain the filing of patent applications on the basis of a patent application abroad made more than twelve months before the filing date of the British patent application, and the belated payment of renewal fees, are still covered by the Emergency Act of 1939 and the various Statutory Rules and Orders attached to it, and post-war regulations have not yet got beyond the recommendation stage,* France has now issued a law which came into force on November 13, 1945, and covers the moratorium for claiming priority under International Convention and for the belated payment of renewal fees for the post-war period. The main points are as follows:

(1) Patentees or Patent Applicants who are citizens or residents of countries affording reciprocity to France may, until further notice, continue to file patent applications in France under International Convention even if the period of twelve months since the filing of the basic foreign application has expired. Patents will be granted on such moratorium applications "sous réserve des droits du tiers," *i.e.*, they will not affect the rights of user established, or the validity of patents applied for, in the interval. Preliminary information received from France includes the following as "countries affording reciprocity": Australia, Belgium, Brazil, Canada, Denmark, Great Britain, Luxembourg, Morocco, Norway, Portugal, Sweden, Syria-Lebanon and Tunisia. For countries not included in the official list, the moratorium for claiming a priority date came to an end in France on November 13, 1945.

(2) The moratorium for the payment of Renewal Fees that have become due since August 21, 1939, has been extended until March 31, 1946, regardless of the nationality or country of residence of the patentee. No further extension will be granted, and after that date patents will become void unless the renewal fee has been paid.

(3) The moratorium concerning designs expired on November 13, 1945.

It will be noted that no difference in principle is made between allied, neutral, occupied, and enemy countries, although in effect the latter are excluded because they had no opportunity for affording reciprocity.

* See "Enemy Owned Patents and Patent Applications," recommendations of the Council of the Chartered Institute of Patent Agents, reported by the author in *J. Pat. Off. Soc.*, December, 1945.

Coal-Tar Products

War Production of Midland Company

THE Midland Tar Distillers, Ltd., have, in the six years to June, 1945, handled 264,000,000 gallons of crude coal tar. At the Government's request, the company erected one of the largest refineries in the country for distilling crude benzol. During the last three years, over 23,000,000 gallons of crude benzol have been distilled there, yielding 2,000,000 gallons of toluene, in addition to refined benzol, which has played an important part in the production of synthetic rubber. Output of tar acids increased by 120 per cent., the total figure for the above period being 8,000,000 gallons. A very large proportion of the pyridine used during the war in the manufacture of M & B 693 was supplied by the company. Pyridine was sent to the U.S.S.R., while very large quantities of tar acids were supplied under Reverse Lend-Lease. Production of creosote amounted to 61,000,000 gallons, the bulk of which went to I.C.I., Ltd., and was hydrogenated into aviation fuel.

Production of road tar was cut down to 62,000,000 gallons. The company was largely responsible for the large-scale production of coal-tar liquid fuel 200 (also known as creosote-pitch mixture), a viscous oil which has replaced large quantities of imported fuel oil. Between 1941 and 1945, 56,000,000 gallons were distributed, the highest annual figure being 16,000,000 gallons. Other activities include the filling of beer bottles as "flame weapons," camouflage, including that of the "white cliffs of Albion."

As regards future activities, orders for plant have been placed to deal with increased production of tar and of the intermediate products therefrom, to effect necessary replacements of plant, and to erect plant required for new processes as a result of the efforts of the research department; this programme will require additional capital. The company has substantially increased its allocation to research, and intends to increase it still further when staff and accommodation can be provided.

ALUMINIUM STANDARDS

A detailed list of the specifications which have been published in recent years, covering aluminium and its alloys, has been issued in convenient booklet form by the Brtish Aluminium Company. The list includes both the Aircraft and the General Engineering Specifications of the British Standards Institution, the D.T.D. Specifications of the Air Ministry, the BS/STA Schedule of the Ministry of Supply, and the L.A.C. Series compiled by the Light Metals Control for the Ministry of Aircraft Production. Both numbers and subjects are fully indexed.

Metallurgical Section

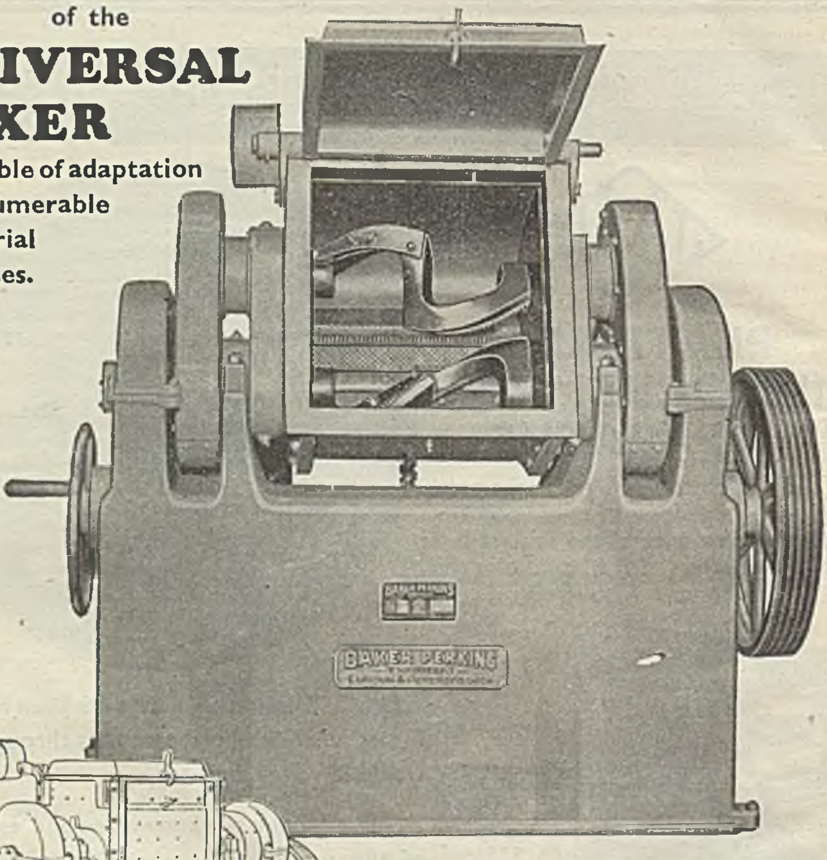
Published the first Saturday in the month

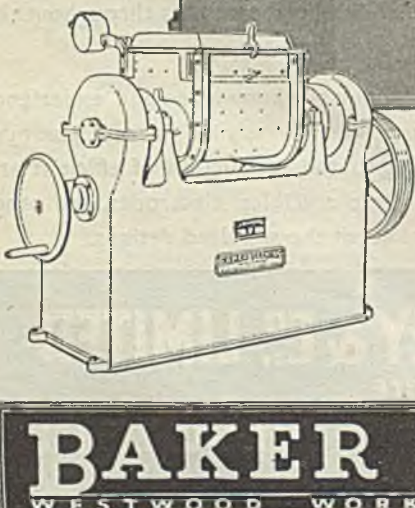
The Basic Principle

of the

UNIVERSAL MIXER

is capable of adaptation to innumerable industrial purposes.





Here, for instance, is a machine of 18 gallons capacity, with our Sigma type blades carrying adjustable, serrated edges, revolving in opposite directions against a saddlepiece likewise serrated, to obtain a shredding action simultaneously with thorough incorporation of the mix.

The jacketed trough is lined with renewable steel wearing plates.

BAKER PERKINS LTD

WESTWOOD WORKS — PETERBOROUGH

Metallurgical Section

January 5, 1946

German Magnesium Production

U.S. Report on Bitterfeld Plant

ACCORDING to a report by Mr. Ralph M. Hunter, of the Dow Chemical Company, who surveyed the German magnesium industry near Bitterfeld, the magnesium capacity of Germany was, at the beginning of August, 1945, about 190,000 lb. of metal per day. Of this total, 154,000 lb. were produced by the I. G. Farbenindustrie in Bitterfeld, Stassfurt, and Aken. The I.G. works at Bitterfeld are very extensive, there being four separate enclosures employing a total of 35,000 workers. The plants are called South Bitterfeld, North Bitterfeld, Wolfen Farbenfabrik, and Wolfen Filmfabrik. The first two specialise in inorganic products, while the Wolfen operations are organic. Light metal manufacture is carried out at Stassfurt and Aken (near Dessau), and light metal casting at Leipzig, under the direction of Bitterfeld. Magnesium has been produced with ferrosilicon and magnesium oxide in an experimental plant. Thus far it has not been promising. A carbon reduction (Hansgirg) unit was also tried with negative results.

Power for I.G. operations in this area was made from lignite, mined from nearby deposits by open-pit methods. The coal was burned on falling grates after rough crushing. Bitterfeld generated 160,000 kW and is connected with other stations, such as Leuna. The Stassfurt and Aken operations received power from this system. A nearby power plant on the system had 30,000 kW capacity destroyed by bombs, but, from general information received, it is believed that the I.G. power system (estimated at 250,000 kW), which is connected with other systems, could produce, or obtain, almost enough current to operate the chemical plants at capacity.

No damage due to bombing had been done to any of the equipment for the production of magnesium in Bitterfeld or Stassfurt. In the latter there was a number of displaced Russian and Italian persons, and some minor damage had been done. No damage had been done at Aken.

The capacities of the three works appear in the following table:

South Bitterfeld	...	300 metric tons per month
Stassfurt...	... ...	1000 ,, ,,
Aken ...	... ...	900 ,, ,,

The raw materials were carnallite from Stassfurt, and high magnesium content dolomite (stated to be 40 per cent. MgO) from Scharzfeld in the Harz mountains. The dolomite was calcined at the quarry and shipped to Teutschental near Halle, where it was slaked in 26 per cent. $MgCl_2$ brine, an end product of the potassium chlorine operations from carnallite in the Stassfurt area. The precipitated $Mg(OH)_2$ was filtered on an Oliver filter, washed with water and cake dropped with 50 to 60 per cent H_2O. This cake was dried in a shelf drier at 500°C. with rabble arms on a vertical shaft to move the material across the shelves. Producer gas was the fuel used. It was then calcined at 900°C. with lignite producer gas. The dried MgO was then mixed with crystal $MgCl_2.6H_2O$ obtained by evaporation of the $MgCl_2$ liquors from the carnallite operations. The product (a mixture with analysis $MgO.MgCl_2$ plus 30 per cent. H_2O of crystallisation) was called "oxychloride," and does not absorb much water. It was shipped from Teutschental to Bitterfeld, Stassfurt, and Aken in special, triple-hopper cars, holding 32 metric tons. At these plants it was mixed with lignite which was ground to 25 per cent. through 250-mesh. At Bitterfeld the mix was oxychloride 88 per cent. plus coal to give 6 per cent. carbon, and peat to yield 6 per cent. carbon.

Briquetting and Drying

The oxychloride, coal, and peat were mixed in dry mixers, a little $MgCl_2$ liquor added to aid in briquetting, and the moist mixture was extruded through a sausage-type briquetter (screw against an orifice) to a 1½-in. cylinder of low strength, which breaks into 2-in. to 4-in. lengths as it is extruded. These were dried at 400°C. to harden, and then calcined at coking temperature to decompose the coal and peat. The product is estimated to contain 10 per cent. H_2O. The chlorinators at Bitterfeld are each rated at 10 tons of anhydrous $MgCl_2$ per day. They are vertical steel cylinders, acid-brick-lined, and are 20 ft. high, about 9 ft. inside diameter, and 13 ft. outside diameter. The briquettes were fed in at the top. Chlorine from the cells (90 per cent. concentration), to which was added chlorine from liquid, was introduced just above the bottom. The temperature was maintained by carbon resistors, operating 3-phase at 2500 amp. and 22 volts (about 0.6 kilovolt-amp. per lb. of magnesium). Each chlorinator served about twelve cells. Molten magnesium chloride flowed out of the chlorinators and was transferred into 3-ft. by 4-ft. crucibles, electrically driven, with tilting mechanism, and fed to the cells once per eight-hour shift.

The chlorine losses occurring in this operation result from stack loss of the gas not absorbed in the briquettes, the conversion of CaO impurities to $CaCl_2$, which is present in the feed up to 6 per cent., and the conversion of a large portion of the 10 per cent. of H_2O to HCl, due to the water-chlorine reaction at the elevated temperature. The $CaCl_2$ and the HCl loss may be estimated at 0.2 lb. of chlorine per lb. of metal for the $CaCl_2$, and 1.5 lb. of chlorine per lb. of metal for the HCl.

Liquid chlorine is supplied to the process at the rate of from 0.5 to 1.0 lb. of chlorine per lb. of metal. The chlorine balance, therefore, would appear to be 1.48 lb. of chlorine per lb. of metal in the $MgCl_2.6H_2O$ added at Teutschental and 0.5 to 1.0, new chlorine, making a total addition of 1.98 to 2.48 and known loss from HCl and $CaCl_2$ of 1.7.

The Bitterfeld Cells

The magnesium cells at Bitterfeld are about 88 in. inside by 48 in. wide by 48 in. deep. The cell is divided as follows: 9-in. cathode space, 2-in. divided partition, 10-in. anode space, 2-in. partition, 13-in. cathode space, 2-in. partition, 10-in. anode, 2-in. partition, 13-in. cathode, 2-in. partition, 10-in. anode, 2-in. partition, 9-in. cathode. The partitions are made of high-silica, acid-proof brick in two pieces about 24 in. long and 17 in. deep; they extend a few inches under the bath and above the cell top to serve as sides of the chlorine dome. The front of the chlorine dome is completed with brick. The anodes are graphite pieces about 4½ in. by 9 in. by 55 in. and are assembled close together at the top on bus-bars to make an electrode 4½ in. by 54 in. by 55 in. The anode life is from 12-16 months. During the life of the anodes very little wear is experienced. The anodes are sealed into the dome with asbestos and cement. The cathodes are steel castings of eccentric shape, designed to present a face about 18 in. by 50 in. to the anode and tapered up to maintain constant current density through the steel.

The cells are composed of high-silica acid-proof brick built into walls about 18 in. thick and encased in steel shells with solid bottoms. The diaphragm brick is the same composition as the lining (about 70 per cent. SiO_2-30 per cent. Al_2O_3). It has a life of about 16 months maximum. The cell pot lining lasts about five years. Cells are spaced with about 3 ft. between cells, in rows about 12 ft. apart. The Bitterfeld cells are rated at 23,000 amp. and 7 volts per cell, although there was evidence of operating at 18,000 amp. The ampere efficiency was about 88 per cent.

The power required was between 8.0 and 8.5 d.c. kWh per lb. of metal. Graphite consumption is .025 lb. per lb. of magnesium. Assuming the cathode face at 18 in. by 50 in., the current density is 4.3 amp. per sq. in.

Cell Bath Analysis

The cell bath was not sampled, as all cells were frozen and true samples were impossible. Analysis of the cell bath was given as follows:

		per cent.	
$CaCl_2$	... ...	45—50	
$MgCl_2$	... ...	10—25	(Average 15 per cent.)
NaCl	... ...	30	
KCl	... ...	10	
CaF_2	... ...	0.5—1.0	

The cell feed in the form of molten $MgCl_2$ analyses 86 to 90 per cent $MgCl_2$, 5 to 6 per cent. $CaCl_2$, and the balance NaCl and KCl. There were no sulphates present, as they are eliminated in the chlorinator. Sludge was dipped once a week and analyses 30 per cent. MgO, 10 per cent. metallic magnesium, the remaining 60 per cent. being bath. A study of the impurity balance indicates a build-up of $CaCl_2$ in the bath, and the bath was dipped whenever $CaCl_2$ exceeded 50 per cent. NaCl was added to restore the desired composition.

Cells were started by pouring in a few hundred pounds of molten carnallite. The graphite electrodes were used with a special transformer for alternating current heating, which was used until the cell was full of normal bath, which was added slowly. There was no indication of iron pick-up during the start.

The chlorine gas outlets are one per dome and three per cell. They are about 2 in. inside diameter, and are composed of a section of ceramic pipe, delivering into a cast-iron line. The line suction was 1 in. of water, and the cell suction about 0.1 in. Before compression, the chlorine is dry filtered through thimbles (bag house) of asbestos cloth for removal of the dust, and is then compressed to about 20 in. of water pressure with a Jaeger blower and returned to the chlorinators. The four cathode chambers are ceramic covered, with lids for metal and sludge removal, and are vented at the back through lines similar to those for chlorine, to remove HCl. Power for the operation was rectified with motor generator sets at 93 per cent. conversion.

Labour figures were given for operation

(cells only) as 20.5 man-hrs. per ton of magnesium, for maintenance of cells 16.8 man-hrs. per ton of magnesium, making a total in the cell room of 37.3 man-hrs. per ton of metal.

Metal Dipping

Metal dipping from cells was done once a day and could be done on a two-day schedule. The metal collected in the four cathode compartments (two double—two single) and was collected by automatic skimming. The apparatus for the purpose was a pot, holding 800 kg., fitted for vacuum operation. The casing is about 5 ft. in diameter and 5 ft. high, and contains a nichrome resistance heater, rated at 60 kW. It is mounted on an electric truck. The whole assembly weighs about 7 tons. A large handwheel operates four corner screws which raise and lower the pot to conform to bath levels. Suction lines at 300 mm. absolute pressure are provided throughout the plant. A pipe, the skimmer for the cell, was connected to the top of the vacuum pot; it is about 1½ in. inside diameter, and reasonably well insulated. It was put lower than necessary in the cell for preheating. When ready, a valve was opened, and the skimmer placed at the surface, the metal being sucked in. There was a certain amount of flexibility in the pipe, but as the cell level falls, the pot is lowered by the screws. The pot was moved from compartment to compartment until one cell was cleared. A man raked metal toward the skimmer to aid the skimming. When cells were cleared, the valve was closed, and the pot went to another cell, or if full, to a separating pot. A pot full usually contained 1300 lb. of metal and 400 lb. of cell bath.

The Separating Pot

At the separating pot, which is in a corner of the cell building, the skimming pot was put under pressure, and metal and bath discharged through a dip pipe. The separating pot is similar to the first in size (about 40 in. by 54 in.), and was heated with an electric heater, but was mounted so as to tip over at 180°C. First, it was discharged through a pipe cast in it, which extended to the bottom. The excess bath ran out, and a small amount of metal was discharged; the pot was tilted the other way and discharged into an alloy pot, which transports the metal to the alloy plant. The skimming operation was claimed to dip one cell in less than five minutes (seventy cells in five hours), and five men could handle this operation at that speed.

The cell settings are supported on a set of I-beams, running lengthwise, which are carried by columns. A number of smaller beams act as purlins. Bricks are used for insulation. The floor is supported by noncontinuous steel beams resting on the walls or brick piers. Reinforced concrete slabs span the beams, and the slabs are covered with brick.

The Stassfurt Cells

The Stassfurt cells are the same as at Bitterfeld, with the following exceptions. One line of cells operated at 32,000 amp. and 6.8 to 7 volts per cell. These cells contain four anode assemblies and five cathodes (two single—three double). The units are the same, but the cathode to anode spacing was given at 4 in., compared to the smaller cells at 7 in. This cell was developed in 1938. Its power requirement is slightly better, being 7.8 d.c. kWh per lb. of metal. At Stassfurt, d.c. power was supplied by rectifiers of multi-anode type, rated at 6000 amp., each containing 18 anodes. The efficiency was 94 per cent. A sludge treatment was used to recover the 10 per cent. metal. A pot setting was used with alternating current used on several electrodes. Sludge was agitated in the cell bath. It was claimed that 8 to 10 metric tons of metal were recovered per month. Composition of the cell bath at Stassfurt was given as 30 to 40 per cent. $CaCl_2$, 20 to 25 per cent. KCl, 20 per cent. NaCl, 15 per cent. $MgCl_2$, with about 100 lb. of NaF added per cell per month.

CHROME PRICES

The Ministry of Supply announce that the following prices per ton for chrome ore and concentrates apply as from January 1. These prices are all f.o.r. consumers' works.

	£	s.	d.
Refractory Grades			
Rhodesian Imperial Grade ...	11	7	6
Transvaal, 1st Grade	9	5	6
Grecian, 1st Grade	12	7	6
,, 2nd Grade	11	10	0
Metallurgical Grades			
Rhodesian Lump Metallurgical	11	15	0
,, Washed Friable ...	11	15	0
Baluchistan	11	7	0
Chemical Grades			
Rhodesian Dyke Chemical ...	11	10	0
Transvaal Chemical Concentrates	11	7	0
Baluchistan	11	7	0

The Alliance Aluminium Company of Basle, that is the international aluminium cartel formed in 1931, has been wound up. Germany's share will be allocated to the remaining members and since the cartel's assets are invested in gold, Germany's share will accrue to the other partners.

Steel Prices Raised

Iron Ore Freed from Price Control

HIGHER maximum prices for steel products came into force on December 31, under the terms of an Order published by the Minister of Supply. At the same time the Central Fund, under which the industry has been working since 1940, is to come to an end. The basic price of pig-iron is increased by £1 per ton, and the rise in the price of the main steel products is, in general, about 5 per cent., though on certain highly-finished products the percentage varies in one direction or the other. The current price for billets goes up from £12 10s. per ton to £12 17s. 6d. and for plates from £16 3s. to £16 19s. 6d. The full details are contained in the Control of Iron and Steel (No. 46) Order, which consolidates most of the preceding Orders, though not including the Scrap Orders and the recent Orders covering tinplate and bolts, nuts, etc.

Iron ore and cinder and scale are freed from price control, and where material is produced to meet unusual requirements, the Minister may authorise an addition to the maximum price. Payments into and out of the Central Fund officially ceased on January 1, but it will not be possible to liquidate the fund until the end of March, by which time the pig-iron position may be expected to have returned to normal. Increasing quantities of ore are being imported, but until these reach pre-war figures, the fund will continue to operate to an extent. On March 31, however, payments will cease altogether.

Other amendments are that electrical stampings are free from all control; and restrictions on the acquisition and disposal for export of springs and certain wire products are removed.

The special reduction of £2 per ton applying to motor-body sheets has been made possible by the economic working under full production of the strip mills of Richard Thomas and John Summers, which will now have the opportunity of operating under full production for the first time.

NON-FERROUS METAL PRICES

The Minister of Supply has issued a third list of selling prices of non-ferrous scrap metals for the period January 1-March 31 on the same terms as the previous lists (*see* The Chemical Age, 1945, June 16, p. 525; September 15, p. 241). The prices are, as a whole, maintained, but the following, additions should be noted: Copper, clean untinned, cut up, £56 10s. per ton; copper wire, £55 10s.-£57 per ton; shell-band scrap (other than turnings), £56 10s. per ton; copper firebox plates, cut up, £57 10s. per ton; brass ingots, £51 per ton.

Cast Iron Research

Current Programme of the B.C.I.R.A.

SIX investigations of a fundamental nature are included in the current (1945-46) programme of the British Cast Iron Research Association, Alvechurch, Birmingham, which celebrates its jubilee in 1946. Four other investigations are sponsored by other bodies (two by the Institution of Mechanical Engineers, and two by the British Iron and Steel Research Association), and five more are general investigations reviewed by the special-purpose research sub-committees.

The six fundamental items are as under:

1. *Graphite Formation.*—The mechanism of graphite formation during solidification.

2. *Graphite Formation—The Malleable Process.*—The mechanism of graphite formation in the solid state during annealing, as in the whiteheart and blackheart malleable processes.

3.—*Decarburisation of Cast Iron.*—The mechanism of decarburising cast iron as in the whiteheart malleable process.

4. *Gases in Pig, Cast and Malleable Cast Iron.*—To study the nature, amount and influence of gases in cast iron on structure and properties.

5. *Standard Test-Bar Casting Methods.*—To study the best method for the production of sound standard test bars.

6. *Improved Methods of Testing.*—(a) The application of the photoelectric absorptiometer to the analysis of cast iron for elements present both in ordinary and very small amounts; (b) the application of spectrochemical methods to the analysis of cast iron for elements present both in ordinary and very small amounts.

Further research items in the chemical field await individual staff, although a great step forward was made towards the full efficiency of the work of this department by the separation of its work, during the year, from that of the analytical laboratory. Mr. W. Westwood, B.Sc., has been placed in charge of the Chemical Research Department; Mr. A. W. Bridgwater, A.R.I.C., is in charge of the Chemical Laboratory.

During his recent visit to America, Sir Ardeshir Dalal, Member for Planning and Development, Government of India, made arrangements with two firms to send their experts to India for the purpose of advising the Engineering and Chemical Panels of the Planning and Development Department. The firms in question are Ford, Bacon & Davis, the famous firm of consulting engineers who have advised the Government of Russia and several South American States, and the Chemical Construction Corporation. An expert from the latter has already arrived in India.

A New View of Welding

Metallurgical Features in Welded Steels

IN a paper by Hugh O'Neill, D.Sc., M.Met., chief metallurgist, L.M.S. Railway, presented to the Institute of Welding on November 28, a new definition of welding was proposed, based on a historical and metallographic review of the art. Methods of the blacksmith gave rise to the use of the actual word, and both ancient practices and modern sintering and "recrystallisation" processes rely upon interatomic diffusion in the solid state to bring about actual joining. For this purpose the presence of liquid metal is not necessary, and theories of friction invoking welding effects because of possible local melting are disputed. A distinction should also be made between welding and adhesion.

The development of metallic arc welding has introduced certain special features due to actual fusion, including the peculiar melting of the parent plate by "slicing" effects in austenitic welds. As another example, the presence of locally fused spots on a steel structure will reduce its resistance to dynamic stressing. These "stray flashes" or "arc dabs" have been intentionally produced on Wöhler test pieces, and the resulting reduction in fatigue strength determined. Local fusion spots produce very high hardness values in the parent plate of low alloy steels, and a further study has been made of hardening effects due to sparking on pure iron. Micro-indentation tests reveal a doubling of the hardness of such iron. The surprisingly high hardness values which can be obtained locally by the spot welding of dead mild steels was also discussed.

Difficulties associated with the production of good metallic arc welds in high-strength alloy steel were examined metallographically in terms of thermal transformations and S-curves. The effect of chemical composition, and of metallographic structure *prior* to welding was considered, and a comparison was made of methods of evaluating the weldability of steels by "carbon equivalent" calculations, by quenching tests, and by welding tests, preference being finally shown for actual welding tests.

Novel Test Method

The paper concluded with a description of a method now under development in the L.M.S. Laboratory, Derby. This uses 5 in. by 2 in. samples taken from actual rolled steel of various thicknesses as delivered, and lays down a standard test welding procedure. The plates are made to overlap, and are clamped in a vice during welding. The welded assembly is sawn into test pieces and the ductility of the weld determined in a simple testing rig also actuated by a bench vice.

Forging Aluminium Alloys

Some Useful Information

TO those practised in working with steel and copper-base alloys, the forging of aluminium alloys is likely to present some difficulty. The aluminium alloys have lower melting points and their hot working range is below "red heat," so that the technique demanded in the production of forgings is, to those accustomed to the older arts, a new one. Accordingly, the Aluminium Development Association have published, on behalf of the Technical Committee of the Wrought Light Alloys Association, a brochure, by J. R. Handforth and J. Towns Robinson, entitled "The Manufacture and Production of Aluminium-Alloy Forgings and Stampings." This will, it is hoped, while supplying useful information to those familiar with light alloy forgings, be found invaluable by those approaching the problems of forging aluminium alloys for the first time, since it presents concisely but in detail all the facts relevant to the manufacture of good quality light alloy forgings.

Furnace Control

In this country forgings are made primarily from extruded bar or cast blanks. These have markedly different characteristics, which involve different techniques of handling during forging, and the authors rightly deal in detail with the production of forging stock by both methods. The preparation of blanks for forging is then discussed both in terms of the machining requirements and preheating for forging; under the latter heading, the types of furnace most suitable for the purpose are described. The importance of accurate furnace control is emphasised, as is the importance of the time-factor in the heating of the stock to forging temperature. A rough method of ensuring that the stock is held long enough in the furnace is to maintain the blanks at the set period for approximately one hour per inch of their thickness.

The requisite plant is next considered, the essentials of the modern forge being discussed. The supreme importance of die design is stressed, and a complete layout of the whole process of the manufacture of a forging is recommended. This should include all operations from the machining of the die to the final stamping of the dummies; while such features as size, shape, direction of grain flow, shrinkage, and the position of the die in the drop hammer, must all be predetermined.

Fabrication details, of course, can be discussed in this brochure only in a general manner. Nevertheless, the fundamentals are outlined at some length. Heat treatment is also discussed; and the paper concludes with chapters on inspection and testing.

The Longhorn Tin Smelter

Performance and Prospects

THE following report on the Longhorn Tin Smelter on the Gulf Coast of Texas supplements the details regarding construction, the process used, etc., which appeared in THE CHEMICAL AGE of August 7, 1943.

According to the U.S. Bureau of Mines' report on tin in 1944, domestic tin smelters produced 30,884 long tons of tin in 1944, of which 30,619 tons came from the Government-owned Longhorn smelter. The 50 per cent. rise in pig tin output at Texas City resulted from improved operating procedures in smelting and ore dressing, notably in lengthened furnace campaigns.

The principal plant improvements were the installation of mechanical samplers and conveyors for ore bedding in the ore-storage building and the addition of a thickener, filters, and a flotation unit for oxide flotation in the ore-dressing section. Towards the end of the year, two of the nine reverberatories were being converted to a single unit with a waste-heat boiler.

Satisfactory results were achieved with charges containing approximately 90 per cent. complex Bolivian ores of about 40 per cent. tin content (including the better-grade Patino ores)—the first large-scale operation on ores of about 65 per cent. of the tin content of those usually smelted in England and about 55 per cent. of those smelted in Holland, Malaya, and the Netherlands East Indies. Although five grades of pig tin have been produced, recent practice has been to make only Three Star or Grade A (99.80 per cent. Sn and over) and no One Star or Grade F. (less than 99 per cent. Sn). More than 80 per cent. of the output is of first quality.

Production Figures

The production of Longhorn tin since smelting operations started in April, 1942, and up to July, 1945, were given in a W.P.B. report of September 12, 1945, as follows (in long tons):

		Monthly average.
1942 (Apr.-Dec.) ...	15,695	1733
1943	20,727	1727
1944	30,619	2551
1945 (Jan.-July) ...	23,494	3356

Longhorn smelter shipments were 37,112 long tons, of which 32,856 tons were Three Star and most of the remainder Grade F and One Star. Industrial users received about 25,100 tons, and the remainder was distributed to Government warehouses.

Only two privately-owned smelters were in operation in 1944—the American Smelting & Refining Company and the Nassau Smelting & Refining Company. Most of the tin recovered was as alloys, principally solder.

Unpredictable Future

The post-war status of the Government's Longhorn tin smelter has been the subject of considerable discussion. The principal arguments advanced for the continued existence of the smelter are: strategic importance, part of the State Department's Good Neighbour policy, and for recovery of public investment. On the other hand, it has been said these arguments are not wholly valid. Military security may be attained more simply by stockpiling metal, a method already adopted in the United States. If it should again be necessary to construct a plant, it has been demonstrated that it could be accomplished in a matter of months, and the technique of ore reduction need not be lost if the smelter ceases operation. Under the concept of Inter-American mutual support it is expected that Bolivia would continue to supply tin to the United States at a premium above the free market price. The investment in the Longhorn smelter is approximately $7,000,000. Its assured operating life will exceed five years; usual accounting procedure would have amortised a substantial part of the investment, had the smelter been a private venture instead of an emergency undertaking, the total cost of which can be considered properly a war expense. Even if salvage value is neglected, the added cost per pound of product for five-year amortisation would be only about 2 c. per lb.

For two or three years longer, or until Far Eastern smelters resume production, operation of the Texas City reduction works is reasonably certain. Thereafter, in the absence of political control of ore sources by the United States, the future is unpredictable.

Personal Notes

The University of Durham has appointed MR. C. E. PEARSON, M.Met. (Sheffield) to the Chair of Metallurgy at Newcastle.

MR. A. G. E. JOYCE and MR. R. F. STEWART, M.C., have been elected to the board of the Dorr Oliver Co., Ltd.

PROFESSOR MEREDITH G. EVANS, who occupies the Chair of Inorganic and Physical Chemistry at Leeds University, is lecturing in Holland under the auspices of the British Council.

SIR HERBERT DAVIS has resigned, as from December 31, from the position of Director of the Oils and Fats Division, Ministry of Food, and is succeeded by MR. J. W. KNIGHT. MR. G. R. OAKE becomes deputy-director.

LIEUT.-COL. R. A. THOMAS, C.B.E., retired on December 31 from the position of Chief Inspector of Explosives, Home Office. He is succeeded by DR. H. E. WATTS, M.B.E., Ph.D., F.R.I.C., hitherto Second Inspector.

MR. F. C. FRARY, director of research of the Aluminum Company of America, has been awarded the Perkin Medal of the American Section of the S.C.I. in recognition of his accomplishments in industrial research.

DR. J. H. BIRKINSHAW, D.Sc. (Leeds), has been appointed, from January 1, to the London University Readership in Biochemistry, tenable at the London School of Hygiene and Tropical Medicine. He has been senior lecturer in the department since 1938, and in 1921-27 he was research biochemist for I.C.I.

DR. J. M. C. THOMPSON has been appointed to a lectureship in the Chemistry Department of Aberdeen University, where he has been acting as an assistant since September last. Dr. Thompson joined the Ministry of Supply Chemical Research Branch in 1940, and was released last September.

SIR HAROLD HARTLEY, C.B.E., M.C., chairman of the Fuel Research Board and member of the D.S.I.R. Advisory Council, has become a member of the board of British Overseas Airways Corporation. He has resigned his deputy-governorship of the Gas Light & Coke Company, and his positions on the boards of the L.M.S. Railway and of Railway Air Services.

MR. C. W. DANNATT, A.R.S.M., A.I.M.M., F.R.I.C., has been elected to the Chair of Metallurgy tenable at Imperial College, University of London, the appointment dating from October 1, 1945. Mr. Dannatt was appointed Reader in Metallurgy in 1937, and since 1940 has been acting head of the metallurgical department at the Royal School of Mines.

MR. D. N. LOWE has been appointed secretary of the British Association for the Advancement of Science, in succession to DR. O. J. R. HOWARTH, who would in normal circumstances have retired in 1942. Mr. Lowe was assistant secretary before the war, during which he served in the Ministry of Production. He has not yet been released, and Dr. Howarth has been asked by the Council to remain in office until the next annual meeting of the Association.

MR. F. H. ROLT, who becomes Superintendent of the Metrology Division of the National Physical Laboratory on April 1 next (when MR. J. E. SEARS retires), has been on the staff of the N.P.L. since 1912. During the war, however, Mr. Rolt served as Director of Jigs, Tools, and Gauges in the Ministry of Supply. MR. A. FAGE succeeds MR. E. F. RELF (now Principal of the College of Aeronautics) as head of the Aerodynamics Division of the N.P.L.

MR. WALTER MURRAY, A.R.I.C., F.R.S.E., has retired from the position of chief technician in the Chemistry Department of the University of Edinburgh, the staff of which he joined in 1889. On December 22 a presentation ceremony was held in his honour; Professor Kendall took the chair and the presentation of a cheque to Mr. Murray was made by Lady Walker, whose husband, the late Sir James Walker, was the previous occupant of the Chair of Chemistry.

MR. JACK WILLIAMS, manager of the Castner-Kellner works of I.C.I. at Runcorn, retired from active service in the chemical industry at the end of 1945, after a lifetime in the business. He took over the position at Weston Point some 14 years ago, and before that date he was a prominent figure in the I.C.I. works at Widnes. On his retirement he was presented, by staff and employees, with a silver salver and punchbowl, together with a volume inscribed with the signatures of all the donors. The function, on December 21, was presided over by Mr. J. Riley, assistant works manager, aided by Mr. F. Whitlow, one of the senior foremen.

New Year Honours

Chemical and allied sciences and the chemical industry are well represented in the first part of the New Year Honours List, which was published on January 1. A further list is to be issued next week.

Scientists honoured with the title of Knight Bachelor include PROFESSOR CHARLES DRUMMOND ELLIS, F.R.S., Wheatstone Professor of Physics in the University of London; MR. PAUL GORDON FILDES, F.R.S., Director of Chemical Bacteriology, Medical Research Council; DR. CHARLES FREDERICK GOODEVE, F.R.S., Director of the British Iron and Steel Research Institute, and lately Deputy-Controller, Research and Development, Admiralty; PROFESSOR IAN MORRIS HEILBRON, F.R.S., Professor of Organic Chemistry at Imperial College, and lately Scientific Adviser, Ministry of Production; DR. EDWARD JAMES SALISBURY, F.R.S., Director of the Royal Botanic Gardens, Kew; DR. HAROLD AUGUSTINE TEMPANY, Agricultural Adviser to the Colonial Secretary; and LT.-COL. S. S. SOKHEY, Director of the Haffkine Institute, Bombay. MR. NORMAN VICTOR KIPPING, the newly-appointed Director-General of the Federation of British Industries and lately head of the Regional Division, Ministry of Production, likewise receives a knighthood.

PROFESSOR A. V. HILL, F.R.S., a secretary of the Royal Society, becomes a Companion of Honour; while SIR EDWARD APPLETON, F.R.S., Secretary of the D.S.I.R., receives the honour of G.B.E.

PROFESSOR A. K. MACBETH, Angus Professor of Chemistry, University of Adelaide, and MR. E. MARSDEN, secretary, Department of Scientific and Industrial Research, New Zealand, become C.M.G.

The following are appointed C.B.E.: MR. JOHN BROWN, General Secretary, Iron and Steel Trades Confederation; MR. T. E. HARRIS, D.D.G. Ordnance Factories; MR. G. R. D. HOGG, assistant secretary, D.S.I.R.; PROFESSOR H. D. KAY, F.R.S., Director, National Institute for Research in Dairying; MAJOR THOMAS KNOWLES, lately Coal-Tar Controller, Ministry of Fuel; MR. G. W. LACEY, lately Controller of Light Metals, M.A.P.; DR. THOMAS MORAN, Director of Research and Deputy Scientific Adviser, Ministry of Food; MR. A. J. PHILPOT, O.B.E., Director of Research and Secretary, British Scientific Instrument Research Association; MR. J. DAVIDSON PRATT, O.B.E., Director and Secretary, A.B.C.M.; DR. F. E. SIMON, F.R.S., Reader in Thermodynamics, Oxford University; and MR. B. C. WESTALL, chairman and managing director, Thomas De La Rue, Ltd.

The award of the O.B.E. is made to MR. H. M. WINN, manager, Baluchistan Chrome Company; and the M.B.E. goes to MR. C. E. JOLLY, technical officer, Ordnance Factories Division, Calcutta; MR. S. SIDDIQUI and MR. L. C. VERMAN, both acting directors, Council of Scientific and Industrial Research, India; and MR. G. W. BAKER, Colonial Chemical Service, Palestine.

Research work on the atomic bomb is rewarded by the bestowal of a knighthood on DR. W. A. AKERS, Director of Atomic Bomb Research, and the award of the C.B.E. to DR. R. E. PEIERLS, scientific consultant, both of the D.S.I.R.

Obituary

SIR CECIL LINDSAY BUDD, K.B.E., who died on December 27 at Harefield, Middlesex, aged 80, spent a lifetime in the metal trade, and was chairman of the London Metal Exchange in 1920-28. He was a director of the British Metal Corporation, Ltd., and chairman of Vivian Younger & Bond, Ltd.

MR. GEORGE STACEY ALBRIGHT, who died recently at Ledbury, aged 90, was a director of Albright & Wilson, Ltd. A native of Birmingham, he was educated at King Edward's School and Mason College there and at Cambridge University. He was awarded the C.B.E. in 1920 in recognition of his services as chairman of the Nitrogen Products Committee during the 1914-18 war. In 1914 he presided over the committee formed to consider the feasibility of the Severn Barrage scheme.

Iron and steel production in France during November remained stationary on October levels owing to the shortage of fuel and electric power. Production of iron ore in October amounted to 981,000 tons, which is 85 per cent. of the output in October, 1938. Aluminium output in September amounted to 3600 tons, which is 103 per cent. of the production in October, 1938.

No Japanese exports of pyrethrum can be expected this year, with a present acreage of 20,053, compared with a 1930-5 average of 42,936, states a report by the Natural Resources Section of General Headquarters there. With Japan's home consumption of the insecticide amounting to 10,000,000 lb., the next crop will be insufficient to meet domestic requirements. Moreover, there are no stocks which could be diverted into export channels. Before the war the United States bought about two-thirds of Japan's annual pyrethrum exports.

All patents bought by Standard Oil Co. of New Jersey from I. G. Farbenindustrie prior to 1939 are to be returned by the Alien Property Custodian to Standard, according to a decision of Federal Judge Wyzanski, who ruled that the Government could retain title only to licences and patents obtained from I. G. after the start of the war, but that the contracts made at The Hague between Standard and I. G. officials were, in effect, not bona fide. The patents to be returned refer to the manufacture of high-octane gasoline and cost Standard $35,000,000.

General News—From Week to Week

A welcome accompaniment of the New Year is the handsome pocket diary which we have received with the compliments of W. J. Bush & Co., Ltd., London, E.8.

Speaking at Belfast recently, Professor J. H. Biggart, of Queen's University, said that encouraging results had been achieved from the use of penicillin in the cure of bacterial endocarditis.

The Minister of Food announces that there will be no change in the existing prices of *unrefined* oils and fats and technical animal fats allocated to primary wholesalers and large trade users during the five weeks ending February 2, 1946.

Acting on the recommendation of a Committee on Special Methods of Recruitment, the Minister of Labour has decided to direct into iron foundries young men who become redundant in, or can be released from, work in non-ferrous metal and steel foundries.

Business correspondence may now be resumed with firms in Austria, although the resumption of private trade is not yet permissible and Austrian-owned property in the U.K. continues to be under the control of the Trading with the Enemy Department.

A breakdown at the purification works on the Romford Gas Company was the official explanation given for the sulphur fumes from the domestic gas supply which affected local consumers last Saturday. The company was inundated with calls from distressed housewives.

The lecture on Industrial Non-Ferrous Alloys delivered to the Royal Institute of Chemistry on March 26 last by Dr. Harold Moore, C.B.E., has been published in pamphlet form by the Institute, with an appendix by Dr. G. V. Raynor on "Factors Controlling the Formation of Primary Solid Solutions in Binary Systems."

Just in time for the New Year, a new (seventh) edition of that invaluable work, Kingzett's *Chemical Encyclopædia*, has appeared. It is again edited and revised by Dr. Ralph Strong, and is published by Bailliere, Tindall & Cox at 45s. We hope to comment on it at greater length in a forthcoming issue.

The Soapmakers' and Fat Splitters' Federation states that in view of the increase of £3 per ton in the price of crude linseed oil the Ministry of Food has agreed to the following increases in the price of linseed oil fatty acids, operating as from December 2, 1945: Split fatty acids from £73 10s. to £76 10s. per ton; split and distilled fatty acids from £85 7s. 6d. to £88 17s. 6d. per ton.

The Scientific Glass Blowing Company, 12 Wright Street, Manchester, 15 inform us that as a result of a fire at their premises the bulk of their accounts and records have been destroyed. They are asking their customers and friends to give them any possible information from their ledgers regarding sales, goods delivered, etc.

The first peace-time Christmas dinner to be given by the Bristol Section of the O.C.C.A. to members and their friends was held at the Grand Hotel, Bristol, on December 20. The occasion was marked this year by the presence of the ladies; guests were received by Mr. W. G. Wade, chairman of the Section, by Mrs. W. G. Wade, and by O.C.C.A.'s president, Dr. H. W. Keenan. The dinner was voted a great success and was followed by a first-rate entertainment which everybody thoroughly enjoyed.

During the war, civil supplies to the U.S.S.R. were centralised through the Allied Supplies Executive. Contracts for U.K. exports to the U.S.S.R. will henceforth be placed direct with manufacturers by the Soviet Trade Delegation at "Westfield," 32 Highgate West Hill, London, N.6. Responsibility for the obtaining of an export licence (where required) will rest with the U.K. exporter, and the procedure in respect of contracts concluded with the Soviet Trade Delegation will be identical with the procedure in respect of contracts concluded with other foreign buyers.

Foreign News

According to an article in *Pravda*, two new oil refineries are to be erected in Stalingrad.

The McGraw-Hill Book Company, 330 West 42nd Street, New York, 18, has issued a new catalogue of its recent publications on American technology and industrial management.

To meet the expenditure for the establishment of a cement factory by the Government of Ceylon, at Kankasenturai in the northern part of the island, the State Council has passed a supplementary estimate of Rs. 8,500,000.

Forthcoming Events

January 7. Society of Chemical Industry. Chemical Society's Rooms, Burlington House, Piccadilly, London, W.1, 6.15 p.m. Mr. J. Newton Friend: "The Rare Earths."

January 8. Royal Institute of Chemistry (Huddersfield Section). Field's Café, Huddersfield, 7.30 p.m. Mr. R. K. Dickie: "The English Oilfields."

January 8. Scottish Engineering Students' Association. Institution of Engineers and Shipbuilders, Glasgow, 7.15 p.m. Miss Helen Towers: "The Selection of Steels for Industrial Uses."

January 8. Hull Chemical and Engineering Society. Regal Room, Regal Cinema, Ferensway, Hull, 7.30 p.m. Mr. J. W. Bull: "Machines for the Tensile-testing of Materials." (Presidential Address.)

January 8. Society of Chemical Industry (Chemical Engineering Group) and **Institution of Chemical Engineers.** Apartments of the Geological Society, Burlington House, Piccadilly, London, W.1, 5.30 p.m. Mr. F. W. Doxey: "Chemical Engineering in the Manufacture of Electric Lamps and Radio Valves."

January 9. Society of Chemical Industry (Microbiological Panel, Food Group) and **Society for Applied Bacteriology.** Chemical Society's Rooms, Burlington House, Piccadilly, London, W.1, 2.15 p.m. Dr. A. T. R. Mattick and Miss E. R. Hiscox: "Some Observations on Heat-Resistance of Micro-Organisms"; Dr. C. L. Hannay: "Some Problems in the Bacteriology of Rivers"; and Mr. A. J. Musgrave: "Mould Growth on Leather."

January 10. Institute of Welding. County Technical College, Stoke Park, Guildford, 7.30 p.m. Mr. C. G. Bainbridge: "Application of Welding to Agricultural Machinery."

January 10. Society of Chemical Industry (Plastics Group) and **Faraday Society.** Institution of Mechanical Engineers, Storey's Gate, London, S.W.1, 2.30 p.m. Dr. G. B. B. M. Sutherland: "The Infra-Red Examination of Plastics."

January 10. Pharmaceutical Society of Great Britain. 17 Bloomsbury Square, London, W.C.1, 7 p.m. Presentation of the Harrison Memorial Medal to Mr. R. R. Bennett. Medallist's address: "The British Pharmacopœia."

January 11. Society of Chemical Industry (Birmingham Section). Chamber of Commerce, Birmingham, 6.30 p.m. Dr. F. J. Llewelyn: "Electrostatics in Industry."

January 11. British Association of Chemists (St. Helens Section). Y.M.C.A. Buildings, St. Helens, 7.30 p.m. Mr. F. Moult: "Hormones."

January 11. Institute of Welding. James Watt Memorial Institute, Great Charles Street, Birmingham, 7 p.m. Mr. R. W. Ayres: "Developments in the Technique and Use of Resistance Welding."

January 11. Institution of Chemical Engineers (North-Western Branch). Conference Hall, Manchester Town Hall: 2 p.m., Civic welcome to members by the Lord Mayor; 2.30 p.m., Dr. C. J. T. Cronshaw: "Chemical Engineering Research" (followed by a buffet tea). Midland Hotel, Manchester, 7 p.m.-1 a.m., reception, dinner and dance.

January 16. Royal Institute of Chemistry (Belfast and District Section). Physics Lecture Room, Royal Academical Institution, 7.30 p.m. Mr. D. Lindsay Keir: "The Influence of Science on Civilisation."

January 16. Institute of Fuel (Midland Section). James Watt Memorial Institute, Birmingham, 2.30 p.m. Mr. R. Scott: "Some Aspects of Tar Distillation."

January 16. Institute of Fuel (Yorkshire Section) and **Coke Oven Managers' Association.** Royal Victoria Station Hotel Sheffield, 2.30 p.m. Dr. J. G. King and Dr. F. J. Dent: "The Utilisation of Waste Heat in the Carbonising Industries."

January 16. Royal Institute of Chemistry, British Association of Chemists and **Association of Scientific Workers.** London School of Hygiene and Tropical Medicine, Keppel Street, W.C.1, 6.30 p.m. "The Present and Future Rôles of the Technical Press."

January 16. North-Western Fuel Luncheon Club. Engineers' Club, Albert Square, Manchester, 12.30 p.m. Mr. Harold Moore: "The National Economics of British Petroleum Refining," followed by a visit to the Manchester Oil Refinery, Trafford Park, by invitation of Dr. F. Kind.

January 17. Chemical Society. Burlington House, Piccadilly, London, W.1, 5 p.m. Professor E. D. Hughes: "Substitution" (Tilden Lecture).

New Companies Registered

Vedey Laboratories, Ltd. (402,150).—Private company. Capital £1000 in 1000 £1 shares. Manufacturers of and dealers in chemicals, gases, drugs, etc. Directors: J. L. Robinson; S. M. Hosain. Registered office: 235 Lanark Road, Maida Vale, W.9.

Janda Chemicals, Ltd. (402,341).—Private company. Capital, £500 in £1 shares. Merchants, importers, packers, of and agents for powders, granules, liquid pastes, chemicals, etc. Directors: R. E. Bennett; O. A. Franklin. Registered office: 162 Victoria Road, Aston, Birmingham, 6.

Artolac, Ltd. (402,321).—Private company. Capital, £2000 in £1 shares. Manufacturers of and dealers in paints, varnishes, lacquers, industrial finishes, etc. Directors: H. G. Fraser; Dr. A. Learner. Registered office: Imperial House, Uxbridge.

South Coast Synthetics, Ltd. (402,361).—Private company. Capital, £200 in £1 shares. Manufacturers of and dealers in paints, pigments, size, varnishes, etc. Directors: A. E. Core; J. S. Palmer. Solicitors: Parker, Bangor-Jones & Palmer, Brighton.

Verva, Ltd. (402,111).—Private company. Capital £5000 in 50,000 shares of 2s. Manufacturing, retail and wholesale chemists and druggists, research workers in biology, chemistry, physical sciences, etc. Subscribers: A. H. D. Fairbarns; Eleanor Cattell. Director: D. J. Dickson. Solicitor: E. W. M. Baldwin, 6 Guildhall Chambers, E.C.

Chemical Engineers' Consultants, Ltd. (23,661).—Private company, registered in Edinburgh. Capital, £100 in £1 shares. Consultants and advisers in relation to all matters pertaining to the preparation, discovery, etc., of all kinds of formulæ, chemical, physical or otherwise, etc. Subscribers: H. S. S. Murray; S. A. J. Murray. Registered office: 31 Townsend Street, Glasgow, C.4.

Company News

Fisons, Ltd., manufacturers of chemical fertilisers, propose a reorganisation of their share capital in order to amalgamate the undertakings of the two chief manufacturing subsidiaries—Anglo-Continental Guano Works and National Fertilisers—into the parent company. The outstanding debentures of the former company are to be paid off in cash, and its 4½ per cent. cumulative preference are to be exchanged for new 4½ per cent. preference shares in Fisons. A similar plan for National Fertilisers will be put forward in the near future. Fisons' own first (7½ per cent.) and second (5 per cent.) shares are to be consolidated into the new 4½ per cent. preference, due compensation being paid. To provide the necessary funds, the capital is to be increased to £7 million by the creation of 2,750,000 4½ per cent. cumulative preference and 2,250,000 ordinary shares of £1 each. The necessary resolutions will be submitted at meetings to be held on January 21, in the Great Eastern Hotel, Bishopsgate, E.C.2.

Commercial Intelligence

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

Satisfaction

VICTOR H. IDDON, LTD., Manchester. chemists' sundriesmen. (M.S., 5/1/46.) Satisfaction December 6, £3320, registered August 8, 1936.

Chemical and Allied Stocks and Shares

STOCK markets maintained the cheerful tone which developed at the close of 1945, values in most sections showing an upward tendency, although apart from South African goldmining shares which recorded spectacular gains aided by boom conditions at the Cape, business was on moderate lines. British Funds continued firm with long-dated stocks fully maintaining recent further gains, while leading industrials were higher where changed. Colliery shares lost ground because of the complexities of the Coal Bill, although the latter is generally regarded as providing a fair compensation basis for shareholders; preference shares rallied on renewed hopes that they will also receive a fair deal. Other nationalisation groups rallied, particularly home rail stocks, which were also aided by expectations that the forthcoming dividends will be maintained.

Shares of chemical and kindred companies reflected the prevailing trend and were generally moderately higher where changed. Imperial Chemical have been prominent, rising to 40s. 9d. aided by the important developments announced for the manufacture in India of a wide range of dyestuffs. Turner & Newall strengthened to 80s. and British Oxygen made a good rally to 84s. Moreover, Dunlop Rubber moved up to 52s. 6d. and the units of the Distillers Co. rose to 119s. 6d. Murex strengthened to 92s. 6d., United Molasses to 44s. and Lever & Unilever to 51s. Fisons eased to 54s. 6d. on the capital proposals. B. Laporte were 83s., and British Drug Houses at 49s. 3d. were helped by big export trade plans. Aided by the results, Cannon Iron Foundries moved up to 20s. 3d. British Tar Products 5s. shares eased to 11s. 9d. on the chairman's statement that the Government's intentions towards the coal and coking industries, to which the company looks for supplies of raw materials, causes a certain amount of uneasiness. Good features in the iron and steel section have been provided by Babcock & Wilcox, which improved to 57s. 6d., and Ruston & Hornsby at 56s. 6d. United Steel at 24s. 10½d., Guest Keen at 42s. 6d. and Colvilles at 22s. 9d. were higher on the increase in steel prices. Among colliery shares, following earlier gains, Shipley have come back to 28s. 6d., Staveley to 43s. 6d. and Bolsover to 46s. 9d. Allied Ironfounders eased to 54s. 6d., but Tube Investments £5⅝ and Stewarts & Lloyds deferred 57s. were firm, while Thomas & Baldwins rallied to 11s. 6d. and the preference to 31s. 6d. Electrical equipments were favoured on encouraging views of export trade prospects; General Electric improved to 94s. 6d., English Electric to 55s. 3d. and Associated Electrical to 56s. 3d., while Crompton Parkinson at 30s. 3d. were helped by the results and strong balance sheet.

In other directions, British Glues & Chemicals 4s. ordinary strengthened to 13s. Greeff-Chemicals 5s. ordinary were 10s. 3d., Griffiths Hughes 47s. 6d. and William Blythe 3s. shares 11s. 3d., while, among plastics, British Industrial Plastics 2s. shares were 6s. 10½d., Catalin 10s. 3d., Erinoid 11s. 9d. and Lacrinoid Products 6s. 1½d. De La Rue strengthened to £10 3/16, Wall Paper Manufacturers deferred rose further to 44s. 3d., Associated Cement at 56s. 9d. xd were little changed and British Plaster Board 32s. 6d. Goodlass Wall 10s. ordinary at 24s. 10½d. moved higher among paint shares, with Lewis Berger 124s. 1½d. Birmid Industries were higher at 99s. 3d. and, awaiting the results, Nairn & Greenwich have been firm at 81s. 3d.

Boots Drug at 55s. 9d. were well maintained, Timothy Whites 44s. 3d. and Sangers 31s. In other directions, Amalgamated Metal rallied to 17s. 6d., Monsanto Chemicals 5½ per cent. preference kept at 23s. and Burt Boulton & Haywood at 26s. have been steady on the recently-issued results and maintained 5 per cent. dividend. Oils lost ground, Anglo-Iranian being 98s. 1½d., Shell 81s. 3d. and Burmah Oil 77s. 6d.

British Chemical Prices

QUIET conditions prevail in most sections of the London chemical market due to the holiday period, although the general tone of the market is steady. Contract deliveries are going forward steadily but there is little fresh business to report. There is little change in the supply position generally and a steady export inquiry continues. Acetic, oxalic and tartaric acids are strong with offers finding a ready outlet and much the same can be said for the potash and soda products, with supplies of liquid caustic potash very scarce. In other sections of the market there is little fresh interest to report. Pitch continues in steady demand for both home and overseas markets.

MANCHESTER.—A quietly steady resumption of trading on the Manchester chemical market after holidays has been reported during the past week. Deliveries of textile bleaching, dyeing and finishing chemicals are going forward again and there is a steady flow of specifications from the rubber manufacturing and other using industries. A fair amount of business is pending on export account and further inquiries for a wide range of heavy chemicals for shipment are coming forward. In sulphate of ammonia and other fertilisers a seasonal expansion of buying activity is expected to make its appearance within the next few weeks.

GLASGOW.—In the Scottish heavy chemical market during the past week business in the home trade has been moderate. Prices remain firm and there is no change in the export position.

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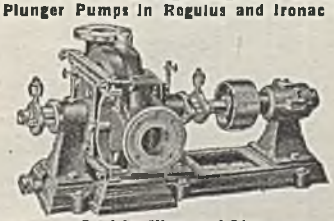

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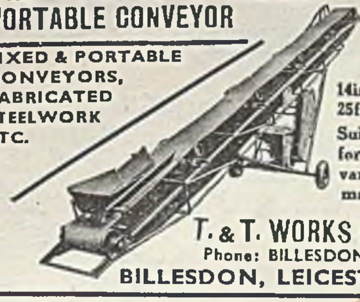

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