The Chemical Age

A Weekly Journal Devoted to Industrial and Engineering Chemistry

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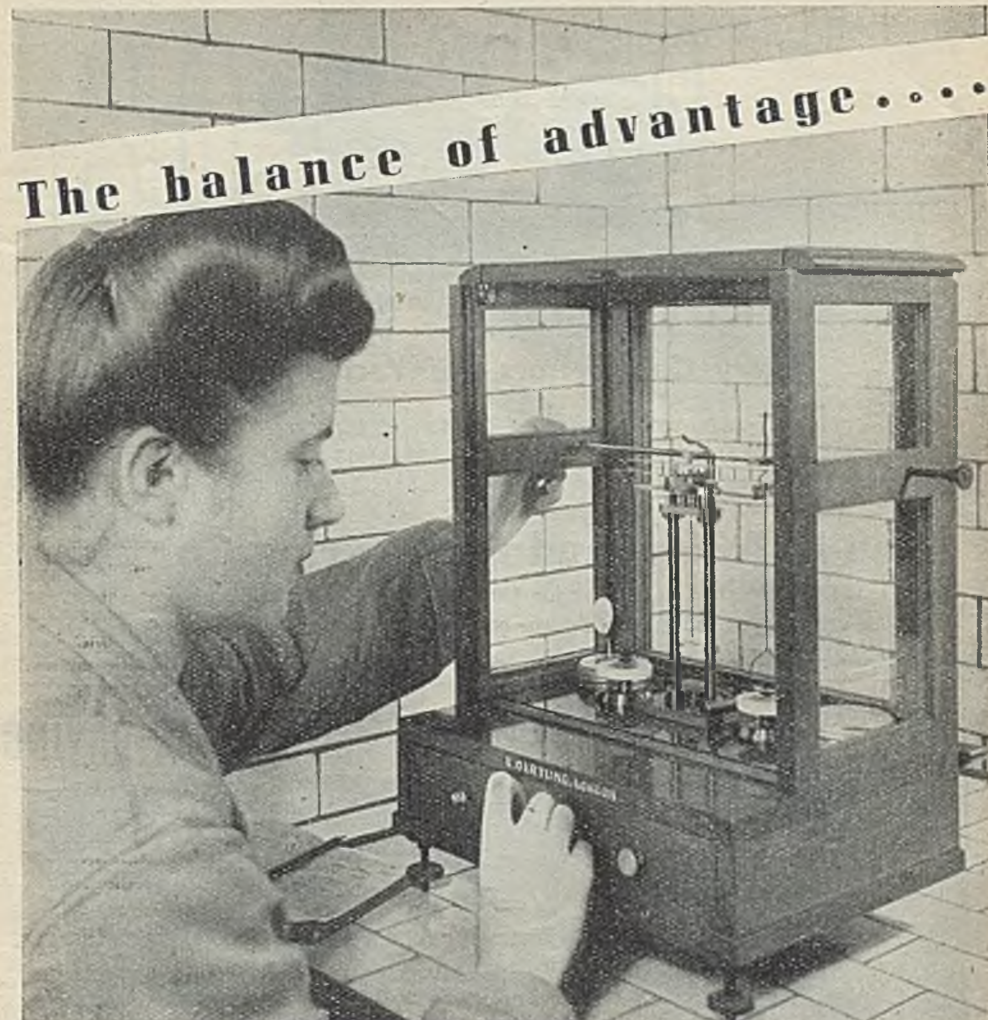

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The Chemical Age

A Weekly Journal Devoted to Industrial and Engineering Chemistry

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Students and Employment

THERE was never so great a demand for trained men and women as there is to-day. There was never so little demand for the unskilled. Everyone knows that the increasingly scientific and technical development of industry is rendering the unskilled worker less needed, and that in the foreseeable future the labourer as we have known him in the past will disappear, and his place will be taken by the "tradesman." The obvious deduction is that the engineer or senior (whatever he may be called) must be still more highly trained if he is to maintain his position as the man who knows what should be done. Mechanisation is largely responsible for this change. We visited a chemical works lately and were told that the works to-day is making nearly three times as much product as in 1930 with 50 fewer men; the reason is mechanisation, and the change in processing has been accompanied by a parallel change in the type of men employed. They are now, we are told, mechanically minded, able to look after machinery. This change has been accompanied in the chemical industry by an increasing complexity in the chemistry and physics of the processes in use, and this again reacts upon the character of those employed in it.

The answer to these problems must lie in the training and higher education of those who are to work in industry. There is, of course, first the training of the rank and file. No longer can we expect to take boys from schools, put them into the works and let them learn whatever they may pick up. That method was fatally easy for employers to follow 20 or 30 years ago, but it resulted in a great deal of ignorance, for the blind led the blind and few received the right kind of training. We are now beginning to understand that firms must train their own men. Few of those who enter industry by the lower rungs of the ladder that may lead to the heights in due course can hope to attend day classes at technical colleges after leaving school. It is, therefore, necessary for employers to arrange regular training for new entrants, and for such of the older men as are willing to be trained; and this training, if at all possible, should be done in the daytime, as a part of the normal employment. If this is not possible, evening classes should be arranged, paid for wholly or in part by the firm, and the employees encouraged to attend. If wage increases and promotion are made to depend at least partly on the results obtained at these classes, encouragement to do well is provided.

On Other Pages

How far is this true education? The answer, of course, is that it is not education in the real sense at all. It is vocational training. It is doubtful whether most people are fitted to aspire to true education. There is nothing to prevent a man from educating himself; the facilities exist and are open to those who can show that they have a mind to take advantage of them. There are few people to-day, however, among the rank and file who are prepared "to scorn delights and live laborious days." Those who do so have their reward. All that can be done for most people is to take care that all are given sufficient vocational training to enable them to do the skilled or semi-skilled work needed in industry to-day. By ancient tradition we are a nation of craftsmen, and it was only the industrial revolution that converted so many into beasts of burden. That phase is passing rapidly. We must again become a nation of craftsmen, but craftsmen of a different kind.

That, then, is one problem. There are others connected with the training of the staff that is to control processes, works, and businesses. The outstanding problem at the moment is that of numbers. Chemical engineering is a case in point. We are told that only about 40 students are being trained in chemical engineering to-day in this country. In the U.S.A., with a population about 2½ times ours, there are 3000. But training in chemical engineering is not true education. It is vocational training on a high plane—and little more. Sir D'Arcy Thompson has lately written: "There is another matter which is more serious still and makes, to my mind, a greater change since I was young, and that is the way men come to the university, not for the love and joy of learning, but for the business of passing an exam. They do not hitch their wagon to a star as so many of my old companions did; they only want a degree, and a job. In short, we have plenty of undergraduates, but a sad lack of students."

There is our most fundamental problem. We have little doubt that if we set about teaching as we set about agriculture or any other form of "culture" we could turn out all the technologists we need. But they would be nothing more than skilled technicians, having more knowledge of science and engineering than the workmen who do their bidding. Is industry satisfied with men of this type? We believe that in general, a very large number of such men would be completely successful in filling the posts that industry has to offer. There are the "general practitioners" of chemical engineering, chemistry, mechanical engineering, electrical engineering, civil engineering, and so forth. Industry says to these men: "Go to a university; get the label which shows a certain proficiency; then, but not till then, we will employ you." So it comes about that the majority "only want a degree, and a job."

True education should be broad-based. But what has industry to offer such a one? The answer, we fear, is: very little. So far as our experience goes, industry rarely welcomes the classical scholar, the historian, the man with a wide and fertile mind. To him it says: "You may turn out good, you may become a captain of industry. Keep on trying. But what a pity you did not take up some really useful subject. We would have given you at least £5 or £6 a week then. No doubt someone will employ you and when you have shown that you can really do something, we will think about you again."

Thus it is that the man of education and learning, as distinct from the plain technologist, gets little encouragement from industry. That is a pity because, although men with a liberal education may find it difficult to design even a tank to hold a liquid, they often make the finest managers, and when they apply their minds to trade and commerce their worth becomes above rubies. We can call to mind many who went through university in the classics, in history, in law, and in similar subjects who subsequently became involved in industry with great advantage to industry. We shall not speak of the living, though there are many examples. We shall instance only, Sir David Milne Watson, while he lived, the leader of the gas industry; Lord Moulton, mathematician and lawyer; Lord Melchett, scholar as well as scientist; and there is many another such. Among the scientists whose names live for evermore, can it be doubted that those who studied at universities "for the joy and love of learning," who "hitched their waggon to a star," figure preponderatingly? It is a sobering thought that though our demand for numbers may well be filled by mass production of students, if we are not very careful we may fail to produce the great leaders in science, in trade, in business, for which this country has ever been renowned.

NOTES AND COMMENTS

Some Historical Exhibits

IN the gradual revival, after their war-time closure, of our national museums, chemistry, up to the present, has had singularly little share. The eager chemical recruit, whether to the professional or the industrial side, has had to take the word of his elders and (presumably) betters concerning the achievements of the great chemists of the past. The engineers have fared better; but then their exhibits have always been more spectacular—have had a greater box-office pull, if we may be permitted the expression—and many of them can stand roughish handling by the very young enthusiasts for the engineering profession. Historical chemical exhibits are relatively unspectacular and demand careful handling and storing. Nevertheless, a selection of the most interesting exhibits from the chemical department has just been put on view again at the Science Museum, South Kensington, none of them looking any the worse for their storage during the war—this in itself being a triumph of organisation. This is not the place to print a catalogue of them; readers should go and see for themselves; but we cannot refrain from recording the reappearance of the chemical specimens prepared by Faraday and Liebig, the chemicals used for Louis Daguerre's photographic process, some dyes prepared by Hofmann, and the first specimens of thallium and its compounds. Faraday's own chemical cabinet is again on view, and, among historic apparatus, the Kelvin rheostat, the Nicol prism analyser and polariser and apparatus used in electrodeposition and in chemical crystallography. So far only a fraction of the Museum's chemical treasure is on view, but it is a start, and an earnest of what is to come when reconstruction is complete.

The Steel Board

LAST week we were kept breathlessly awaiting the Minister of Supply's statement about the Steel Board. From day to day the news was postponed, and we reserved space in our columns in order to have plenty of room for the epoch-making pronouncement which was to have so profound an effect on one of the basic industries of the nation. Wednesday came, and with it the announcement, which amounted to little more than that the Minister was prepared to use the Board for advice on how the steel industry ought to be run. It was not difficult to find some more cogent news with which to fill our columns; for if ever there was a damp squib, this was it. Because the Iron and Steel Federation has agreed to participate in the Board on these advisory terms, the outside-left Press accuses the Minister of surrendering to the " steel barons." What has, in fact, occurred, is that the Minister, coached, doubtless, by Dr. Van der Bijl, has seen that to nationalise steel is not as easy as all that, nor can it be brought about in a day. Dr. Van der Bijl has declined the honour of the first chairmanship of the Board, and we must now await further news of its constitution. Mr. Lincoln Evans, we know, is to be a member; we shall be interested to learn in due course the names of the other members, among whom, it is promised, will be included " men with direct managerial experience of the industry."

The Left-Wing View

FROM the standpoint of the industry, the undertaking given by the Iron and Steel Federation, that they " will press on with the modernisation programme with all possible speed," may mean quite a lot or it may mean nothing at all—it all depends on the significance of the operative word " possible." Unfortunately, non-committal vagueness has been characteristic of previous utterances from this source, and the record of the Federation's attitude towards modernising is not a specially handsome one. Whoever wishes to understand the outlook of the opponents of the Federation—and the partisans of nationalisation—should glance through a pamphlet, *Steel—the Facts,* by Henry Owen, just published by Lawrence and Wishart at 4s. This is a blunt but authoritative statement of the left-wing point of view, and Mr. Owen certainly has some hard things to say, notably in his Sections 5 and 6, " Monopoly and Prices," and " Production and Politics." He stigmatises the May Report for the sloppiness of its language, and some of his stories about cartel action against non-members make lurid reading. Confirmed opponents of nationalisation of this vital industry would do well to read it, and learn what evidence of past inefficiency the other side has put forward. The ordinary man-in-the-street, whose well-being depends so largely on the good management of the iron and steel industry is sorely tempted to exclaim " A plague o' both your houses "!

Iron and Steel Research

SHORTLY before we went to press, the British Iron and Steel Research Association issued a booklet based on talks given by its Director, Sir Charles Goodeve. In this, it is pointed out that everyone agrees that research must play a key part in maintaining the place of the British iron and steel industry in the pre-eminent position necessary to the prosperity of the country, although people may differ as to the best method. Set up during the last part of the war, the basic funds being provided on behalf of the industry by the British Iron and Steel Federation, the Association is primarily concerned with background or objective research, and with new techniques, processes, etc., of common interest, its work lying between that of the university laboratores and industrial laboratories. It is rightly stressed in the booklet that the extension of co-operative research activity in the Association does not lessen the need for research laboratories in the industry itself, but, rather, increases it. In accordance with one of the great lessons of the war, it has been decided not to attempt to centralise the research work of the Association in any one laboratory, at least for the time being. Wisely, the Association will continue the policy of the parent bodies of using all the existing research facilities in the country, supplementing these where efficency demands by special groups or research stations dealing with certain fields.

Drop in Coal Production

JUNE was considered a bad month for coal production and now comes the announcement by the Ministry of Fuel and Power that during July production dropped yet again, this time by 121,800 tons to 3,272,500. These figures relate to mined coal only; there was an increase of 26,500 tons in the production of opencast coal. The reduced output of mined coal is largely, if not wholly, accounted for by the fact that July is the recognised holiday month in the Scottish coal districts, and, to a less extent, in some Midland and Northern areas. Compared with a year ago, there was a slight improvement in the over-all production of mined coal, despite the fact that there were fewer wage-earners on the colliery books. In this there is reason for a certain amount of satisfaction, but there can be no complacency about the statement that during July there was an appreciable increase in absenteeism, particularly in voluntary absenteeism. Another factor not without significance is that the number of workers on the colliery books, which, since last autumn, had been slowly increasing, showed no further increase from June to July. It may be argued that in the circumstances the figures given cannot lead to any definite conclusions, but it is patent that even with a reduction of absenteeism the future output of coal is still largely an unknown factor and that those industrialists who are considering the use of oil as an alternative source of energy are wise.

Welsh Industries Fair

DESPITE fuel problems and many other difficulties, British trade, on the whole, is making a good recovery from wartime restrictions. An indication of this—small, perhaps, but significant in its way—is that all available space has now been booked for the Welsh Industries Fair which is being held in Cardiff from September 23-28. This event is in the nature of a " repeat performance " of the fair held earlier in the year (*see* THE CHEMICAL AGE, June 1, p. 616), and has been arranged to accommodate firms who were unable to show on the previous occasion. Encouraged by the success which has attended their efforts this year, the organisers of the Fair have planned to hold it next year in London, from January 1-7. This will be the first national all-Welsh show to be held outside the Principality, and many firms are expected to take advantage of the opportunity of displaying their wares in the Metropolis. The chemical and metallurgical industries play no small part in the output of an amazing variety of products now being manufactured in Wales and Monmouthshire.

The Government of Saskatchewan is proposing to build and operate a sodium sulphate processing works at Lake Chaplin, West of Regina, according to a statement by the Premier of the province. A " saline deposit " method will be used; two private operators are already working at Lake Chaplin, using the mining method. Except for some deposits in Georgia, Saskatchewan has a monopoly in North America of natural sodium sulphate.

Chemical and Allied Industry in Sweden

The Importance of Wood and Water Power

AMONG the countries of the world, Sweden is one of those most richly endowed with forests, half its area being wooded. Though she lacks a domestic supply of such important industrial products as coal and mineral oils, a close connection exists between forestry and the chemical and mining industries. The reduction of iron ore by charcoal is still the most common method used; the wood-pulp industry is another branch of the forest industries that has grown up in the last two decades, and the rapid development in the chemical pulp industry has found good use for valuable chemical products from pulp-mill waste. Thus Sweden's industrial development is largely due to, and based upon, her abundant natural resources of timber, ore, and water power, coupled with technical enterprise in their exploitation.

Iron and Steel

For nearly 1000 years Sweden has supplied the world with iron, highly valued for its purity. Until quite recently, some 40 per cent. of all the iron manufactured in the world was produced in Sweden, and exported in considerable quantities, chiefly as unwrought iron and steel for certain specific purposes. As time went on, however, the Swedish iron and steel industry gradually became concentrated on the more highly processed types of steel manufactured by the Bessemer, open-hearth, and electro-steel processes. The first properly constructed furnace for the manufacture of such quality steel by the Bessemer process and the first Bessemer converter to yield such steel in continuous production were built by G. F. Göransson at an iron works in Central Sweden in 1858.

As to the raw material, it is to be noted that the Swedish ores now being mined possess an average iron content of 50-55 per cent., and are distinguished by a low sulphur content of less than 0.01 per cent. and a phosphorus content below 0.005 per cent. Though in North Sweden the ores, generally, have a higher phosphorus content, they are, on the other hand, the richest in iron. Whereas the European ores contain on an average 35-40 per cent. iron, over 1000 million tons of the estimated 2000 million tons of iron ore worth mining in Lapland have an iron content of 60-70 per cent.

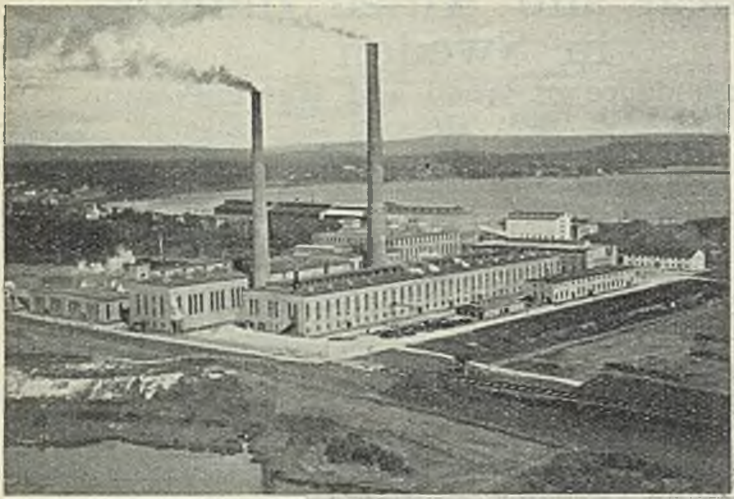
Another important factor in the production of pig iron as a basic material for the manufacture of special types of steel is the good quality of charcoal, free from sulphur and phosphorus, which Sweden obtains from her forests, where pine and spruce are practically the only trees that are industrially used. Sweden's output of charcoal pig iron, however, has considerably declined owing to an increased use of scrap iron in steelmaking and of Swedish sponge iron now produced in conjunction with the wider use of scrap iron in the manufacture of steel. Swedish sponge iron, with maximum 0.015 per cent. phosphorus and 0.10 per cent. sulphur, is an extremely pure material and consequently highly suitable for open-hearth, electric-arc and high-frequency furnaces, for the production of various kinds of quality steels.

These special steels require also, apart from pure basic materials, ferro alloys with a low carbon percentage and a high degree of purity. The production of these alloys in Sweden has become very important, and she has a large export of ferro-silicon, ferrochromium and ferro-manganese. Sweden has been able to maintain a leading position in steel production, thanks largely to close co-operation within the industry. Research work is carried on continuously by the different works in collaboration with, and with the support of, the Government. The centre for iron and steel research is the institution known as the Swedish Ironmasters' Association, founded in 1747.

Pulp Industry

Of the main branches of the pulp industry, one produces mechanical, the other chemical pulp, either as sulphite or sulphate cellulose. These three are the common types of pulp not only in Sweden but also in other pulp-producing countries. A fourth type is obtained by means of the soda process, whereby aspen and certain other hardwoods are manufactured into paper pulp. This process is of considerable importance in the United States, but in Sweden good quality aspen wood is not sufficient even for the large match industry. Generally speaking, conifer wood makes better pulp than hardwood because of its longer fibre and consequently stronger paper. Chemical pulp in its turn makes stronger paper than mechanical pulp, for the latter contains not only the actual cellulose fibre, but also a large part of the original material found within the fibrous structure of the wood, such as lignin, carbohydrates and other material.

Sweden is the world's biggest exporter of pulp. During 1939 the export amounted to 2.3 million tons, with a combined value of nearly 350 million kronor, corresponding to close on 20 per cent. of Sweden's total exports. The pulp industry is favoured by some rather remarkable natural advantages.



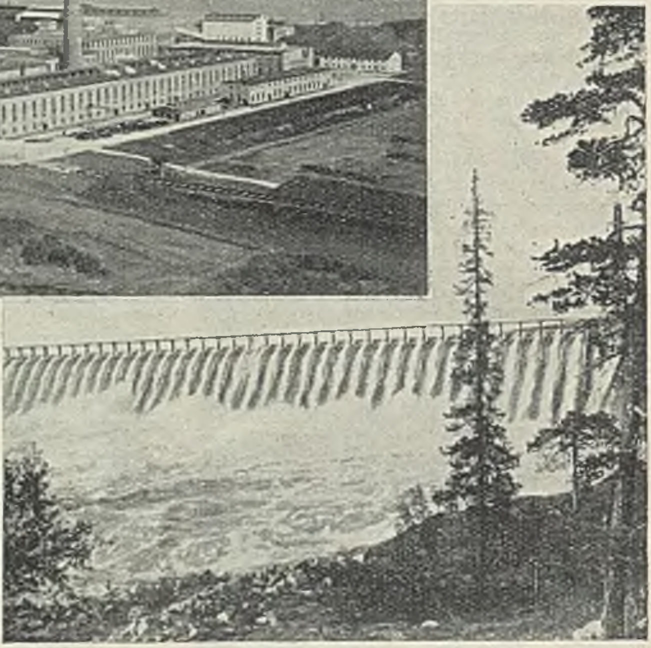


Fig. 1. (above). A Swedish pulp factory at Ostrand in the Sundsvall district.

Fig. 2. (right). Water-power in Sweden: a regulation dam at a power plant.

Swedish spruce and pine wood is an exceptionally good raw material for pulp making and, thanks to the Swedish timber-floating system, the pulp wood can be conveyed at a comparatively low cost from the depths of the forest to the pulp mills on the coast. About 500 million cu. ft. of wood are floated down to the mills each year. All the streams that could be utilised for floating have been developed and combined into a network for this purpose, and the floating costs have become so low that no other form of transportation can compete with this system.

The particularly suitable quality of the raw material is attributable to the northerly situation of the Swedish forests, where the growth of the timber is so slow that a tree requires twice as long to reach a certain size in Sweden as in more southerly countries, a state of affairs which leads to the development of a particularly strong and flexible fibre.

The first pulp mill was established in Sweden as early as 1857, only a few years after the invention of the method of making paper pulp out of wood. Since then Sweden's output of mechanical pulp has shown a steady increase, reaching, in 1939, about 700,000 tons, of which more than half was consumed in the country for the production of newsprint. The remainder, well over 300,000 tons, was exported in the form of either wet or dry mechanical pulp. At quite an early stage, however, it was found that mechanical pulp did not possess the durability and strength requisite for the manufacture of finer grades of paper, and efforts were therefore directed to devising a process for releasing the wood fibres by chemical action. The type of wood pulp that was gradually obtained by this means, and which is generally called chemical pulp, wood cellulose, or merely cellulose, has by degrees acquired such importance that during the years immediately before the war world production was quantitatively about double that of mechanical pulp, while the value of the output of chemical pulp in pre-war days was four times as high as that of mechanical pulp.

Distinction must be made between sulphite and sulphate cellulose, though Sweden played a leading part in the technical development of the methods for producing both these types of chemical pulp. C. T. Ekman was the first to solve the practical problem of the production of sulphite pulp, and in 1874 he built in Sweden the world's first sulphite mill. The product known as strong, unbleached sulphite cellulose is now the most important article in Sweden's pulp trade. It is used in the manufacture of finer grades of paper, and in recent years has increased rapidly in importance as a raw material for the manufacture of artificial silk (rayon) and cell-wool (staple fibre). The type of pulp which is used as raw material for these products—known as viscose pulp—is now produced by many Swedish sulphite mills and has become a leading export item.

Other highly processed types of bleached sulphite cellulose have lately been developed, including super-purified dissolving cullulose, which is characterised by the high chemical stability. These types, which fetch high prices and so far are produced on only a small scale, are used in the manufacture of synthetic textile fibres and cellulose lacquers, in nitrating processes, etc.

Whereas sulphite pulp is made almost exclusively of spruce wood, pine wood is the raw material for sulphate cellulose. Methods of producing this kind of pulp were invented at an early date. During the 1880's the Swedish engineer, A. Müntzing, made a substantial contribution in this field by his method of producing "kraft" pulp, which is characterised by a very strong fibre of comparatively dark colour. The well-known Swedish kraft paper is made of such pulp and it, too, has become an important export product. About 1930 Swedish sulphate mills developed new methods of bleaching sulphate pulp. Bleached sulphate pulp possesses not only great strength and durability, but also a high degree of whiteness, and a considerable demand has arisen for this type of pulp for certain purposes.

Another sphere of utility for cellulose is in the manufacture of synthetic textile fibres. In 1939, world production of rayon and cell-wool amounted to one million tons, which meant that 10 per cent. of all textile goods were produced with artificial fibres. Since then, considerable progress has been made in the production of synthetic textile raw materials based upon cellulose, and new types and qualities have been tried. Wood cellulose is also used as an animal feeding-stuff, and Sweden produced during the war about one million tons of fodder cellulose. During the same period synthetic albumen, the so-called fodder yeast, was used, like fodder cellulose, primarily as cattle feed, and, after undergoing certain processes, also for human consumption.

Since wood cellulose became of cardinal importance in the sphere of plastics, the demand for the Swedish product has increased considerably. As early as 1860 scientists had evolved the art of making plastic substances from cellulose, the first being celluloid, a mixture of cellulose nitrate and camphor. In many fields celluloid has soon been ousted by other synthetic products, but it is still the only material that meets the requirements of cinematographic films. An explosive form of this nitrate is a component of smokeless gunpowder and of certain high explosives; and it is the chief component in the hard glossy lacquer used, *e.g.*, for the

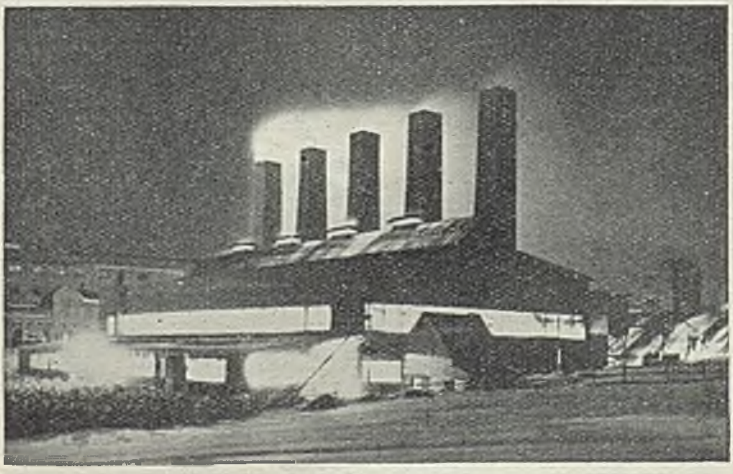


Fig. 3. A smelting house for ferro-alloys at the works of the Uddeholm Co., one of Sweden's oldest and largest industrial foundations. Its activities cover metallurgical and chemical works, pulp mills and hydro-electric plants.

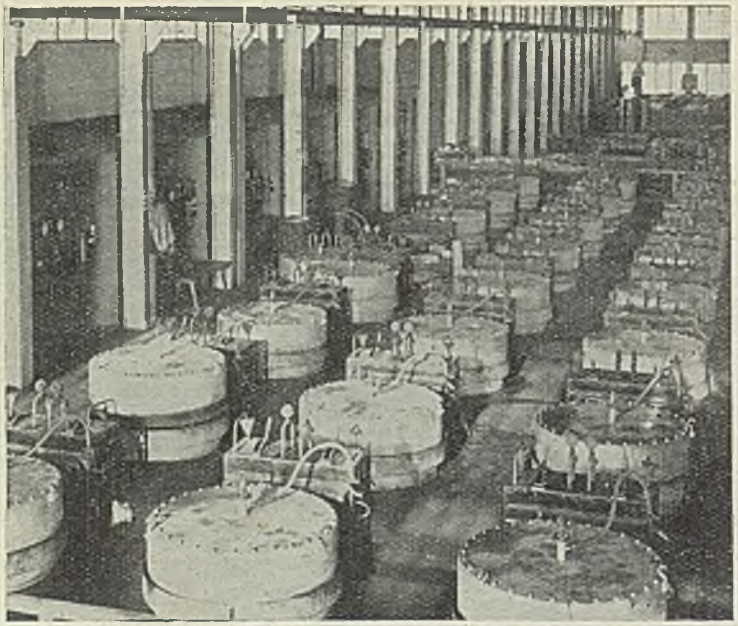


Fig. 4. An annealing plant for cold rolled band and strip steel at the Sandvik works, one of the largest iron and steel works in Sweden.

painting of motor cars. It is also the basis of the wrapping material known as viscose foil (Cellophane).

Many by-products from the manufacture of cellulose have acquired increasing importance, *e.g.*, the production of sulphite spirit. In the production of viscose pulp no less than 125 litres of 95 per cent. spirit are obtained per ton of pulp and the capacity of the Swedish sulphite spirit distilleries now amounts to nearly 100 million litres of 95 per cent. spirit per annum. Most of it is used as motor fuel, while a considerable quantity, in a more rectified form, is employed for human consumption and in various synthetic preparations. Another important by-product is liquid resin, the tall-oil of commerce. Before the war this product was largely exported, but during the war it became an important raw material for the domestic manufacture of soaps. Modern chemistry also uses derivatives of liquid resin not only for detergents, but also as a raw material in the manufacture of printers' ink. A by-product in the manufacture of sulphate cellulose is turpentine oil, and many others now obtained are semi-finished products for the manufacture of medical preparations and for the organic chemical industry, as well as for synthetic rubber production.

Besides the chemical products already mentioned, which originated and derived in connection with Sweden's main industries, many more have given rise to Sweden's organic chemical industries. Sulphite spirit is used as a raw material for glycoles, solvents, acetic acid, ether, etc., and cellulose itself has become a raw material for derivatives such as methyl and ethyl cellulose. By-products from the manufacture of charcoal are formalin and methanol, and raw materials for tanning extracts are likewise derived from forestry.

Sweden is a pioneer country in the explosive industry since the revolutionary inventions of the brothers Alfred and Imanuel Nobel. The former invented dynamite and smokeless powder and a large-scale explosives industry has since grown up in Sweden, originally based on the Nobel inventions, extending in recent years to the manufacture of nitrocellulose for laquers and a number of articles in the sphere of aromatic chemistry, among other things, of saccharine, acetylsalicylic acid, etc.

The manufacture of medical preparations in Sweden is of comparatively recent date; simultaneously with inventions in other countries, and independently of them, the Swedish medico-chemists manufactured the various sulphonamid preparations, hormone substances and vitamin products.

If the forest has largely dictated the trend of Sweden's organic chemical industry, the electric energy generated from the waterfalls has served as the main foundation of the inorganic chemical industry, for this involves a great number of electrochemical and electrometallurgical processes which require a large supply of cheap electrical power.

An important section is the production of inorganic chemicals based principally on iron pyrites or pure sulphur. These were formerly imported on a considerable scale, but since the discovery of the rich ore fields at Boliden, so large an output of iron pyrites has been obtained that Sweden has not only become self-sufficient, but has actually been able to enter the world market as an exporter. The company working these ore fields is also the world's largest producer of arsenic. Certain quantities of this last are exported in the form of wood-impregnating preparations and plant-protecting insecticides, but the output of arsenic is so enormous that only a minor quantity can at present find a market.

The Swedish electrochemical companies produce, *inter alia,* chemically pure alkalis, which have for many years enjoyed a world-wide reputation. Their electrometallurgical production is responsible for a number of export articles such as ferro-alloys and metal compounds, as well as synthetic abrasives such as electrocorundum and siliceous carbide. Sweden was the first country in the world to adopt the electrochemical manufacture of perchlorates, and when the first Swedish electrolytic chlorate works was built in the 1890's it had only one predecessor.

The products just mentioned are very largely manufactured for export, though a considerable portion of the chlorates is used in the manufacture of matches. Swedish safety matches have occupied a unique position in the world for nearly 100 years, their reputation being largely due to Swedish mechanical inventions for their manufacture. Not only are safety matches a Swedish invention, but so are the ingenious machines that impregnate the matches with paraffin, provide them with their ignition heads, and pack them in the boxes.

Another leading product of the electrothermal industry is calcium carbide, large quantities of carbide being utilised in the Swedish artificial fertiliser industry for the production of calcium cyanamide. Other artificial fertilisers manufactured in Sweden are nitrolime and superphosphates. The production of superphosphates is closely allied to that of sulphuric acid, and the capacity of the Swedish factories has in recent years been considerably enlarged, and much mechanical ingenuity applied to the processes of manufacture (*see* THE CHEMICAL AGE, 1945, *54*, 691). The same applies to the works which manufacture—on the basis of rock salt and sulphuric acid—hydrochloric acid and sodium sulphate, aluminium sulphate, and kindred materials.

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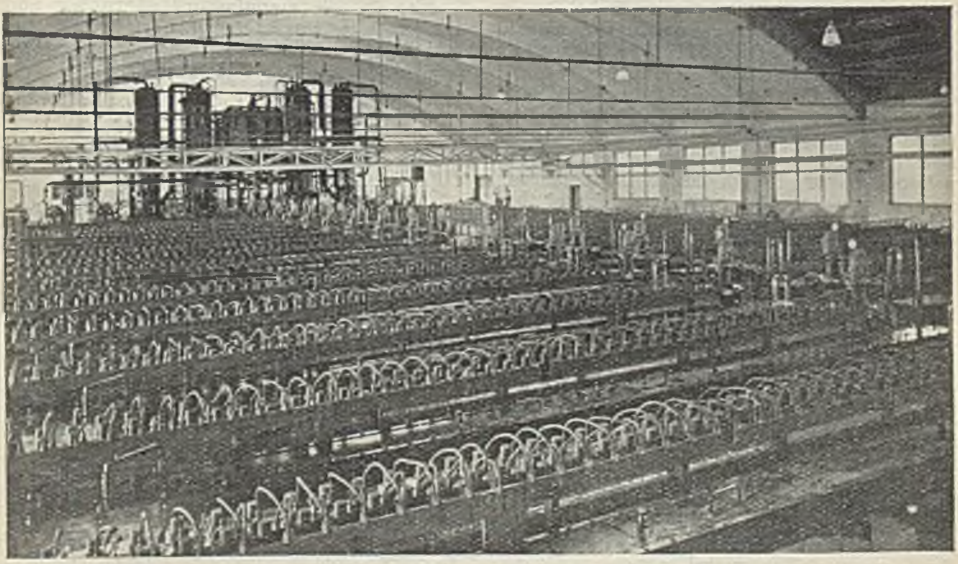

Fig. 5. The electrolytic alkali plant of the Elektrokemiska Co., Bohus, Sweden.

LETTERS TO THE EDITOR

B.A.C. AND T.U.C.

SIR,—As an ordinary member of the British Association of Chemists, I was astonished to read Mr. Norman Sheldon's letter in your current issue denying that the Council of the Association sponsored the recent motion at the general meeting in favour of affiliating to the T.U.C.

The official report circulated to us with the ballot papers states: " Mr. D. Jackson, on behalf of the Executive Committee, then moved ' That the Council be authorised to apply for affiliation to the Trades Union Congress !" Mr. Sheldon states that he " happened " (?) to be in the chair at this meeting and that he " made it clear that Mr. Jackson would not speak on behalf of the Executive Committee." There is no mention whatever in the report of this having been said. Why not? Surely it is most important if Mr. Sheldon is correct. But is he?

What is the real attitude of the B.A.C. Council to affiliation? Mr. Sheldon says it is neutral, but, on referring to the official report which was circulated, I find on pp. 2 to 6 a statement headed: " Report of Council on Affiliation to the T.U.C.," and it is stated that " This Report was adopted by the Council at its meeting on February 9, and ordered to be circulated to all members of the Association." The report is quite plainly in favour of affiliation to the T.U.C. and ends with these words: " In the light of the foregoing considerations, the Council has decided to secure the authority of the members of the Association for making our application for affiliation to the T.U.C."

If words mean anything at all, this means that the Council of the B.A.C. *did* sponsor the motion that Mr. Jackson proposed at the meeting. If this is not so, then I ask Mr. Sheldon to tell us: (1) Who did frame the motion in question?; and (2) Whether his letter in your columns represents his own personal opinion or whether it is an official pronouncement made on the authority of the Council or Executive of the Association? (If the latter, why is it not signed by the general secretary?)

The whole trouble with the B.A.C. for years has been its inability to exercise effective leadership among chemists. The result is that, on the one hand, the respectable, conservative Royal Institute of Chemistry has continued to recruit chemists so that its membership increased by 459 in 1945; while, on the other hand, the progressive left-wing Association of Scientific Workers continued to increase its membership and recruited 1138 new members in the first quarter of this year. But the B.A.C. membership figures have remained static for the past three years. The moral surely is, that plenty of people can be found to join any well-organised association which knows its own mind and knows where it is going, but that nobody can be found to join one which speaks with a multitude of conflicting voices and whose Council, apparently, just cannot make up its mind about anything.

Yours faithfully,

NON-SOCIALIST CHEMIST.

August 24, 1946.

Walnut-Shell Powder

SIR,—Walnut-Shell powder from the U.S.A. contains about 50 per cent. cellulose, 29 per cent. lignin, 5 per cent. cutin, 9 per cent. furfural, 7 per cent. ethanol. The moisture is 6.70 per cent. In 100-mesh mixed with 80/90-mesh softwood woodflour it is a good filler for phenolic and cresylic synthetic resin moulding powders, giving a high lustre finish to the moulded product and helping to increase its dielectric strength. Also the presence of cutin helps to prevent water absorption, an important factor where hardness in the finished moulded product is required.

On account of the scarcity of the suitable softwood woodflour, this walnut-shell powder is being largely used now by firms making the above-mentioned powders in Australia and also the U.S.A., and if import licences are granted it will most probably be used by the English firms.

In 325-mesh it is a splendid extender for synthetic glues and in coarser grades it is used as a carrier for horticultural insecticides, also a producer of voids in fireclay bricks and high-temperature ceramics and gives good wearing surfaces in high-grade linoleum and magnesite jointless floorings.

Also in the manufacture of rubber and high-voltage insulative products it reduces weight, while increasing strength and wearing qualities.—Yours faithfully,

W. S. DAHL.

London, W.14.

New Control Orders

Mercury

THE Control of Mercury (No. 12) (Revocation) Order, 1946 (S. R. & O. 1946, No. 1403), which came into force on August 23, revokes the Control of Mercury (No. 11) Order, 1945, and thereby removes the statutory maximum price control of mercury and mercurials.

Construction has started at Queen's University, Kingston, Ontario, Canada, of a new four-storey wing which is to provide additional space for undergraduate and research laboratories in chemistry and chemical engineering.

South African Chemical Notes

Shortage of Soaps and Paints

(from Our Cape Town Correspondent)

OWING to the acute world shortage of oils and fats—used in huge quantities by soap factories—soap is likely to be included among the articles rationed in the Union. With the exception of a small quantity of nut-oil produced in the Transvaal, all the ingredients for the manufacture of soap are imported, the main normal sources of supply being India, Sumatra, and Ceylon. Considerable supplies of oil were imported into the Union from India, but the serious famine there has compelled the Indian Government to divert these supplies to the manufacture of foodstuffs. Soap factories in the Union have been compelled to decrease their production during recent months, and now can supply only at the rate of half last year's requirements. The shortage of meat in the Union has made it impossible for soap manufacturers to obtain supplies of animal fats which are used on a big scale in the making of washing soaps. In addition, UNRRA has asked for huge supplies of fats and oils to feed the starving populations of Europe, and this has also affected local soap factories. The manager of a big soap concern said that factories in the Union are not likely to be forced to stop the manufacture of soap and that with less hoarding of supplies the essential demands of the public would be met.

War Against Insects

The arsenic-resistant tick that has threatened the coast belt of South Africa north and south of East London has been shown to fall an easy victim to Gammexane, probably one of the most powerful insecticides now in use in South Africa. The first small supplies reached this country in December, 1944, and were immeditely tested against the recalcitrant tick. The results were startling. A dilution of one part of Gammexane in 20,000 was effective against the tick, compared with a much higher concentration of DDT. All the research work in the Eastern Province has since been concentrated on Gammexane. Cattle are cleared of arsenic-resistant ticks in three or four weekly dippings. Thousands have been dipped without harm. Cattle have been dipped in drizzly weather and inspanned and worked immediately after dipping. Gammexane dips, in addition, have little or no effect on milk production. Extensive experiments in South America and Australia have confirmed this South African success.

The damage done by wood-boring insects has become so serious in the Union that experiments have had to be conducted with the object of defeating them. Now, after long and tedious operations, a powerful synthetic chemical has won the approval of the Forest Products Institute and the Division of Entomology. This chemical, P.C.P. (pentachlorophenol), is no new discovery, but it is only recently that it has been properly tested under South African conditions. The institute and the division have placed their seal of approval on the use of P C.P. solutions, summarising their findings by stating that it "ensures, by momentary immersion, a dry, clean, safe, economical, and certain protection against wood-destroying organisms," and, as a result of its use, the timber shortage has been rendered less acute.

Specially constructed smoke generators are being tested by experts at Onderstepoort in the campaign against nagana, a disease which has caused considerable stock losses in Natal and Zululand. The generators produce a thermal mixture containing DDT, which is driven off in the form of smoke for use against the flies which cannot be reached by other means. The Minister of Agriculture told a deputation from the Natal Agricultural Union that the Government regarded nagana as a national problem and was bearing all the expenses of the anti-nagana measures. All the farmers had been asked to pay for was the "1553" preparation which was being obtained from America for use against this scourge. The clearing of bush and aerial spraying had all been done at State expense. The deputation was also informed that Dr. G. de Kock, of Onderstepoort, would carry out an aerial survey of the Mkuzi Reserve in order to see how spraying could be extended. A two-mile trip would have to be cleared round the reserves and clearing would also be necessary inside the reserves.

The Paint Problem

Local paint firms predict that the shortage of basic pigments, now acute, will get worse before it gets better. Coupled with the need to repaint exteriors to preserve them from the weather is the desire on the part of property owners to refurbish their buildings for the Royal visit. "The biggest demand," according to the manager of a paint store, "is for whites and creams. But linseed oil, which cost 3s. 9d. a gallon in 1939, now sells at 14s. 6d. a gallon. White lead used to cost 6d. a pound. To-day—when one can buy it —it will cost 1s. 3d." Other materials, such as zinc oxide and lithopone, are scarce. Zinc oxide is often unobtainable in South Africa, but when supplies are available it sells at 150s. per cwt. Lithopone, once the cheapest base for paints, has risen 75 per cent. in price and now sells at 997s. 6d. per cwt. As an alternative to the conventional white and cream fronts of buildings, property owners may decide to repaint in brighter hues, but paint firms do not expect that the main streets will suddenly break out in red and purple. The shortage of paint has increased the demand for whitewash, which is being more lavishly used than for a long time past.

Vermiculite

Since 1937 the Government Metallurgical Laboratory has interested itself in the examination of samples of vermiculite from the Palabora deposit in the Transvaal with a view to its possible economic development and use. Methods and processes used in other countries were examined and attention was directed to the production of commercial grades in South Africa. In consultation with leading experts and under the guidance of the Laboratory, commercial interests were able to determine the most suitable plant for pre-treating, cleaning, and exfoliating the ore. The entire field of vermiculite technology has been covered by a valuable bulletin issued by the Government Metallurgical Laboratory, which deals very fully with occurrence, working, uses, assaying, and testing of the mineral. It is considered that the most rapidly-growing and probably most important use of vermiculite from the point of view of South African consumption is as an aggregate in light-weight concrete, for which vermiculite appears to be a highly suitable material. In this connection it might be emphasised that the potential market for products of this nature should be limited only by the demand for houses (likely to be unlimited for many years to come) and the country's readiness to break away from traditional building practice and take advantage of new materials and methods to accelerate the programme.

The new £24,000 factory for Rely Paint & Metal Works, Paarden Eiland, Cape Town, has been officially opened. The company expects to double its present output when the new factory is in production. It recently completed an agreement with a leading U.S. paint combine to make their rubber-based "Insl-X" paints in South Africa under licence.

Metallisation S.A. (Pty.), Ltd., 48 Van Beek Street, New Doornfontein, Johannesburg, are now applying special rust-proof coatings of zinc to steel truck bodies. They claim that this method is most hygienic and has proved eminently successful when applied to trucks carrying meat.

From New York it is reported that the Buffalo Machine Company, of Buffalo, has applied for a patent for a device designed to produce combustible gas from a commercial type of atomic "C" uranium.

Synthetic Resin Mouldings

New British Standard

FOR some years there has been a British Standard Specification for synthetic resin moulding powders of the phenol formaldehyde type. A corresponding specification for the aminoplastic (urea) materials has now been issued as B.S. 1322: 1946, Synthetic Resin (Aminoplastic) Moulding Materials and Mouldings. This specification standardises the methods of test and provides the technical information necessary to frame purchasing specifications for aminoplastic moulding materials and mouldings.

The specification defines two types of material according to their properties, and further types will be included later enabling a purchaser who requires material or mouldings for a particular purpose either to quote B.S. 1322 or, alternatively, to build a specification for a special type of aminoplastic material or moulding, by fixing a special standard of performance and prescribing the standard tests. The methods of test included in this specification are based on experimental work carried out by the British Electrical and Allied Industries Research Association, the British Plastics Federation, the General Post Office, and other industrial and Government laboratories. Copies of this specification may be had from the B.S.I., 28 Victoria Street, London, S.W.1, price 2s.

Chemical Exports

July Figures Show Big Increase

A GRATIFYING increase in the exports of chemicals, drugs, dyes and colours from the U.K. is shown in the Board of Trade monthly accounts for July.

The total value for the month is given as £6,471,353, which is an increase of £2,031,777 over the figure for June, £3,863,344 over the figure for July last year, and £4,614,704 over the monthly average for 1938. British India continues to be the biggest customer, her purchases during July totalling £1,657,329, followed by Australia (£1,210,771), and the Union of South Africa (£1,029,448).

Imports of chemicals, drugs, dyes and colours into the U.K. during July again showed a decline. The total value is given as £1,353,191, which is £52,237 less than the total for June, £1,830,794 less than the figure for July last year, and £218,800 less than the monthly average for 1938. The largest supplier during July was the U.S.A., with goods valued at £435,863; Canada was second (£165,439); and Spain third (£151,910).

Thorium Reclamation

Recovery from Gas-Mantle Residues

by A. G. AREND

THE extraction and refining of thorium is one of the more complicated branches of the rare metal industry because of the presence of so many other constituents and rare products in greater or lesser quantity. Unlike uranium, an associated radioactive metal, the separations are more involved (at least, as a general rule), and although detection can be made by observing the feeble radioactivity exhibited, actual identification cannot be confirmed in the easy way possible with uranium. The fact that uranium possesses a soluble carbonate simplifies discrimination, and when to this is added the existence of a hydrate, which, unlike those of the alkali metals, is insoluble, and which is produced as a distinctive yellow precipitate, it becomes one of the simplest metals to test for. The same, however, cannot be said of thorium. To-day, nevertheless, its separation has been assisted by the introduction of a number of specialised precipitation reagents, instead of depending on the somewhat crcuitous iodate method. The latter could reveal the presence of 0.0002 per cent. of thorium, but, of course, necessitated the services of a regular laboratory lay-out, apparatus, equipment, etc. Details of the tests have appeared elsewhere, and need not be repeated.

Thorium has gained some importance recently in view of the development of nuclear researches, where the splitting of its nucleus is limited to fast neutrons, an operation which is at present under close scrutiny. Whereas hitherto no really successful industrial application has been found for uranium, with the exception of its use as a catalyst, thorium enjoyed great popularity even in earlier years for the production of incandescent mantles, as well as for similar catalyst uses, and for medicinal and scientific investigations.

Wide Distribution

Thorium is widely distributed, as a reference to numerous geological and mineralogical papers will reveal. It exists in various Norwegian granites, in different limestones, and dolomites, and in fluorspar, and, in this country, has appeared in certain areas in Scotland. While its main sources are monazite, and the less common thorite and thorianite commercial ores, Vesuvian lava, and a number of other lavas show evidence of its presence. As some of the available material is in one form or another of infusible silicates, the initial opening-up of these offers difficulties unknown with the more soluble varieties of ore, but hydrofluoric acid solvent solutions, using lead receptacles, have gained some popularity. The difficulty of acquiring a relatively cheap source of thorium for scientific investigation led to some unique experiences. Despite the care which is bestowed on the packing of incandescent gas mantles, consignments of these have been damaged in transit, and rendered worthless. Acquisition of these broken mantles was undertaken by a Glasgow firm a number of years ago, and although the source was an uncertain one, it provided a sufficiency of thorium for the purposes on hand. Unlike the regular ore extraction process, the residue from the broken mantles furnished a material which, despite the fact that the fabric had only been immersed in a solution of the rare earth salts, was more concentrated than many of the ores worked.

Regular Extraction Process

So far as the regular ores, such as monazite sand, are concerned, the concentration is initially complicated by the fact that there are particles to contend with which, although small, have a relatively high specific gravity, and larger particles of low density. Shaking and jigging on mechanical tables operated in different ways produced unexpected hazards, and the electro-magnetic method tended to oust the other alternative of air-flotation. To-day, both these latter methods have been improved on, and the concentration is continued until some 90 per cent. of monazite is obtained from the associated sand. The monazite itself can contain anything from 2 to 14 per cent. of thoria, according to whether it hails from Brazil, Travancore, or the U.S.A.

Electro-magnetic separation has been expedited by the use of more magnets spaced to deal rapidly with each lot as the material flows along a continuous conveyor belt. The discharge is made into various bins, and the process repeated several times, and, with good working, a 95 per cent. concentrate has been reached.

Air-flotation has likewise been speeded up by the use of improved blowers, balloon collectors, and intermediate curved channels, but it would appear that the combined employment of both systems holds the greatest advantage. Unlike the slower fusion processes, or methods of dissolving in hydrofluoric acid (which are unduly costly), the concentrate alike from these sands, and from limestone, and dolomite, allows of direct solution by digestion in concentrated sulphuric acid. The plant used comprises a

Fig. 1. Working a monazite deposit in Travancore State, South India.

battery of cast-iron pans, care being taken to see that no moisture can get access to these, as diluted acid would soon make an inroad and seriously corrode the metal. This measure obviates the use of the more costly silicon-irons, or alloy steel containers. One of the practical troubles is the "bumping" of the syrupy liquors as the mass becomes pasty. Special pans have been designed which tend to offset this bumping difficulty, but have not apparently been used in thorium extraction, and a closed vat with stirrer device is persevered with, using a ceramic take-off to remove obnoxious fumes, and a settling-bend where dissipated liquid particles collect. Sulphuric acid of 76.7 per cent. concentration is first placed in the pan, and raised almost to boiling point, while a stream of the concentrates is allowed to flow in at interrupted intervals, until the ratio is of the order of one of solids to two of liquid. Gas burners are used as the source of heat, and a sump is provided beneath them in case of contingencies such as a break-away of the liquor, with a pan cracking; although this occurrence is somewhat rare, it nevertheless caused coal-firing to be abandoned.

In the process of recovering thorium from broken gas-mantle accumulation, as shown in the accompanying flow-sheet, the same method is followed up to this point, but the difficulties are less numerous, as there are no rare-earth phosphates to contend with. The process, however, is not to be regarded as simple, for a number of other rare constituents have to be separated, and what is worse, the original thoria used is rarely perfectly pure to begin with. Translation of heat into light with pure thoria is actually less than with the impure or commercial material as distinct from other oxides. The relative values of this have been worked out in detail, and show pure thoria at 0.5 and the commercial at 6.0 in light-emitting power, whereas zirconia is less markedly influenced. It is the presence of the added impurities which give the full light power, and hence there is no need to purify the initially obtained thoria.

The manufacturing process of the gas-mantle is well known, and it transpires that the Welsbach's original mixture has never been improved on. Woven cotton or artificial silk fabrics are used for the impregnation, and the more recent rayon fabrics have also been tried out, despite the encroachment of electricity on gas lighting. To save time, the consignment of damaged mantles, with their cardboard or paper packagings, are first emptied *in toto* into an oven and burned, and by applying a current of air, all light-weight matter is removed to a collecting receptacle, leaving behind the ceramic rings. This light mass requires an oxidising treatment to burn off all free carbon, and as stirring is prohibited, this is a lengthy process. The product so obtained compares with monazite concentrates except that it is free from phosphates and other deleterious matter. The fine material is first sprinkled with water before opening the oven, when a damp greyish mass is removed, suitable for the same treatment as before. It was found that an initial fusion with soda rendered the mass more amenable to solution in sulphuric acid, which was applied as described.

The solution contains small percentages of cerium, beryllium, and magnesium, besides its main constituent thorium, but the presence of undecomposed carbon particles causes the separation of more than the usual amount of free sulphur from the sulphuric acid. The original solution used for impregnation contains a mixture of 100 parts of thorium nitrate (containing from 48 to 49 per cent. thoria), 10 parts cerium nitrate, 5 parts beryllium nitrate, and 1.5 parts magnesium nitrate. Beryllium and magnesium nitrates are added chiefly to strengthen the ash skeletons of the mantles, while the light-emitting power of the latter principally comes from the thoria-ceria mixture. It will thus be seen that despite the small additions made to the fabric, when once the latter has been almost completely burned off and separated by air-flotation the final ash concentration is largely composed of thoria; but it requires accumulations of thousands of damaged mantles to give an appreciable amount.

Before the war, thoria was quoted at 40s. per oz., and hence allowed a fair margin for outlay (besides also being difficult to procure), and it was this feature which gave the incentive to recover it. Not a little of the success depends on the initial burning, first to remove the collodion, and paper, etc., and finally to get rid of the adhering carbon particles, but the total weight obtained is still surprisingly small. The same burning transforms the nitrates into oxides which slowly dissolve in the acid mentioned. (An alternative method of drawing the material into solution is by first fusing with sodium hydrosulphate when it is rendered soluble in water.)

As salts of zirconium and a number of adulterants may be present, besides the small addition of magnesium, the familiar oxalic acid precipitation is initially used, but this means that cerium is simultaneously deposited. Sufficient water is added to form a 15 per cent. acid solution, and the precipi-

Thorium Reclamation Flow-Sheet

Gas mantle residues heated with sodium hydrate, alkali washed out, and residue digested in hot concentrated sulphuric acid, filtered, and washed.

Filtrate made 15 per cent. acid, and oxalic acid added, settled 24 hours, filtered, and washed. (This separates most common metals, and also zirconium, from the thorium).

Precipitate dissolved in concentrated ammonium carbonate solution, the liquor neutralised, made to contain 10 per cent., ammonium nitrate, and 3 per cent. hydrogen peroxide, while maintained at between 60° and 80°C., filtered, and washed. (Precipitate may still contain traces of cerium).

Wet residue dissolved in 10 per cent. hydrochloric acid, boiled with potassium azide, and the precipitate filtered, washed, dried, and ignited in crucible to give pure thoria.

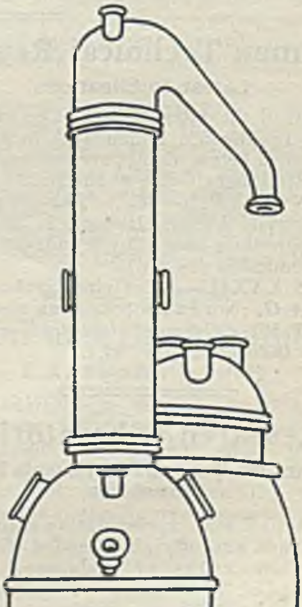

Fig. 2. For laboratory work, initial digestion of the residues is carried out in earthenware vessels with tubular device to avoid losses by splitting, but on the large-scale closed iron pans with stirrer are necessary to minimise bumping.

tate allowed to stand 24 hours prior to filtering. This precipitate is dissolved with as concentrated a solution of ammonium carbonate as can be obtained, with the addition of sufficient ammonia to form the normal salt.

The earlier methods, with the exception of the slower iodate process, could not be depended on for large-scale recovery, and such recovery was found to be unduly expensive, particularly as the process had to be repeated several times. For this reason, a crude gelatinous precipitate of thorium hydrate is first prepared by treating the neutral solution containing 10 per cent. ammonium nitrate, with 3 per cent. hydrogen peroxide at between 60° and 80°C. This method separates the thorium from practically the entire cerium, beryllium, and other rare metals present, but is not fool-proof. Care must be taken not to dry the precipitate as it can be rendered very resistant to solution in acids, and while still wet is dissolved in hydrochloric acid (10 per cent. solution), and boiled with potassium azide, which latter method has been found to be most reliable. The precipitate obtained is simply ignited in a crucible to a dense white powder, or pure thoria.

Concluding Notes

A number of special practical difficulties arise in connection with thorium products, particularly with the hydrate, which if not dissolved instantly according to its condition, can form an opalescent solution, which, so far from dissolving to a clear liquid, coagulates with the acid. So far as mantle residues are concerned, the cerium beryllium, and zirconia or other rare earth oxides included are not usually present in sufficient quantity to justify reclamation. Particulars of the radioactivity of thorium, the light-emitting power of its oxide, and characteristics of other salts have appeared in detail elsewhere, and need not be repeated.

The main sale of the mineral is in the form of the dioxide or thoria, which is to-day used as a catalytic agent, for searchlights, for improved flashlights, in the heating filaments of certain electric lamps, as a screen for "X" rays, and in a number of specialised scientific investigations.

German Technical Reports

Latest Publications

SOME of the latest technical reports from the Intelligence Committees in Germany are detailed below. Copies are obtainable from H.M. Stationery Office at the prices stated.

CIOS XXXIII—32. The Vereinigte Leightmetall-Werke, Hanover: Aluminium and magnesium base alloy foundry, processes and production (3s. 6d.).

CIOS XXXIII—40. Gelsenkirchner Bergwerks A.G.: Nordstern coke-oven plant (1s.).

FIAT 501. German aluminium and magnesium industries (10s. 6d.).

Research Laboratories

Ashmore Benson and Pease's New Premises

A LARGE and representative gathering of friends and officials attended the Stockton-on-Tees works of Ashmore, Benson, Pease & Co., Ltd., and the Power-Gas Corporation, Ltd., on the occasion of the inaugural opening of new research laboratories on August 23.

The ceremony was performed by the Mayor of Stockton-on-Tees, Alderman Alex Ross, who was accompanied by members of the Stockton Corporation Industrial Development Committee. In commending the firms upon their enterprise and expansion of the laboratories and works, the Mayor mentioned that they were well-known as being among the foremost and largest concerns with a world-wide reputation for the design and supply of plant and equipment for the chemical, gas, and iron and steel industries. He pointed out that the laboratories were equipped not only to serve clients who were installing plant of this description, but also for the purpose of investigating new processes in which they as manufacturing and general contracting engineers became interested.

After an inspection of the laboratories and tour of the works, the party was entertained to tea by the managing director, Mr. N. E. Rambush, and executives of the companies.

HIGH POLYMERS

The London Section of the Oil and Colour Chemists' Association announces that the sixth series of post-graduate lectures will be entitled "The Chemistry of High Polymers" and will be delivered by Professor H. W. Melville, D.Sc., F.R.S. (Professor of Chemistry, Marischal College, University of Aberdeen), in the lecture theatre of the Royal Institution, 21 Albemarle Street, London, W.1, on the following Thursdays: October 3, 10 and 17, at 6.30 p.m. The syllabus will be as follows: Lecture I, Synthesis; Lecture 2, Molecular Size: Lecture 3, Molecular Structure. An inclusive charge of 10s. for the three lectures will be made to members and visitors. Admission will be by ticket only and applications for tickets, accompanied by remittances, must be sent to the hon. secretary, Mr. David E. Roe, c/o Atlas Preservative Co., Ltd., Fraser Road, Erith, Kent.

Personal Notes

LIEUT.-COL. A. M. WEBER-BROWN, M.V.O., has been appointed a director of the London Tin Corporation.

DR. A. E. DUNSTAN has been appointed to represent the Institute of Petroleum on the Royal Society's Committee on Chemistry.

DR. R. N. JONES of the Department of Chemistry, Queen's University, Kingston, Ontario, has accepted an appointment as associate research chemist at the Canadian National Research Laboratories, Ottawa.

MR. ARTHUR WHITELEY, managing director of the Glanmor Foundry Co., Ltd., and its associate, Thomas & Clement, Ltd., iron founders, both of Llanelly, has accepted an invitation from the Government to be the controller of all the foundries in the British zone of Germany, which employ nearly 500,000 people.

MR. FRANK SMITH has been appointed sales executive of the Dunlop Rubber Company with particular responsibility for sales administration and co-ordination of the company's many distributive divisions. During his 31 years with the company, Mr. Smith has held important appointments in London and Birmingham. His future office will be at the Dunlop administrative headquarters in London.

PROFESSOR DOUGLAS HAY, M.C., B.Sc., M.Inst.C.E., has been appointed chief mining engineer to the National Coal Board. He will take up his appointment at an early date. Professor Hay is president of the Institution of Mining Engineers and hon. professor of mining, Sheffield University. He is at present managing director of Barrow Barnsley Main Collieries, Ltd., and the Barnsley District Coking Co., Ltd., also technical director of the Wombwell Main Co., Ltd. He has been consulting engineer on ventilation of the Mersey Tunnel (1929-37) and Dartford Tunnel since 1937.

Chemical Research

Success of Austrian Experiments

ACCORDING to the Directorate of Information Services, Control Office for Germany and Austria, Treibacher Chemische Werke is carrying out experiments for the production of sodium bichromate and potassium bichromate. Laboratory results are so far satisfactory, and it remains to be seen whether the furnaces and mills prove adequate for this work, in which case production on a commercial scale could start at short notice.

Treibach is also experimenting with water-glass and has successfully produced solid water-glass, 1500 kilogrammes having been delivered to the Bleiberger Bergwerks Union for use with their molybdenum flotation plant. It is reported that results were satisfactory and commercial production of solid waterglass can begin, provided sufficient quantities of quartz sand and soda are available. Production of water-glass solumnion has not been so successful owing to lack of suitable apparatus, but it is considered that this difficulty will be shortly overcome.

Welding of Light Alloys

Forthcoming B.W.R.A. Symposium

A SYMPOSIUM on the welding of light alloys is being organised by the British Welding Research Association. It is to be held on Wednesday and Thursday, October 16-17, in the Henry Jarvis Hall of the Royal Institute of British Architects, 66, Portland Place, London, W.1. The programme will include four sessions dealing with: (1) development of high-strength aluminium alloys for welding; (2) pressure welding and flash welding of light alloys; (3) spot welding of light alloys; and (4) welding of magnesium alloys.

Demonstrations and exhibits will be arranged at the offices of the Association at 29 Park Crescent, a few minutes' walk from the lecture hall. Although accommodation will be limited, a certain number of tickets will be available and application should be made to the British Welding Research Association, 29 Park Crescent, London, W.1.

Iron and Steel Output

U.K. Figures for July

ACCORDING to figures issued by the Ministry of Supply (Iron and Steel Control), the U.K. production of pig-iron and steel during the first two quarters of this year and during the month of July was as follows, the figures given representing tons:

PIG IRON

	Weekly Average	*Annual Rate*
1st Quarter	145,500	7,566,000
2nd Quarter	150,500	7,827,000
July	147,000	7,645,000

STEEL INGOTS AND CASTINGS

	Weekly Average	*Annual Rate*
1st Quarter	242,600	12,617,000
2nd Quarter	252,100	13,111,000
July	226,000	11,759,000

Stock tin ore (tin content) in United Kingdom, January 1, 1946, 7322 tons, and on July 1, 1946, 7753 tons.

A CHEMIST'S BOOKSHELF

Journal of the Electrodepositors' Technical Society (Vol. XX, 1944-45). London: Electrodepositors' Technical Society. Price (to non-members) 21s.

The latest volume of this Society's journal maintains the high standard set in previous issues. This is the only technical society in Britain concerned with the electrodeposition industries, and serves as a useful forum for the presentation of papers and the discussion of current trends and problems in the industries. Much credit is due to the officers of the society, and to the editor (Dr. S. Wernick) for the work they have done in the prompt production of the useful annual volumes throughout the war years. As would be expected, the majority of the papers in the current volume relate to methods of production, and problems immediately concerned with the production of munitions, but solutions found for war-time problems often result in improved methods, lower costs, and speedier output for peacetime application.

Four papers in this volume emanate from the Armament Research Department of the Ministry of Supply, Mr. A. W. Hothersall and Dr. G. E. Gardam of that department being old and tried supporters of the society. Two of the papers comprise work carried out some time ago but only now released for publication. The production of copper powder by electrodeposition is discussed by Mr. Hothersall and Dr. Gardam, who determined the appropriate conditions of operation and the plant required for a pilot-plant to produce 1 lb. of powder per hour. Production of metal powders by electrodeposition is a matter of some interest in view of the rapidly increasing ramifications of powder metallurgy. (Some of the aspects of powder metallurgy are described briefly in another paper in this volume by Mr. G. H. S. Price, of the G.E.C. Research Laboratories). Dr. Gardam reports an investigation to obtain a machinable deposit of chromium for a specialised purpose. Of the remaining two papers from the Armament Research Department, that dealing with the chromate passivation of zinc plate by Dr. S. G. Clarke and Mr. J. F. Andrew is a valuable contribution to the knowledge of a new process which assumed considerable importance in the production of zinc-plated weapons for the war in the Far East. This process, on which little real scientific data have hitherto been available, has a proved value for preserving zinc plate under very damp and humid conditions. Finally, Mr. E. Spencer-Timms describes a newly-developed magnetic tester for determining the thickness of electrodeposited coatings on a steel base. While the instrument has certain limitations, it is a useful addition to the limited number of ways of testing the thickness of a deposit quickly and non-destructively.

Two papers describe the application of electrodeposition to the production of bearings for aircraft engines. Mr. O. Wright reports that electrodeposited lead bearings, only 0.0005 in. to 0.001 in thick, have proved highly satisfactory even after 600 hours' operational flying on an engine with the highest bearing load per sq. in. of any aero-engine in the world. Silver bearings have also proved particularly suitable for heavy-duty bearings in aircraft engines, as they have a high resistance to corrosion by oxidised oils and good seizure resistance. According to Mr. Sprague's work a very thin undercoating of nickel and copper is required with a top coat of silver 0.002-in. thick.

On the engineering aspect of the processes, Dr. Jevons discusses pressing technique as a preliminary to the production of good deposits. In view of the tremendously wide field of application of metal pressings in modern industrial practice, this paper is a useful summary of the defects which may arise in the plated metal surface owing to inherent faults in the metal or to bad pressing technique. A new plant for the continuous electroplating of wire is described by Dr. J. Kronsbein and Mr. A. Smart. This new design is claimed to eliminate the disadvantages of former continuous wire-plating plants, namely, the excessive floor space and the limited current carried by the wire above the surface of the liquid.

Other related subjects of interest include the production of "black finishes" on steel by Mr. H. Silman; the increased resistance to corrosion conferred by an undercoat of tin in composite tin/zinc and tin/cadmium deposits by Dr. S. Warnick, and the effects of the presence of sulphate on the anodic film on aluminium, by Mr. D. Jackson. Mr. H. D. Hughes gives a useful account of a recently-developed method (electrography) for examining electrodeposits. This may be applied first, for reasonably quick and certain identification of the metal coating, and second, for the examination for defects, mainly porosity. This represents a further method of non-destructive testing of deposits and is of value on that account.

The recorded discussions are lively and full of practical suggestions and criticisms. This is a valuable addition to the series of annual volumes.

Recent Progress in Synthetic Resin Finishes and Enamels and Recent Progress in Electroplating and Metal Finishing. London: Hood-Pearsons Publications, Ltd. Pp. 52 and 48. 3s. 6d. each.

These two booklets, the first of the publishers' "Technical Progress" series, both draw largely on previously published work in German sources, the first being composed almost entirely of translations of German papers or excerpts from recent books.

The first two chapters of Booklet No. 1 give a general impression of vagueness coupled with a notable absence of "hard" data. Probably much more valuable work along the same lines could be produced by correlating the data from the appropriate CIOS, BIOS, and FIAT reports now appearing. As a result of this absence of "hard" data the booklet suffers a double disadvantage in that it is not of sufficient value to the chemist or research worker, while it is too technical to appeal to the foreman plater or charge-hand operator. Chapter 3, dealing with the preparation of the fatty acid (oil) modified alkyd resins, is merely a summary of existing patents, but it does include a full bibliography. The last chapter presents in a more interesting fashion some recent developments in the application of pre-applied organic finishes before cold-drawing. It is interesting to learn that one or more undercoats of organic resins may be applied to steel or other metal sheet before cold-drawing, and that tin containers for food are manufactured in this manner without apparently any necessity for lacquering after the tin has been formed. A similar procedure may also be applied in the production of motor-car body and wing pressings, thus effecting considerable savings in labour and production costs.

Booklet No. 2 is a much more practical publication designed to appeal to the works chemist or foreman in a plating shop. It is well equipped with useful practical data relating to bath compositions and operating conditions in the plating shop. Chapters 1-4 are devoted largely to a discussion of the newer "bright" plating processes, while there are some helpful data on the use of the "organic brighteners," and a note on the attendant possibilities and dangers in operation. The production of "bright" deposits of the important metals—nickel, zinc, cadmium, and chromium—is quite well covered, but more could have been said on "bright" brass plating and alloy plating generally. The last chapter contains a useful summary of the available data on the effect of the phosphatic coatings (produced chemically, not electrolytically) in facilitating deep-drawing of metal sheet. The application of this phosphatising process to the treatment of pistons and piston-rings opens up some interesting possibilities.

EXPERIMENTAL PLASTICS AND SYNTHETIC RESINS. By G. F. D'Alelio, A.B., Ph.D. New York: John Wiley & Sons, Inc. London: Chapman & Hall, Ltd. Pp. 185. 18s.

Ninety-seven experiments and twenty-seven test methods demonstrate the chemical reactions used in the preparation of plastic materials. Included in this unique book are the essential principles and laws governing the important industrial plastics of to-day. The book is suitable both in the training of students and for laboratory use, and is intended to supply the members of college and university staffs with techniques and processes which could be used as part of a laboratory course in plastics. Since many of the highly successful war applications of plastics were the result of joint efforts by industry and research, it is fitting that industry and research should work hand in hand to promote plastics as a branch of science. This text-book deals with practically all the well-known resins and plastics which can be prepared readily, even in a small laboratory, and the questions set after each experiment will provide a most valuable part of a student's training. Formulas and figures complete a well-designed and executed scheme for a thorough grasp of the most important thermosetting and thermoplastic materials. An appendix contains a list of industrial supplies suitable for use in the experiments of this manual, of importance chiefly for the American processor. The absence of advertising matter is a distinct advantage in comparison with many publications on plastics, and this maintains the level of the book as a scientific contribution.

Swedish Chemists

British Works and Institutions Visited

TWO professors and twenty-six students of chemistry from Sweden spent several weeks during August in the Sheffield and Manchester areas visiting chemical works and institutions. The arrangements were made by the British Council.

While in Sheffield they visited the I.C.I. works at Billingham; the Department of Glass Technology at Sheffield University; Newton, Chambers & Co., Ltd.; Southwood Ovens high temperature carbonisation plant; the Research and Development Department of the United Steel Co.'s Stockbridge Works; the carbonising plant of the Derbyshire Coalite Co., and the refinery of the British Diesel Oil and Petrol Co. at Bolsover.

In the Manchester area the party went to the Walmapur Co.'s works at Darwen; the Manchester Oil Refinery at Trafford Park; Messrs. Pilkington Brothers' glass factory; the soap and chemical works of Jos. Crosfield & Sons, at Warrington; the I.C.I. dyestuffs division and works at Blackley; the Shirley Institute, Didsbury; the Chorley Bleaching Co.; Partington Gas Works; Lever Brothers' soap factory at Port Sunlight; the United Alkali Co., Widnes; and the alkali division of I.C.I. at Winnington.

Phthalic Anhydride from Xylene

American Process

SOME details of the process developed in the U.S. for the commercial production of phthalic anhydride from petroleum *ortho*-xylene instead of from naphthalene are given in *Chemical Industries* (1946, *59*, 68). The plant operating the process, the first of its kind, was built by the Standard Oil Company of California for its subsidiary, the Oronite Chemical Company, at the cost of $1½ million and was completed at the end of 1945. Its capacity is 3500-4000 tons per annum, about 5 per cent. of the national total. Until the construction of this plant, naphthalene was the sole raw material for the commercial production of the anhydride. The process employed is basically the same: catalytic vapour-phase oxidation over a vanadium-based catalyst.

Source of Xylene

The *o*-xylene for the process is produced as a petroleum by-product with a purity ranging from 85 to 90 per cent. The plant for the preparation of the *o*-xylene from the crude xylene cut was originally erected for the production of toluene during the war, but has since been converted for the separation of this material. The *o*-xylene is fed from two 20,000-gallon tanks through a steam-heated vaporiser by individual gear pumps to eight identical process units where it is injected into the heated air stream at approximately atmospheric pressure. The air is supplied for this part of the process by two compressors running in parallel at 7600 r.p.m.

The ratio of air to hydrocarbon as it enters the converter is dictated by the explosive limit of the mixture and is kept on the lean side to prevent the possibility of an excessive temperature rise which would result from an insufficient ratio of air to feed. This mixture is fed through a multiple-tube converter where the anhydride is formed.

The converter consists of a bundle of tubes, catalyst-filled, cooled by a circulating bath of molten salt, which holds the temperature of the catalyst above 540°C. Heat is removed from the cooling medium by passing it through a waste heat boiler for steam generation. The time of contact with the fixed-bed catalyst, which is vanadium-based as in naphthalene oxidation, is less than one second.

The product from the converters is passed through coolers before entering the five large box-like condensers where the long white to tan straw-like crystals form on the side walls. These crystals fall into tapered bins from which they are collected. The waste gases from the converter are collected in a stack and burned.

On a weight basis the actual yield of phthalic anhydride from *o*-xylene is over 70 per cent., comparing favourably with that from naphthalene. The theoretical yield from pure *o*-xylene is 140 per cent., as compared with 116 per cent. from naphthalene Carbon dioxide is the principal by-product of the oxidation process, although in some naphthalene conversions appreciable amounts of carbon monoxide are produced.

The crude crystals are periodically removed from the condenser boxes and transferred to an underground melt tank where closed steam coils are used for its liquefaction. The resultant molten material is then pumped to the first of the two distillation columns, which are operated in series. The centre cut from the first still passes to the second, from which the purified product is removed to an aluminium storage tank. The bottoms and heads from the first still are returned for reworking.

The still molten anhydride is then fed from the aluminium storage tank to a water-cooled stainless-steel drum on which it solidifies. A doctor-knive shaves the pure white solid from the drum, the flakes dropping into an automatic weighing machine for packaging.

With the purpose of giving some information about the firm for the benefit of intending apprentices, W. C. Holmes & Co., Ltd., chemical engineers, Huddersfield, have issued a well-produced brochure, "The Training of an Engineer," which should meet a real need. Special sections deal with works training, technical training and additional training.

A material which has suffered overmuch in the past from lack of standardisation of quality is that familiar laboratory reagent, soda-lime (sodium calcium hydrate). Commercial samples have varied greatly in their efficiency as absorbents for carbon dioxide and other acid gases. Consequently, by using strict laboratory control, SOFNOL, LTD., Westcombe Hill, Greenwich, S.W.10, have good grounds for their claim that their product, "Sofnol non-hygroscopic soda-lime" is the most efficient carbon-dioxide absorbent yet discovered. A new section of their catalogue (SO-646), dealing with this product, gives physical data about it, together with specifications of the types of material available, and is illustrated with three boldly effective graphs.

General News—From Week to Week

The telephone service with Iceland has been reopened and the charge for a three-minute call is 24s.

After being in consultation with the Government here for several weeks, Dr. H. J. van der Bijl, chairman of the South African Iron and Steel Industrial Corporation, has returned to Johannesburg.

To give members an opportunity of securing their own hotel accommodation in London, preliminary notice has been circulated of the autumn meetings in London of the Refractory Materials and Building Materials Sections of the British Ceramic Society.

North London Branch members of the Institute of Welding are being invited to inform the hon. secretary, Dr. E. Sharratt, B.Sc., Ph.D., by October 1, whether they would support a proposed dinner-dance next April.

A £644,000 contract for the extension of the South African Iron and Steel Industrial Corporation's coke oven plant at Pretoria has been secured by the Woodhall-Duckham Vertical Retort and Oven Construction Co. (1920), Ltd.

Government purchase of tungsten and molybdenum ores and concentrates with the exception of small outstanding commitments has ceased, and it has been decided to return to private trading in these materials, according to the Ministry of Supply.

Under a contract for the delivery to the Ministry of Supply of 215,000 metric tons of aluminium from Canada during 1946-7, the first shipment, consisting of about 16,000 long tons, worth about £1,500,000, has now reached this country.

A chemistry sub-section will be included in an exhibition of more than 1,200 modern British books, which is to be opened in Berne on September 3, under the auspices of the British Council, and will later be shown in Basle, Zurich, Geneva and Lausanne.

A new DTD Specification, No. 758, has been issued for copper naphthenate, and is obtainable from H.M. Stationery Office (6d.). Further revised specifications dealing with magnesium alloy castings are Nos. 59B, 140B, 285A and 350A (1s. each), superseding 59A, 140A, 285 and 350 respectively.

At an extraordinary meeting of Metal Industries, Ltd., to be held immediately before the general meeting in Glasgow on September 12, a resolution increasing the maximum number of directors will be submitted. If it is passed, Mr. J. H. Enion will be proposed as additional director.

The July issue of the *Journal of the Textile Institute*, just published, contains an account of the proceedings at the annual conference, held at Scarborough in June, together with an appeal to members to raise £50,000 and to help towards a total membership of 10,000 as part of the Institute's special effort to improve and extend its usefulness.

The Minister of Fuel told members of the Scottish Regional Fuel Efficiency Committee at Glasgow that he would "rather spend £100,000,000 on research into devices for utilisation of coal waste than on the reorganisation of a great industry. There are some in the Government," he said, "who are wholeheartedly in support of desires expressed by research workers in every field of industry, and I believe that the money will be forthcoming."

By invitation of the Netherlands National Committee, the Fuel Economy Conference of the World Power Conference will be held at The Hague, Holland, on September 2-10, 1947. During the conference, an official visit of two days will take place to the Netherlands State Coal Mines, Lutterade. Intending participants from Great Britain are invited to apply for further particulars to: British National Committee, World Power Conference, 36, Kingsway, London, W.C.2.

At the annual meeting of Goodlass Wall and Lead Industries, Ltd., the chairman, Mr. Clive Cookson, advocated the reopening of the London Metal Exchange, in order to minimise the fluctuation of prices and to enable lead consumers to obtain lead at any time at the world price. At the same time, he spoke of the great skill with which the lead supply had been handled throughout the war by the Ministry of Supply, and forecast that, owing to the shortage of lead, Government control must continue to operate for some time.

Foreign News

The Dominion Tar and Chemical Company has offered a graduate fellowship of $800 in organic chemical research for the academic year of 1946-1947 at the University of Toronto.

Monsanto Chemical Company has succeeded in synthesising caffeine, and is erecting a $1,500,000 plant for the process at St. Louis. This would appear to be the first instance where so complicated a molecule as caffeine (mol. wt. 194) has been synthesised from its ultimate components, hydrogen from water and nitrogen from air, and is an important research achievement.

The Czechoslovak economic authorities are reported to be considering the establishment of a chemical industry in the eastern part of Slovakia.

Austrian iron production has been restarted with consent of the British Civil Administration for Styria. In Donawitz the first blast furnaece was put into action, with a daily production of 450 tons pig-iron. The monthly production of the Donawitz area will be raised to 60,000 tons of iron ore from the Erzberg mines and 6000 tons steel from five Siemens-Martin converters.

Washington announces that several non-ferrous metals, including cadmium and bismuth and their alloys, have been suspended from price control. The items covered are used for the most part for industrial purposes and represent but a small part of the cost of the industries in which they are used and the supply is at present greater than demand.

Hexaethyl tetraphosphate, a contact insecticide developed by the Germans during the war, is now being produced in the U.S. by the Monsanto Chemical Company. Though not yet thoroughly tested, it is believed to be efficacious against plant aphids and mites which are immune to DDT, and it is proposed to use it as a supplement to nicotine sulphate in dusts or sprays.

Forthcoming Events

September 10-11. Institute of Metals (Autumn Meeting). Institution of Civil Engineers, Great George Street, London, S.W.1. September 10, 2.30 p.m.: Official business, followed by three papers. September 11, 10 a.m.: Simultaneous groups of papers (in Lecture Hall and South Reading Room); 1.15 p.m., Annual luncheon at Connaught Rooms, Great Queen Street, W.C.2. Applications to the Secretary not later than September 1.

September 11. British Association of Chemists. Gas Industry House, 1 Grosvenor Place, London, S.W.1, 7 p.m. Mr. J. S. Evans, B.A., B.Sc. (H.M. Inspector of Factories, Engineering and Chemical Branch): " The Factory Acts as They Affect Chemists."

September 11. Institute of Welding (North London Branch). The Fyvie Hall of The Polytechnic, Regent Street, London, W.1, 7.30 p.m. T. J. Palmer: " The Weldability of Malleable Cast Iron."

September 16-19. Association of Tar Distillers. Programme of meetings at Queen's Hotel, Leeds, 1: September 16, 6 p.m., National Pitch Committee; September 17, 10 a.m., National Creosote Executive Committee, 2.15 p.m., A.T.D. Executive Committee; September 18, 9.30 a.m., A.T.D. Naphthalene Refiners, 10.30 a.m., A.T.D. general meeting, 2.15 p.m. National Creosote Committee, 4 p.m., B.R.T.A. Managing Council; September 19, 9.30 a.m., Pitch Marketing Company and Pitch Supply Association.

September 23-28. Welsh Industries Fair. Drill Hall, Cardiff, 11 a.m.-6 p.m.

September 26-27. Council of Industrial Design and Federation of British Industries. Central Hall, Westminster, London, 10 a.m. Conference on " Design," in association with the " Britain Can Make It " Exhibition.

Company News

The British Oxygen Co., Ltd., is paying an interim ordinary dividend of 8 per cent., as in each of the two preceding years.

Major & Co., Ltd., are again paying an ordinary dividend of 6 per cent. for the year ended March 31. Net profit was £25,108 (£19,900).

" Sanitas " Trust, Ltd., for the year ended May 31, record a net profit of £63,031 (£62,059) before taxation, and, with a final dividend of 7½ per cent. are repeating the 12½ per cent. ordinary dividend for the year.

The Beecham Group announces an increased first interim dividend on the deferred share capital. The distribution, which is in respect of the year ending March 31 next, is to be 8½ per cent. (7½ per cent. in 1945-46).

Metal Industries, Ltd., report a net profit of £146,140 (£123,477) for the year ended March 31. A final dividend of 7 per cent. (6 per cent.) on " A " and " B " ordinary stocks makes 10 per cent. (9 per cent.) for the year.

New Companies Registered

Pasta Resin Products Ltd. (417,718).—Private company. Capital £4500 in 4400 £1 shares and 1000 2s. shares. Manufacturers of, and dealers and workers in resins, powders, plastic goods, chemicals, etc. Subscribers: F. C. Kennish, G. Bocking. Solicitors: Slaughter & May, 18 Austin Friars, E.C.

Phenco Ltd. (417,785).—Private company. Capital £1000 in £1 shares. Manufacturers of and dealers in plastic and composition materials and articles, etc. Subscribers: A. T. Pelling; S. G. Stranes. Registered office: 1 Queen Victoria Street, London, E.C.4.

Zirconal Ltd. (417,655).—Private company. Capital £1000 in 1s. shares. Manufacturers and dealers in refractory articles and objects; manufacturing, research and analytical chemists, etc. Directors: Major W. E. Smith, C. Shaw. Registered office: 103 Cannon Street, E.C.4.

United Kingdom Essence Company, Ltd. (417,806).—Private company. Capital £1000 in £1 shares. Manufacturers and distillers of and dealers in essential oils, perfume essences, bases and raw materials, etc. Director: E. P. Tuddenham. Registered office: 151 Strand, London, W.C.2.

Hydrocarbon & Resin Developments, Ltd. (417,348).—Private company. Capital £8400 in 8000 6 per cent. cumulative preferred ordinary shares of £1 and 8000 deferred shares of 1s. Chemists, distillers, refiners, dye makers, manufacturers of chemicals and paints, resin, oil, and other fuels, etc. Directors: O. I. Philipp; E. Hene; C. Waite; and H. V. T. Stokoe. Registered office: Princes House, 95 Gresham Street, London, E.C.2.

Commercial Intelligence

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

Mortgages and Charges

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

LONDON WELDING CO., LTD., London, E. (M., 31/8/46.) July 24, mortgage to District Bank Ltd., securing all moneys due or to become due to the Bank; charged on Reliance Garage, formerly Harrisons Garage, Factory Road, Eastleigh. *Nil. April 11, 1946.

Chemical and Allied Stocks and Shares

WITH less tension in international affairs, stock markets have been firm, small movements ruling in British Funds, while industrial shares were inclined to strengthen, and leading oil shares responded to the big programme of converting railway locomotives from coal-burning to oil-firing. Yield considerations again drew attention to iron and steel shares, the view persisting that the Government will have to slow down its nationalisation programme.

Imperial Chemical were less active, but at 45s. regained part of an earlier decline, as have Dunlop Rubber at 75s. 3d. United Molasses, although active on the possibility of a higher interim dividend, failed to keep best levels, and have eased to 56s. 4½d. Turner & Newall were 89s. 6d., Lever & Unilever 54s. 3d., British Plaster Board 34s. 3d., and Associated Cement 70s. British Aluminium have been firm at 43s. 9d., and British Match 48s. 3d., B. Laporte were again quoted at 100s., while in other directions, Fisons, which remained under the influence of the full results, were active up to the higher level of 61s. British Drug Houses eased to 57s. 6d., and Burt Boulton to 25s. 6d. Shares of the Valor Company showed activity up to close on 70s. Lawes Chemical 10s. ordinary were 13s. 3d., and Greeff-Chemicals Holdings 12s. 6d.

Yield considerations attracted further buying of Thomas & Baldwins 6s. 8d. shares, which rose to 12s. 4½d., Stewarts & Lloyds also moved up to 54s. 1½d., Tube Investments to £6⅝, United Steel to 26s. 4½d., Thos. Firth & John Brown to 49s. 4½d., Colvilles to 25s. 9d., and Guest Keen to 41s. Triplex Glass rallied well to 42s. 10½d., and radio shares strengthened, with Cossor 36s., in recognition of the widening scope of the industry's activities. More attention was given to plastics, De La Rue moving up to £12¼, British Industrial Plastics 2s. ordinary were 8s., Erinoid 5s. ordinary 16s. 6d., and British Xylonite £7⅝. Business around 12s. 3d. was shown in British Lead Mills 2s. ordinary, while British Tar Products were 12s. Blythe Colour Works 4s. ordinary have been dealt in up to close on 47s., it being pointed out that there is a good yield assuming last year's dividend total is maintained; according to some views an increased dividend is not unlikely, although it is not, of course, expected that last year's victory bonus will be repeated. Paint shares became rather less firm, with Goodlass Wall 30s. 1½d., Pinchin Johnson 43s. 6d., and International Paint £6¼. Metal Box shares at £5 31/32 lost part of their recent rise, but there was again firmness in textiles, Calico Printers being 43s. 6d. awaiting the results, while Bradford Dyers were 24s. 9d., Bleachers 14s. 6d., Courtaulds 56s. 9d., and British Celanese 36s.

Beechams deferred have risen to 28s. 1½d. on the higher interim dividend, Griffiths Hughes rose further to 64s. and, awaiting the results, which it is being assumed will either confirm or deny deal rumours, Aspro showed activity up to 39s. 1½d. Sangers were 35s., Boots Drug 64s. 3d., and Timothy Whites 48s. 3d. British Oxygen were £5 xd. and Borax Consolidated deferred 48s. 3d. Leading oil shares responded to the better international news and also to the conversion of main line locomotives from coal-burning to oil-firing, Shell being 98s. 9d., Burmah Oil 71s. 10½d., and Anglo-Iranian 100s. 7½d. London & Thames Haven Oil 4s. shares also moved up to 17s., and C. C. Wakefield to 68s. 6d., while Ultramar Oil were better at 75s., and Canadian Eagle Oil 34s. 9d.

Prices of British Chemical Products

THERE have been no special features in the London industrial chemicals market during the past week, quotations throughout displaying a very firm undertone. The demand for shipment has persisted, while the home demand has been fully maintained, and in some directions even increased, with a consequent tightening in the supply position. There has been a steady movement among the soda products, with chlorate of soda in good call. In the potash section, offers of permanganate of potash are finding a ready outlet, and priority users are quickly absorbing the limited supplies of bichromate of potash. A good inquiry is recorded for hydrogen peroxide, formaldehyde, barium chloride, and the lead compounds. Conditions in the coal-tar products market show little change on the week. Pressure for contract deliveries is the chief note, and a firm price position is maintained.

Manchester.—Fairly active trading conditions have been reported on the Manchester chemical market during the past week. Both light and heavy products are being called for in steady quantities against contracts by users in the Lancashire area, including the textile and allied industries, though the movement of supplies is still affected to some extent by holiday conditions. Replacement buying by domestic consumers during the past few days has been on a fair scale, and shippers have been circulating inquiries for a wide range of heavy products on export account. On the whole, moderate buying interest is being displayed in superphosphates and other fertilisers. The tar products market keeps very firm and steady pressure for supplies of the leading light and heavy descriptions is reported.

Glasgow.—Business in general has been very brisk, and supplies have been inadequate to meet demands. Export business has remained steady.

Price Changes

Rises: Ammonium carbonate; antimony oxide; lead acetate; lead nitrate; litharge; magnesium chloride; oxalic acid; pitch; sodium iodide; sodium sulphate (Glauber salt).

General Chemicals

Acetic Acid.—Maximum prices per ton: 80% technical, 1 ton, £47 10s.; 80% pure, 1 ton, £49 10s.; commercial glacial, 1 ton, £59; delivered buyers' premises in returnable barrels, £4 10s. per ton extra if packed and delivered in glass.

Acetone.—Maximum prices per ton, 50 tons and over, £65; 10/50 tons, £65 10s.; 5/10 tons, £66; 1/5 tons, £66 10s.; single drums, £67 10s.; delivered buyers' premises in returnable drums or other containers having a capacity of not less than 45 gallons each. For delivery in non-returnable containers of 40/50 gallons, the maximum prices are £3 per ton higher. Deliveries of less than 10 gallons free from price control.

Alum.—Loose lump, £16 per ton, f.o.r. Manchester: £16 to £16 10s.

Aluminium Sulphate.—Ex works, £11 10s. per ton d/d. Manchester: £11 10s.

Ammonia, Anhydrous.—1s. 9d. to 2s. 3d. per lb.

Ammonium Bicarbonate.—Manchester: £40 per ton d/d.

Ammonium Carbonate.—£42 per ton d/d in 5 cwt. casks. Manchester: Powder, £43 d/d.

Ammonium Chloride.—Grey galvanising, £22 10s. per ton, in casks, ex wharf. Fine white 98%, £19 10s. per ton. See also Salammoniac.

Ammonium Persulphate.—Manchester: £5 per cwt. d/d.

Antimony Oxide.—£120 to £123 per ton.

Arsenic.—Per ton, 99/100%, £26 10s. for 20-ton lots, £31 for 2 to 10-ton lots; 98/99%, £25 for 20-ton lots, £29 10s. for 2 to 10-ton lots; 96/99% white, £21 15s. for 20-ton lots, £25 15s. for 2 to 10-ton lots.

Barium Carbonate.—Precip., 4-ton lots, £19 per ton d/d; 2-ton lots, £19 5s. per ton, bag packing, ex works.

Barium Chloride.—98/100% prime white crystals, 4-ton lots, £19 10s. per ton, bag packing, ex works.

Barium Sulphate (Dry Blanc Fixe).—Precip., 4-ton lots, £18 15s. per ton d/d; 2-ton lots, £19 10s. per ton.

Bleaching Powder.—Spot, 35/37%, £11 to £11 10s. per ton in casks, special terms for contract.

Borax.—Per ton for ton lots, in free 1-cwt. bags, carriage paid: Commercial, granulated, £30; crystals, £31; powdered, £31 10s.; extra fine powder, £32 10s. B.P., crystals, £39; powdered, £39 10s.; extra fine, £40 10s. Borax glass, per ton in free 1-cwt. waterproof paper-lined bags, for home trade only, carriage paid: lump, £77; powdered, £78.

Boric Acid.—Per ton for ton lots in free 1-cwt. bags, carriage paid: Commercial, granulated, £52; crystals, £53; powdered, £54; extra fine powder, £56. B.P., crystals, £61; powder, £62; extra fine, £64.

Calcium Bisulphide.—£6 10s. to £7 10s. per ton f.o.r. London.

Calcium Chloride.—70/72% solid, £5 15s. per ton, ex store.

Charcoal, Lump.—£22 to £24 per ton, ex wharf. Granulated, supplies scarce.

Chlorine, Liquid.—£23 per ton, d/d in 16/17 cwt. drums (3-drum lots).

Chrometan.—Crystals, 5⅝d. per lb.

Chromic Acid.—1s. 10d. to 1s. 11d. per lb., less 2½%, d/d U.K.

Citric Acid.—Controlled prices per lb., d/d buyers' premises. For 5 cwt. or over, anhydrous, 1s. 6¾d., other, 1s. 5d.; 1 to 5 cwt., anhydrous, 1s. 9d., other, 1s. 7d. Higher prices for smaller quantities.

Copper Carbonate.—MANCHESTER: £8 15s. per cwt. d/d.

Copper Oxide.—Black, powdered, about 1s. 4½d. per lb.

Copper Sulphate.—£33 10s. per ton, f.o.b., less 2%, in 2 cwt. bags.

Cream of Tartar.—100 per cent., per cwt., from £13 17s. 6d. for 10-cwt. lots to £14 1s. per cwt. lots, d/d. Less than 1 cwt., 2s. 5½d. to 2s. 7½d. per lb. d/d.

Formaldehyde.—£27 to £28 10s. per ton in casks, according to quantity, d/d. MANCHESTER: £28.

Formic Acid.—85%, £54 per ton for ton lots, carriage paid.

Glycerine.—Chemically pure, double distilled 1260 s.g., in tins, £4 to £5 per cwt., according to quantity; in drums, £3 19s. 6d. Refined pale straw industrial, 5s. per cwt. less than chemically pure.

Hexamine.—Technical grade for commercial purposes, about 1s. 4d. per lb.; free-running crystals are quoted at 2s. 1d. to 2s. 3d. per lb.; carriage paid for bulk lots.

Hydrochloric Acid.—Spot, 7s. 6d. to 8s. 9d. per carboy d/d, according to purity, strength and locality.

Hydrofluoric Acid.—59/60%, about 1s. to 1s. 2d. per lb.

Hydrogen Peroxide.—11d. per lb. d/d, carboys extra and returnable.

Iodine.—Resublimed B.P., 10s. 4d. to 14s. 6d. per lb., according to quantity.

Lactic Acid.—Pale tech., £60 per ton; dark tech., £53 per ton ex works; barrels returnable.

Lead Acetate.—White, 70s. to 75s. per cwt., according to quantity.

Lead Nitrate.—About £70 per ton d/d in casks. MANCHESTER: £55.

Lead, Red.—Basic prices per ton: Genuine dry red lead, £71; orange lead, £83. Ground in oil: Red, £84; orange, £95. Ready-mixed lead paint: Red, £86; orange, £98.

Lead, White.—Dry English, in 8-cwt. casks, £83 per ton. Ground in oil, English, in 5-cwt. casks, £94 10s. per ton.

Litharge.—£68 10s. to £71 per ton, according to quantity.

Lithium Carbonate.—7s. 9d. per lb. net.

Magnesite.—Calcined, in bags, ex works. £36 per ton.

Magnesium Chloride.—Solid (ex wharf), £27 10s. per ton.

Magnesium Sulphate.—£12 to £14 per ton.

Mercuric Chloride.—Per lb., for 2-cwt lots, 9s. 1d.; smaller quantities dearer.

Mercurous Chloride.—10s. 1d. to 10s. 7d. per lb., according to quantity.

Mercury Sulphide, Red.—Per lb., from 10s. 3d. for ton lots and over to 10s. 7d. for lots of 7 to under 30 lb.

Methylated Spirit.—Industrial 66° O.P. 100 gals., 3s. per gal.; pyridinised 64° O.P. 100 gal., 3s. 1d. per gal.

Nitric Acid.—£24 to £26 per ton, ex works.

Oxalic Acid.—£100 to £105 per ton in ton lots packed in free 5-cwt. casks. MANCHESTER: £5 per cwt.

Paraffin Wax.—Nominal.

Phosphorus.—Red, 3s. per lb. d/d; yellow, 1s. 10d. per lb. d/d.

Potash, Caustic.—Solid, £65 10s. per ton for 1-ton lots; flake, £76 per ton for 1-ton lots. Liquid, d/d, nominal.

Potassium Bichromate. — Crystals and granular, 7¾d. per lb.; ground, 8¼d. per lb., for not less than 6 cwt.; 1-cwt. lots, ½d. per lb. extra.

Potassium Carbonate.—Calcined, 98/100%, £57 per ton for 5-ton lots, £57 10s. per ton for 1 to 5-ton lots, all ex store; hydrated, £51 per ton for 5-ton lots, £51 10s. for 1 to 5-ton lots.

Potassium Chlorate.—Imported powder and crystals, nominal.

Potassium Iodide.—B.P., 8s. 8d. to 12s. per lb., according to quantity.

Potassium Nitrate.—Small granular crystals, 76s. per cwt. ex store, according to quantity.

Potassium Permanganate.—B.P., 1s. 8½d. per lb. for 1-cwt. lots; for 3 cwt. and upwards, 1s. 8d. per lb.; technical, £7 14s. 3d. to £8 6s. 3d. per cwt., according to quantity d/d.

Potassium Prussiate.—Yellow, nominal.

Salammoniac.—First lump, spot, £48 per ton; dog-tooth crystals, £50 per ton; medium, £48 10s. per ton; fine white crystals, £19 10s. per ton, in casks, ex store.

Salicylic Acid.—MANCHESTER: 1s. 8d. to 2s. 1d. per lb. d/d.

Soda, Caustic. — Solid 76/77%; spot, £16 7s. 6d. per ton d/d.

Sodium Acetate.—£42 per ton, ex wharf.

Sodium Bicarbonate.—Refined, spot, £11 per ton, in bags.

Sodium Bichromate.—Crystals, cake and powder, 6½d. per lb.; anhydrous, 7¼d. per lb., net, d/d U.K. in 7-8 cwt. casks.

Sodium Bisulphite. — Powder, 60/62%, £19 10s. per ton d/d in 2-ton lots for home trade.

Sodium Carbonate Monohydrate.—£25 per ton d/d in minimum ton lots in 2 cwt. free bags.

Sodium Chlorate.—£36 to £45 per ton, nominal.

Sodium Hyposulphite.—Pea crystals 19s. per cwt. (ton lots); commercial, 1-ton lots, £17 per ton carriage paid. Packing free.

Sodium Iodide.—B.P., for not less than 28 lb., 10s. 2d. per lb.

Sodium Metaphosphate (Calgon).—11d. per lb. d/d.

Sodium Metasilicate.—£16 10s. per ton, d/d U.K. in ton lots.

Sodium Nitrite.—£22 10s. per ton.

Sodium Percarbonate.—12½% available oxygen, £7 per cwt.

Sodium Phosphate.—Di-sodium, £25 per ton d/d for ton lots. Tri-sodium, £27 10s. per ton d/d for ton lots (crystalline).

Sodium Prussiate.—9d. to 9½d. per lb. ex store.

Sodium Silicate.—£6 to £11 per ton.

Sodium Sulphate (Glauber Salt).—£5 5s. per ton d/d.

Sodium Sulphate (Salt Cake).—Unground. Spot £4 11s. per ton d/d station in bulk. MANCHESTER: £4 12s. 6d. to £4 15s. per ton d/d station.

Sodium Sulphide. — Solid, 60/62%, spot, £20 2s. 6d. per ton, d/d, in drums; crystals, 30/32%, £13 7s. 6d. per ton, d/d, in casks.

Sodium Sulphite.—Anhydrous, £29 10s. per ton; pea crystals, £20 10s. per ton d/d station in kegs; commercial, £12 to £14 per ton d/d station in bags.

Sulphur.—Per ton for 4 tons or more, ground, £14 5s. to £16 10s., according to fineness.

Sulphuric Acid.—168° Tw., £6 2s. 8d. to £7 2s. 8d. per ton; 140° Tw., arsenic-free, £4 11s. per ton; 140° Tw., arsenious, £4 3s. 6d. per ton. Quotations naked at sellers' works.

Tartaric Acid.—Per cwt., for 10 cwt. or more, £15 8s.; 5 to 10 cwt., £15 9s. 6d.; 2 to 5 cwt., £15 11s.; 1 to 2 cwt., £15 13s. Less than 1 cwt., 3s. 1d. to 3s. 3d. per lb. d/d, according to quantity.

Tin Oxide.—1 cwt. lots d/d £25 10s.

Zinc Oxide.—Maximum prices per ton for 2-ton lots, d/d; white seal, £54 5s.; green seal, £53 5s.; red seal, £51 15s.

Zinc Sulphate.—Tech., £25 per ton, carriage paid.

Rubber Chemicals

Antimony Sulphide.—Golden, 1s. 5d. to 2s. 6d. per lb. Crimson, 2s. 2d. to 2s. 6d. per lb.

Arsenic Sulphide.—Yellow, 1s. 9d. per lb.

Barytes.—Best white bleached, £8 3s. 6d. per ton.

Cadmium Sulphide.—6s. to 6s. 6d. per lb.

Carbon Bisulphide.—£37 to £41 per ton, according to quality, in free returnable drums.

Carbon Black.—6d. to 8d. per lb., according to packing.

Carbon Tetrachloride.—£44 to £49 per ton, according to quantity.

Chromium Oxide.—Green, 2s ped lb.

India-rubber Substitutes.—White, 6 3/16d to 10¼d. per lb.; dark, 6 3/16d. tc 6 15/16d. per lb.

Lithopone.—30%, £28 2s. 6d. per ton.

Mineral Black.—£7 10s. to £10 per ton.

Mineral Rubber, "Rupron."—£20 per ton.

Sulphur Chloride.—7d. per lb.

Vegetable Lamp Black.—£49 per ton.

Vermilion.—Pale or deep, 15s. 6d. per lb. for 7-lb. lots.

Plus 5% War Charge.

Nitrogen Fertilisers

Ammonium Phosphate.—Imported material, 11% nitrogen, 48% phosphoric acid, per ton in 6-ton lots, d/d farmer's nearest station, in August, £19 12s., rising by 5s. per ton per month to September, then by 2s. 6d. per ton per month to March, 1947.

Ammonium Sulphate.—Per ton in 6-ton lots, d/d farmer's nearest station, in August, £9 12s. 6d., rising by 1s. 6d. per ton per month to March, 1947.

Calcium Cyanamide.—Nominal; supplies very scanty.

Concentrated Fertilisers.—Per ton d/d farmer's nearest station, I.C.I. No. 1 grade, where available, £14 18s. 6d.

"Nitro Chalk."—£9 14s. per ton in 6-ton lots, d/d farmer's nearest station.

Sodium Nitrate.—Chilean super-refined for 6-ton lots d/d nearest station, £17 5s. per ton; granulated, over 98%, £16 per ton.

Coal Tar Products

Benzol.—Per gal. ex works: 90's, 2s. 6d.; pure, 2s. 8½d.; nitration grade, 2s. 10½d.

Carbolic Acid.—Crystals, 11½d. per lb. Crude, 60's, 4s. 3d. MANCHESTER: Crystals, 9½d. to 11½d. per lb., d/d; crude, 4s. 3d., naked, at works.

Creosote.—Home trade, 5¾d. to 8d. per gal., according to quality, f.o.r. maker's works. MANCHESTER, 6½d. to 9¾d. per gal.

Cresylic Acid.—Pale, 97%, 3s. 6d. per gal.; 99%, 4s. 2d.; 99.5/100%, 4s. 4d. American, duty free, 4s. 2d., naked at works. MANCHESTER: Pale, 99/100%, 4s. 4d. per gal.

Naphtha.—Solvent, 90/160°, 2s. 10d. per gal. for 1000-gal. lots; heavy, 90/190°, 2s. 4d. per gal. for 1000-gal. lots, d/d. Drums extra; higher prices for smaller lots. Controlled prices.

Naphthalene.—Crude, ton lots, in sellers' bags, £7 2s. 6d. to £10 per ton, according to m.p.; hot-pressed, £11 10s. to £12 10s. per ton, in bulk ex works; purified crystals, £25 15s. to £28 15s. per ton. Controlled prices.

Pitch.—Medium, soft, home trade, 75s. per ton f.o.r. suppliers' works; export trade, 120s. per ton f.o.b. suppliers' port. MANCHESTER: 77s. 6d. f.o.r.

Pyridine.—90/140°, 18s. per gal.; 90/160°, 14s. MANCHESTER: 14s. 6d. to 18s. 6d. per gal.

Toluol.—Pure, 3s. 1d. per gal.; 90's, 2s. 4d. per gal. MANCHESTER: Pure, 3s. 1d. per gal. naked.

Xylol.—For 1000-gal. lots, 3s. 3½d. to 3s. 6d. per gal., according to grade, d/d.

Wood Distillation Products

Calcium Acetate.—Brown, £21 per ton; grey, £25. MANCHESTER: Grey, £25 per ton.

Methyl Acetone.—40/50%, £56 per ton.

Wood Creosote.—Unrefined, about 2s. per gal., according to boiling range.

Wood Naphtha, Miscible.—4s. 6d. to 5s. 6d. per gal.; solvent, 5s. 6d. per gal.

Wood Tar.—£5 per ton.

Intermediates and Dyes (Prices Nominal)

m-**Cresol** 98/100%.—Nominal.

o-**Cresol** 30/31° C.—Nominal.

p-**Cresol** 34/35° C.—Nominal.

Dichloraniline.—2s. 8½d. per lb.

Dinitrobenzene.—8½d. per lb.

Dinitrotoluene.—48/50° C., 9½d. per lb; 66/68° C., 1s.

p-**Nitraniline.**—2s. 5d. per lb.

Nitrobenzene.—Spot, 5½d. per lb. in 90-gal drums, drums extra, 1-ton lots d/d buyer's works.

Nitronaphthalene.—1s. 2d. per lb.; P.G., 1s. 0½d. per lb.

o-**Toluidine.**—1s. per lb., in 8/10 cwt. drums, drums extra.

p-**Toluidine.**—2s. 2d. per lb., in casks.

m-**Xylidine Acetate.**—4s. 5d. per lb., 100%.

Latest Oil Prices

LONDON.—August 28.—For the period ending August 31 (October 12 for refined oils), per ton, naked, ex mill, works or refinery, and subject to additional charges according to package: LINSEED OIL, crude, £65. RAPESEED OIL, crude, £91. COTTONSEED OIL, crude, £52 2s. 6d.; washed, £55 5s.; refined edible, £57; refined deodorised, £58. COCONUT OIL, crude, £49; refined deodorised £56; refined hardened deodorised, £60. PALM KERNEL OIL, crude, £48 10s.; refined deodorised, £56; refined hardened deodorised, £60. PALM OIL (per ton c.i.f.), in returnable casks, £42 5s.; in drums on loan, £41 15s.; in bulk £40 15s. GROUNDNUT OIL, crude, £56 10s.; refined deodorised, £58; refined hardened deodorised, £62. WHALE OIL, refined hardened, 42 deg., £89; refined hardened, 46/48 deg., £90. ACID OILS: Groundnut, £40; soya, £38; coconut and palm-kernel, £43 10s. ROSIN: Wood, 32s. to 45s.; gum, 44s. to 54s. per cwt., ex store, according to grade. TURPENTINE, American, 87s. per cwt. in drums or barrels, as imported (controlled price).

Inventions in the Chemical Industry

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

Applications for Patents

4-Chlorophenyl ethers.—J. R. Geigy, A.-G. 23054.

Condensation products.—J. R. Geigy, A.G. 23113.

Light sensitive materials.—Gevaert Photo-Producten N.V. 22906.

Refractory materials.—V. Goldschmidt. 23155.

Acylated esters.—B. F. Goodrich Co. 22952.

Dyestuffs.—N. H. Haddock, W. O. Jones, J. K. Page, D. G. Wilkinson, and I.C.I., Ltd. 22791.

Polymeric materials.—D. A. Harper, and I.C.I., Ltd. 23072-3.

Vulcanised materials.—D. A. Harper, and I.C.I., Ltd. 23074.

Polymeric materials.—D. A. Harper, W. F. Smith, and I.C.I., Ltd. 23070.

Deposition of metals.—Hudson Bay Mining & Smelting Co., Ltd. 22716.

Disinfectants.—R. M. Hughes. (J. R. Geigy, A.-G.). 22716.

Metal flaw detection.—L. Johnson. 22613.

Bituminous compounds.—G. H. King. 22943.

Introducing gases into fluids.—G. W. King. 23086.

Photographic emulsions.—Kodak, Ltd. 22695.

Thieno uracils.—Lederle Laboratories, Inc. 22953.

Albuminous products.—J. Lenderink. 23121-2.

Synthetic resins.—D. McPherson. 23161.

Poly-pentaerythritols.—S. F. Marrian, A. McLean, and I.C.I., Ltd. 23075.

Welding electrodes.—Mond Nickel Co., Ltd. 22715.

Molybdenum articles.—Mullard Radio Valve Co., Ltd., W. A. Anderson, and J. W Crawford. 22866.

Potassium bitartrate.—Permutit Co., Ltd. 22994.

Glycerine.—Procter & Gamble Co. 22735-6.

Welding of Metals.—R.E.F. Manufacturing Corporation. 22688.

Cleaning of raw wool.—M. A. Renison, and C. Mitchell. 23017.

Ammoniation of superphosphate.—W. Siegel. 23044.

Polymeric materials.—W. F. Smith, and I.C.I., Ltd. 23068.

Composite materials.—W. F. Smith, and I.C.I., Ltd. 23069.

Dyestuffs.—S.A. de Matières Colorantes et Produits Chimiques Francolor. 22738.

Semi-siccative oils.—Soc. l'Impregnation S.A.R.L. 23085.

Smoke-producing compositions.—B. A. Toms, and K. E. V. Spencer. 22809.

Insecticides.—United States Rubber Co. 22792.

Methyl carbinol.—Usines de Melle. 22662.

Polyester-amide compositions.—J. T. Watts, H. G. White, and I.C.I., Ltd. 23066.

Moisture-resistant coatings. — Western Electric Co., Inc. 23001.

Polymeric compositions.—H. G. White, and I.C.I., Ltd. 23067.

Gaseous fuels.—S. H. White. 22739.

Complete Specifications Open to Public Inspection

Polymerisation of ethylene.—E. I. du Pont de Nemours & Co. March 15, 1941. 12116-17, 12120/41.

Manufacture of high molecular compounds. —E. I. du Pont de Nemours & Co. April 10, 1941. 12226/42.

Compositions comprising polymers of acrylonitrile and shaped articles therefrom. —E. I. du Pont de Nemours & Co. June 17, 1942. 9639-40/43.

Synthetic resins.—E. I. du Pont de Nemours & Co. January 31, 1945. 3125-6/46.

Process for the rapid fixation of dyestuffs on cellulose acetate rayon.—Durand & Huguenin, A.-G. February 3, 1945. 8563/45.

Hydrolysis of cellulose materials.—H. M. L. R. Fouque. February 3, 1945. 2253/46.

Preparation of water-repelling agents and process of rendering materials water-repellent.—J. R. Geigy, A.-G. January 31, 1945. 3086/46.

Water-repellent agents, and the treatment of cellulose materials therewith.—J. R. Geigy, A.-G. February 1, 1945. 3094/46.

Poly-n-vinyl pyrrole compounds moulding composition and process.—General Aniline & Film Corporation. February 2, 1945. 1264/46.

Light-sensitive materials. — General Aniline & Film Corporation. February 1, 1945. 4535/46.

Preparation of extracts from aromatic plants, entirely soluble in hot water.—Germinal S.A. January 25, 1945. 27054/45.

Treatment of polymeric methyl methacrylate.—Imperial Chemical Industries, Ltd. January 30, 1945. 2994/46.

Preparation of fatty acid esters.—Lever Bros. & Unilever, Ltd. June 19, 1942. 20367/46

Substituted acridines and intermediates therefor.—E. Lilly & Co. February 3, 1945. 34686/45.

Chemical compounds and processes of preparing the same.—Merck & Co., Inc. January 8, 1944. 2779/45.

Manufacture of synthetic rubber.—Phillips Petroleum Co. February 2, 1945. 3116/46.

Production of aluminium.—Reynolds Metals Co. January 30, 1945. 24612/45.

Production of crotonic acid.—Shawinigan Chemicals, Ltd. February 2, 1945. 15522/45.

Dyeing of artificial fibres.—S.A. de Matières Colorantes et Produits Chimiques Francolor. January 25, 1945. 17991/45.

Azo dyestuffs.—S.A. de Matières Colorantes et Produits Chimiques Francolor. February 2, 1945. 2141/46.

Water insoluble dyestuffs.—S.A. de Matières Colorantes et Produits Chimiques Francolor. February 2, 1945. 2142/46.

Sulphonic derivatives of guanidine.—Soc. des Usines Chimiques Rhône Poulenc. June 10, 1941. 26490/45.

Electro-deposition of selenium.—Standard Telephones & Cables, Ltd. December 1, 1942. 19830/43.

Deposition of metallic selenium on a base element.—Standard Telephones & Cables, Ltd. December 1, 1942. 1228/44.

Basic alkyl esters.—Sterling Drug, Inc. February 2, 1945. 35232/45.

Complete Specifications Accepted

Production of cyclic amidines or salts thereof.—Boots Pure Drug Co., Ltd., P. Oxley, and W. F. Short. May 26, 1944. 579,303.

Tank or container for fuel or other inflammable liquids.—M. L. Bramson. September 20, 1943. 579,421.

Use of polyester-amide compositions for coating, impregnating, adhesive or like purposes.—J. G. Cook, J. T. Watts and I.C.I., Ltd. December 6, 1943. 579,340.

Manufacture of methyl silicon polymers.—Corning Glass Works. (Cognate applications 7685/44 and 7686/44.) July 11, 1943. 579,408.

Process for crystallising salts.—F. B. Dehn (Potash Co. of America). June 28, 1943. 579,330.

Vitamin A products and methods of preparation thereof.—Distillation Products, Inc. June 2, 1943. 579,449.

Polymerisation of unsaturated compounds in the presence of thiols and derivatives thereof.—E. I. du Pont de Nemours & Co. March 20, 1943. 579,353.

Polymerisation of acrylic acid derivatives. —L. Fallows, and E. V. Mellers. September 7, 1943. 579,379.

Production of monoesters of ascorbic acid. —Hoffmann-la Roche, Inc. May 11, 1942. 579,333.

Production of avation gasoline.—Houdry Process Corporation. January 20, 1942. 579,280.

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ABSTRACTOR & TRANSLATOR required for Intelligence Department of Chemical manufacturing concern, in the London area, covering range of physical and organic chemistry. Salary according to age and experience. Applications to Box No. 2335, THE CHEMICAL AGE, 154, Fleet Street, London, E.C.4.

SALES Engineer with chemical engineering background to assist Sales Manager in firm of international repute in marketing special process plants. Sales experience more valuable than high technical qualifications. Large field immediately available. Box No. 2338, THE CHEMICAL AGE, 154, Fleet Street, London, E.C.4.

THE UNIVERSITY OF SHEFFIELD

THE University intends to fill as soon as possible in 1946-47 the CHAIR OF FUEL TECHNOLOGY which has been vacant since the death of Professor R. V. Wheeler in 1939, the Department having meanwhile remained in action. Long previous industrial experience is not essential, but proved power in original and modern investigation is, especially in the physics or physical chemistry of fuel and combustion. The salary will be not less than £1450, with superannuation provision under the Federated Superannuation Scheme for Universities and with family allowances. Further information can be obtained from the undersigned, with whom those who may become candidates are invited to communicate not later than 1st October, 1946.

A. W. CHAPMAN.
Registrar.

WANTED

WANTED Caustic Soda Solid and Liquid (90Tw), required in large and regular lots. Box No. 2330, THE CHEMICAL AGE, 154, Fleet Street, E.C.4.

WANTED—Experimental Hydro-extractor. Cage dia., 15 in. by 18 in. Must be in good condition. Full details and price to Box No. 2339, THE CHEMICAL AGE, 154, Fleet Street, London, E.C.4.

WANTED.—Supplies of Nitre Cake in ten-ton lots, Box No. 2126, THE CHEMICAL AGE, 154, Fleet Street, E.C.4.

FOR SALE

MIXERS FOR SALE

ENCLOSED Vertical Cylindrical **MIXER**, mild steel welded construction, unjacketed 5 ft. 6 in. high by 9 ft. 6 in. dia., over-driven agitator mounted on top and driven through gearing from T. E. surface-cooled 7½ h.p. Squirrel cage motor by Crompton, 400 volts, 3 phase, 50 cycles, with starter ; fitted with baffles and mixing blades of the finger type ; shaft supported in foot step bearing ; 2 bottom outlets.

Overdriven Steam Jacketed **MIXER** by Brinjes & Goodwin, having cast-iron pan 46 in. dia. by 33 in. deep, having a cover in 2 halves ; cast-iron agitator ; steel propellor and scraper blades belt driven through bevel gears (having ratio of 3 : 1) fast and loose pulleys.

Vertical Stainless Steel Lined Steam Jacketed **MIXER** by Rosedonns 5 ft. 6 in. dia. by 3 ft. deep, totally enclosed pan, having two 3 in. connections and inspection window, 15 in. manhole in the top cover ; agitator being S.S. fins overdriven through gearing.

Vertical Aluminium **MIXER** 5 ft. 9 in. by 3 ft. 3 in. deep ; fitted with horizontal agitating shaft carrying 3 aluminium propellor type agitators and running through glanded bearings ; aluminium shaft direct driven from fast and loose pulleys, loose aluminium covers.

Mild Steel Steam Jacketed **MIXER** 4 ft. 6 in. dia. by 2 ft. 6 in. deep, flat bottom of ⅜ in. thick steel, riveted jacket, overdriven through bevel gearing from sprocket wheel, hand wheel operated dog clutch, 50-lbs. wp.

Unused Vertical Mild Steel **MIXER** of welded construction, 5 ft. dia. by 6 ft. deep, on straight, dished bottom fitted with 2½ in. dia. vertical rubber covered agitating shaft with paddle stirrers overdriven through "V" ropes from 3 h.p. totally enclosed Brook Motor 380 volts, 3 phase, 50 cycles, with starter, mounted on top of Mixer ; 3½ in. bottom run-off, and three 2 in. decanting outlets at side.

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