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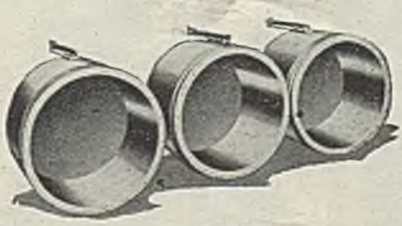

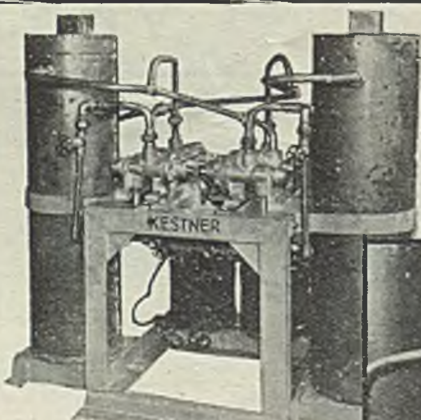
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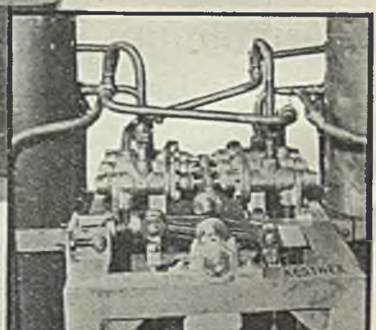


OF THE BUSINESS...
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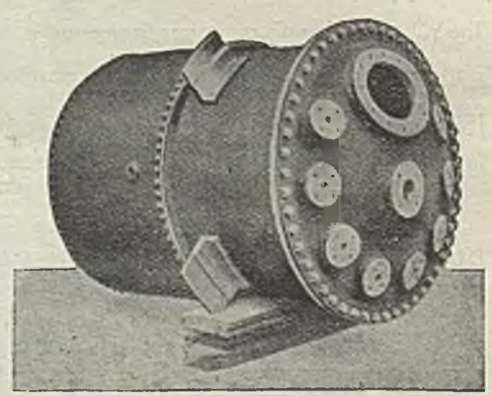

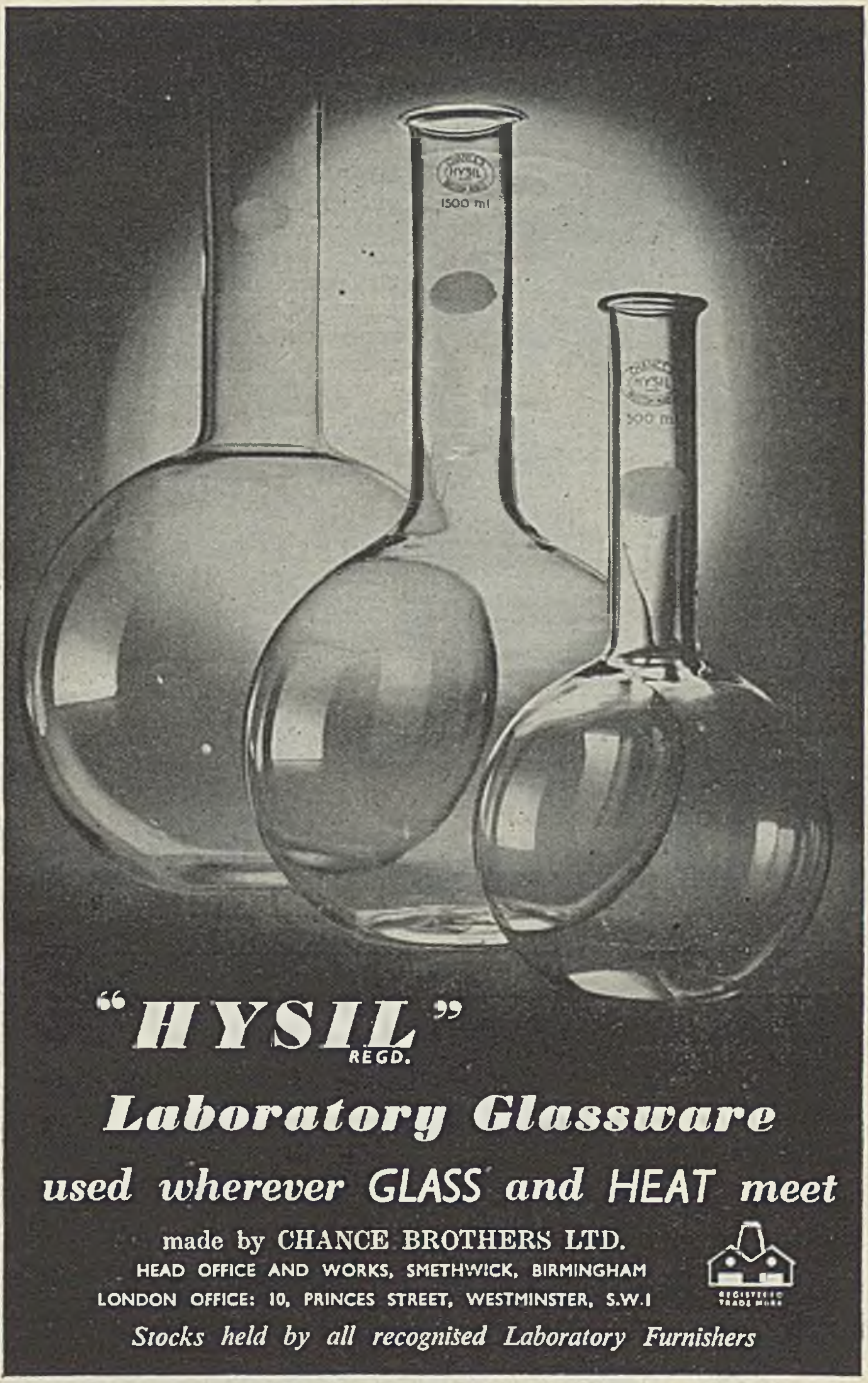
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Some Notes on Fertilisers

IT seems a long time since Sir William Crookes drew attention to the threatening impossibility of feeding an increased population on account of the shortage of foodstuffs. The development of fertilisers since that time has changed the picture altogether. There has been no shortage of food in the world in general, even though climatic conditions may have caused famine in certain areas, and though we have had an experience of this sort in England during the last few years due to quite other reasons. This experience has shown how necessary it is not only to use fertilisers, but to use fertilisers correctly in accordance with the type of soil and the type of crops to be grown.

A detailed account of the experience of the war years and of the lessons to be learnt from them has been given by Dr. Crowther, of Rothamsted, in his pamphlet, *Fertilisers during the War and After*, which was reviewed in our issue of August 25. The survey leaves us in no doubt as to the importance of fertilisers and prompts the reflection that whatever branch of industry may one day be superseded by the general march of science that of the manufacture of fertilisers must remain highly stable. The conclusion is also clear that the use of fertilisers is likely to become much more highly scientific in the future. We can hardly escape the belief that the time will come when the chemist will control certain farming operations just as he now controls certain manufacturing operations.

Looking a long way ahead to a future organisation of society towards which the present Government is obviously tending, we can imagine that the farms of this country may no longer be worked by small farmers, but combined into much greater farms, each of which will have its chemist or staff of chemists. The operations of the War Agricultural Committees have been tending towards that sort of régime. It would seem very desirable that these committees should be continued and that there should be at the headquarters of each a central staff to go out and advise every farmer in the area as to the best use of his land and in particular as to the correct method of fertilising it. Dr. Crowther's work shows how immensely complicated and scientific the application of fertilisers has now become through the knowledge and experience gained from recent researches.

On Other Pages

To pursue this thought a little further, some of the details given by Dr. Crowther may be summarised with advantage. Nitrogen fertilisers, of which sulphate of ammonia is the leading form, help general growth and leaf production. Phosphate fertilisers promote quick rooting, good establishment, and early ripening, and are needed particularly for swedes, other root crops, and clovers. Potash fertilisers are of special importance for fruit, potatoes and other root crops, and clovers. Soils may be so short of one or other of these three major plant foods that all crops will need the appropriate fertiliser. Calcium occupies a unique position among plant foods because it must be supplied in basic forms, as in lime or limestone, to prevent soil from becoming too acid. As dressings of lime have commonly to be measured in tons per acre and depend much more on the state of the soil than the crop grown, it is customary to treat liming materials as soil-improvers rather than fertilisers. Fertilisers differ so widely in their contents of plant foods that it is necessary to allow for their strength in planning manuring schemes, in costing alternative forms, and above all, in rationing for widely differing systems of farming.

The economics of the use of fertilisers is complicated. Experimental evidence has accumulated on the response of crops to successive equal increments of fertiliser dressings. Ultimately, a point is reached at which the cost of a little extra fertiliser is just repaid by the value of the extra crop, and the fertiliser shows the maximum profit. The levels of these "most profitable dressings" naturally depend on the responsiveness of the crop and on its value per unit. Thus, it pays to manure potatoes more heavily than cereals. For cash crops it is relatively easy to work out the "most profitable dressings," but for fodder crops the assessment is more difficult. The "most profitable dressings" are not very sharply defined, for there is a wide range over which the return in extra crop is close to the cost of extra fertiliser. Generally, farmers prefer to work somewhat below these "most profitable dressings," and make only slightly less profit on considerably less outlay. Further, these "most profitable dressings" are not to be regarded as ideal or generally recommended dressings, but should serve rather as a sort of handicap or bogey. The complex task of balancing expenditure on fertilisers against probable return, and a discovery of the economic limits to which fertilisers should be applied must apparently be worked out by the farmer himself. It is complicated by the different analyses of fertilisers as regards their essential constituents and the availability of those constituents.

Lime and limestone, the "soil-improvers," must be used to prevent acidity; and Dr. Crowther tells us that vast areas of acid soils still need liming. Some of the acid soils, especially those ploughed out of poor grass or waste land during the war, have been so acutely acid that even such resistant crops as potatoes have failed through lack of lime. An important modern development has been to provide ground limestone as an alternative to burnt lime, though, unfortunately, the unit price of limestone has remained unduly high. In some parts, especially in the West and North, there is an unjustifiable old prejudice against limestone. Although twice as much is required, it is more easily stored and applied, and it can go on at any time. There is no need to use exceedingly fine material; samples ground to 50 per cent. through the 100-mesh sieve will generally have sufficient fine material for rapid action; the coarse grit makes distribution easier and provides slowly acting reserves. Magnesian limestones can be used in place of lime. Magnesium oxide is more caustic than calcium oxide, and burnt magnesian lime should not be used in dressings over, say, 2 tons per acre.

The more we consider Dr. Crowther's words, indeed, the more strongly do we become convinced of the importance of fertilisers to the practice of the chemical industry in general. The use of fertilisers has, indeed, become a factory process, in which the farmer has to balance cost against yield. We have, to-day, endeavoured to evaluate some of these factors; but there are yet others with which we hope to deal at a later date—not forgetting the impact on the future of this country of the increasingly scientific use of fertilisers.

NOTES AND COMMENTS

Trade with the Netherlands

THE conclusion of the monetary agreement with the Netherlands represents a further completion of the system of bilateral payment agreements which this country has signed with the countries of Western Europe. It is to be hoped that the negotiations with Norway, which were interrupted when Lend-Lease ended, will be resumed at an early date. While an agreement with Portugal may also be expected before long, this is not the case with Spain as long as the Franco régime—which is still giving support to German financial and commercial interests—remains in power. Although a certain amount of criticism has been expressed both as regards the devaluation of the guilder from the rate of exchange of 8.72 guilders to the pound sterling, ruling before the war, to a rate of 10.691, and the differential exchange rate for Dutch East Indian currency of 7.6 guilders to the £, the agreement has, nevertheless, been welcomed in both countries as a step towards a much needed liberation of international trade. The agreement limits the holdings by the Central Banks of each other's currencies to £5,000,000 (fl. 53,450,000), it provides for freedom of transfer within the combined monetary area and for cooperation regarding the elimination of transfers of "hot money," and it contains a multilateral clause, the application of which, however, has to wait until a substantial world trade has been revived, and the dollar supply position cleared. The relaxation of trading restrictions, particulars of which are given in a later column of this issue, is a natural corollary to this monetary accord.

The I.G. Underground

FURTHER reports have come to hand concerning the specialists of every kind who are working over the affairs of the I.G. The latest "find" is the discovery, in the American zone, of a salt mine near Heilbronn which contained not only all the records, but also all the equipment, of the research establishment of Dr. Albert Ernst, chief physicist of the Ludwigshafen-Oppau chemical works. This huge organisation turned out a vast variety of products, chief among which were catalysts used in the manufacture of synthetic oil, and a number of important intermediates, and a large nitrogen works also formed part of the plant. A survey of the bomb damage caused in the Ludwigshafen plant, carried out by the French commission under Commandant Castets, shows that while 50 per cent. of the buildings were destroyed, only 35 per cent. of the equipment was put out of action; even had it been totally destroyed, there were plans for establishing a complete range of manufacturing processes in the underground galleries of the Heilbronn salt mine. Plans, records, and equipment are now captured, and Dr. Ernst himself is "at the disposal" of the American authorities.

In the Russian Zone

AS stated last week, good liaison is being maintained with the Russian authorities on I.G. affairs. A Russian delegation recently visited Frankfort and, on leaving, stated that they would recommend the appointment of a special control officer for I.G. Farben interests in the Russian zone. As that zone contains the great Leuna works, which, though "badly damaged," are still capable of a monthly output of 5000 tons of fertilisers, according to Russian reports, such an appointment would seem well worth while. An important factor, by the way, that is often forgotten in assessing bomb damage is that a works, itself quite unharmed, may be brought to a standstill by the destruction of another plant which supplied a vital intermediate or starting product—and then, on top of that, there was the dislocation of transport, perhaps the most important job of all.

Perversion of Science

A FINER example of the perversion of science could hardly be found than the action of Dr. J. Lange, professor of chemistry in Vienna University, when he destroyed an electron microscope—described in the Austrian People's Court as "the finest electronic microscope in the world "—in order (so he says) to prevent it from falling into the hands of the Russians. He declared that he believed he was doing his duty "as a German" in taking this action; and he reinforced it by shooting and killing two colleagues, Dr. Horeischy and Dr. Vollmar, who tried to stop him. In our leading article last week we spoke of "organisation of the wrong kind, directed by the wrong people" and its effect upon scientists, and we feel that Dr. Lange is a melancholy exemplar of this thesis. Worse still, his dementia shows how the worse casts out the better; for he was a former student of the Rockefeller Institute, New York, and had lectured at universities in America and Norway before becoming infected with the Nazi poison. This is a warning to those who are now attempting to organise science for the benefit of mankind that they must insist on the universality of their benevolent plans; it is not enough to inculcate the right principles in Britain or in the U.S.A. or in Russia—they must be accepted everywhere. Our scientific control commissions are finding proof enough in Germany of the malevolent activities of I.G. Farben; it will be an uphill struggle to turn this negative energy into an equally potent positive, but it is a struggle that must be fought and won if the human race is to survive.

Works Library Problems

A MARKED deterioration in public morality, especially in regard to petty thieving, was remarked upon by Mr. Eric Simons, publicity manager to Edgar Allen & Co., Ltd., Sheffield, in a discussion at the ASLIB conference in London last week, on the problems of running a works information service in industry. He also stated that workers in the North were, on the whole, hostile to books, and were often completely incapable of making use of information when it was given them; in the South, on the other hand, information was both appreciated and used. Not only were thefts of small articles common in the works, he said, but there had also been a considerable amount of common theft of valuable books, not by workmen, but by members of the staff, to a degree inconceivable twenty years ago. The worst problem to be faced in starting a works library nowadays was how to prevent these robberies. At the same conference, Professor Bernal expressed the view that the world of the research worker and the world of the librarian were too far separated. The modern library should be a distributor and organiser of knowledge, he thought. Unfortunately, as we see it in the light of the above comments, the difficulty is aggravated with scientific libraries, such as are specially valuable when attached to a works. Scientific books are often costly, and are bound to offer a particular temptation to the sneak-thieves arraigned by Mr. Simons. The only hope is that the standard of morality in the works—and among the staff—may rise with the removal of unpleasant war-time conditions.

Netherlands Trade Agreement

Custodian Control Relaxed

IN accordance with three new Orders (S. R. & O. 1945, Nos. 1117-9), those provisions of the Trading with the Enemy Act, 1939, and the Custodian Order, 1939, which remained in force after the liberation of the Netherlands now cease to apply in respect of money and property accruing on or after September 10, 1945, to persons resident in that territory.

Money which had become due before September 10, but has not yet been paid or held to the order of the Custodian of Enemy Property, remains payable to the Custodian. Similarly, property in the United Kingdom which before that date was subject to report to the Custodian is still governed by Article 4 of the Trading with the Enemy (Custodian) Order, 1939.

Banking channels between Britain and the Netherlands are now restored subject to the operation of the Defence (Finance) Regulations. Export and Import Licensing Regulations and the parallel regulations of the Royal Netherlands Government must still be observed. The actual undertaking of commercial transactions must depend on the availability of the necessary physical facilities, *e.g.*, supply of goods, transport, etc. A Treasury Order (S. R. & O. 1945, No. 1120) has also been made regulating the use of sterling at the disposal of residents in territories within the Dutch Monetary Area.

Brazilian production of oiticica oil has reached an annual figure of about 10,000 tons and is still increasing.

British Chemical Trade Accounts

Foreign Trade Figures for First Six Months of 1945

A WELCOME reappearance among official statistics—which still seem to be suffering largely from a war-time blackout hangover—has been made by the Accounts Relating to the Trade of the United Kingdom, giving details of oversea trade for the first half of 1944 and 1945. The value of exports (other than munitions) amounted to £173,000,000 in the first half of this year, an increase of £42,000,000 compared with the same period last year. For purposes of comparison, exports in 1938 have been halved, giving a round total of £235,000,000.

Fall in Imports

The value of imports in the first half of 1945 was £598,000,000, a fall of £53,000,000 (or 8 per cent.) against last year. The value of re-exports, however, showed a rise from £3,100,000 to £23,300,000, leaving retained imports at £74,000,000. Compared with one-half of 1938, the value of imports has risen by £138,000,000 this year. Imports of chemicals, etc., amounted to £11,000,000, a fall by £1,000,000 on the year, compared with the 1938 figure of £7,000,000.

The average value index (1938=100) was 186 in the first half of this year, an increase by 4½ per cent. over the figure for the corresponding period of 1944. The same increase has been registered for manufactured goods, with chemicals, drugs, dyes and colours up from 153 to 162. Eliminating changes in average values, the volume figures show that exports in the first six months of this year were 29 per cent. above those of 1944, two-thirds of the rise being due to shipments to liberated Europe. The volume index for the chemical group rose from 82 to 91.

Exports of Chemicals

In the following table a picture is being given of the major changes in the quantities and value of the more important chemicals.

		Quantities			*Value*		
		One-half	*First six months*		*One-half*	*First six months*	
		1938	1944	1945	1938	1944	1945
Ammonium sulphate	*ton*	156,697	47,559	104,735	1,026,575	543,053	1,250,326
Benzol	*gall.*	24,420	19,789,097	12,682,432	2,321	2,136,805	1,359,357
Cresylic acid	,,	980,826	826,210	1,381,450	139,935	208,999	345,363
Tar oil, creosote oil, and other heavy tar oils	,,	18,169,648	233,957	295,452	442,990	14,420	23,783
Copper sulphate	*ton*	15,451	9,233	24,528	255,127	286,445	782,935
Disinfectants, insecticides and weed-killers	*cwt.*	188,752	166,133	182,895	393,056	512,313	607,665
Fertilisers, manufactured ...	*ton*	73,180	131	417	334,716	987	3,619
Glycerine	*cwt.*	52,788	1,089	13,585	196,914	4,506	51,740
Salt	*ton*	166,210	60,160	63,314	321,974	279,046	301,561
Caustic soda	*cwt.*	974,162	1,403,489	1,558,790	520,543	928,945	1,105,359
Zinc oxide	*ton*	7,222	284	2,194	134,131	10,701	72,608
Others	*value*	—	—	—	1,214,763	1,375,140	2,024,695
Total of chemical manufactures and products (other than drugs and dyestuffs) ...	...	—	—	—	6,992,088	8,602,196	10,735,040
Dyes, dyestuffs and tanning extracts	*cwt.*	147,718	74,793	81,715	703,258	1,764,488	1,349,567
TOTAL (all items) ...	*value*	—	—	—	11,139,895	14,030,376	16,443,792

A new mineral discovered in British Guiana is reported by the Imperial Institute to be composed of euxenite, a multiple oxide containing uranium and other elements. Only a small quantity of the mineral, which is in limited demand as a source of uranium, has so far been found and there are doubts that it can be worked economically even if it were found to occur in sufficient quantity. But its presence, in conjunction with the recent discoveries of columbium and titanium, indicates the occurrence of other rare earth minerals, and the region has been noted for investigation as a part of the proposed geological survey for British Guiana. In view of the increased importance of uranium, it seems possible that the economic difficulties may be overcome.

DDT is being manufactured in Spain and marketed under the brand name ZZ (zeta zeta). Production started early in 1945, and the material has appeared in several forms, including powder, liquid spray, lotion, and soap. The powder and the liquid are prepared both for home and large-scale agricultural use. The present capacity of the factory is 150 lb. of the pure ingredient daily, and from 3 to 6 tons of products are manufactured daily. The company expects sales to reach 3,000,000 pesetas during the first year of production, and no appreciable increase in output is possible now because of the shortage of raw materials. DDT is also sold in Spain by a branch of the Swiss Geigy concern, but its output is likewise restricted by the lack of materials.

Cerium Oxide Abrasive

British-Made Material Available

MENTION made in our columns recently (p. 252) of the development, by a Canadian concern, of ceria as an abrasive for polishing optical glass has in some quarters been taken to imply that a similar development had not taken place in this country. This is certainly not so; for an improved cerium oxide powder for high-grade optical glass is produced in England (at Ilford, Essex), under the name "Cerirouge," by Thorium, Ltd., of 10 Princes Street, London, S.W.1, a well-known firm of 30 years' standing specialising in the production of compounds of the rare earth metals, including radioactive elements such as mesothorium and radiothorium.

War-Time Demand

It is true that for many years this country was entirely dependent on overseas supplies of cerium oxide, but war-time demand has stimulated home production, and Cerirouge, which was developed in co-operation with the British Scientific Research Association, is now on the market and readily available, in standard packings of 15-lb. and 1-lb. bottles.

Cerirouge is a buff-coloured powder, the particle size and hardness of which are carefully controlled to render it particularly suitable for use as an optical polishing agent. Apart from the fact that its light colour makes it much cleaner to handle than an iron oxide rouge, it is also cleaner than the latter in the technical sense, *i.e.*, the polished surface produced by it does not require subsequent treatment to remove the "haze" often associated with ordinary rouges.

Speed of Operation

Its outstanding properties are speed of operation and freedom from sleeking. The superior speed is particularly apparent when lenses of deep curvature are being polished, and since the number of such lenses which can be mounted on one block is necessarily small, a reduction in polishing time materially assists in overcoming production difficulties. An operator who has become accustomed to using ordinary rouge must bear in mind this increased speed of working, particularly when a vigorous polishing action is applied, as, for example, when "pulling" a block to the desired figure. In these circumstances, frequent application of the test plate is advised to prevent the block from becoming too deep, until the operator has become familiar with the polishing agent.

The freedom from sleeking is the result of careful control during manufacture, in which the hardness and particle size of the material are closely regulated and impurities are rigorously excluded.

It is extremely important that polishers intended for use with Cerirouge should not be impregnated with an iron oxide before use, otherwise the polishing action may be greatly impaired; but, apart from this precaution, Cerirouge may be used with pitch polishers in exactly the same manner as the iron oxide rouges, although less material is usually required to give a complete polish. When felt polishers are employed, speed of operation should not fall below 2 about 200 ft. per minute.

Sodium Hydride

Some Useful Reactions

RECENT work in the electrochemical laboratory of E.I. du Pont de Nemours & Co. (reported by V. L. Hansley and P. J. Carlisle, *Chem. Eng. News*, 1945, 23, p. 1332) has made the production of sodium hydride on a large scale considerably easier. To bring about a rapid and complete reaction between sodium and hydrogen, a surface-active or dispersing agent for liquid sodium is needed, to cause it to spread over a supporting body of inert material or preformed sodium hydride. Most suitable are sodium derivatives of hydrocarbons such as anthracene, phenanthrene, or fluorene, of which only a trace is needed.

Solutions of sodium hydride in fused caustic soda can be used to reduce metal salts to metals, the hydride being oxidised to caustic soda. Lead and copper oxides can be so reduced at temperatures over 290° C., and titanium tetrachloride at 400° C. It is reported by Hugel and Egloff that NaH will act as a catalyst in the reduction of aromatic hydrocarbons, and the catalyst is not immediately "poisoned" by sulphur, so that the hydrocarbons can be hydrogenated and desulphurised in one operation. Other miscellaneous catalytic effects are recorded in the article quoted.

Sodium hydride should not be exposed to the atmosphere for long periods, since after a small amount of sodium hydroxide is formed, the mixture becomes exceedingly hygroscopic. Also, after contact with the air for a minute or two, the hydride may ignite. It does not burn violently, however, and, on the laboratory scale, can be extinguished by excluding air. In the presence of low-flash-point liquids or vapours the hydride should be measured out at a distance, and the two materials brought together in an inert medium, or blanketed by an inert gas. Unused sodium hydride should be disposed of by burning it to sodium hydroxide in a shallow iron vessel in a fume cupboard.

Uranium

Some Characteristics and Sources

(from a Special Correspondent)

THE emergence of the atomic bomb has once again focussed public attention on uranium and will undoubtedly stimulate the search for this metal which is potentially the greatest source of energy so far known to science. Many laboratories are now working on uranium as a source of power.

Uranium occurs as uranium oxide, U_3O_8, in pitchblende; as potassium uranyl orthovanadate, $K.UO_2(VO_4).3H_2O$, in carnotite; as calcium uranyl phosphate in autunite $Ca(UO_2)_2(PO_4)_2.8H_2O$; and in at least 100 other minerals. These ores were hitherto interesting mainly because uranium was the element of the highest-known atomic weight, and the parent substance of a large number of radioactive elements.

Klaproth's Discovery

Uranium was first discovered in Germany, where it occurs in the black mineral known as pitchblende. A metal was known to be present in this substance, but it was believed to be tungsten until, in 1789, W. H. Klaproth proved conslusively that it was an unknown element, to which he gave the name "uranium," naming it after the planet Uranus which had just been discovered in the heavens and had caused much excitement in the astronomic world. There were friendly suggestions that it should be called "klaprothium," after its discoverer, but uranium it was called and so it has been ever since.

Until Mendeléeff formulated his periodic table, uranium was thought to have the atomic weight of 120 ($O = 16$). There was no place for such an element, and Mendeléeff suggested the value 240 and the placing of the element with chromium, molybdenum and tungsten, to which elements it was chemically similar. The correctness of this value was confirmed by Dulong and Petit's law, and by the determination of the vapour densities of some of its halides. The most accurate determination, carried out by converting uranous bromide into silver bromide, gave the ratio $UBr_4 : 4AgBr$, from which $U = 238.19$. The value of 238.15 is now accepted, and it is interesting as being the highest atomic weight and also as being the atomic weight of a parent radio-element.

The phenomenon known by the name of radioactivity is exhibited by certain elements of high atomic weight and by their compounds. Of these elements, uranium and thorium have been known for many years, but since they exhibit but feeble radioactive properties these remained undetected until the close of the 19th century (1896), when Becquerel discovered that uranium compounds emitted rays which affected a photographic plate. A systematic examination of uranium and thorium minerals soon led to the discovery of numerous radio-elements present in extremely small quantities, but manifesting very great activity. Notable among these was the element radium, separated from pitchblende by Mme. Curie. Until shortly before the outbreak of war, therefore, little interest was taken in uranium, the sole desire being to increase the available supplies of radium, but the new use of uranium for the release of atomic energy has brought this metal and the search for its ores into the limelight again.

Uranium has also been used in making steel alloys with properties similar to those of tungsten steel, the scope for such alloys being limited by their cost; and it has been alloyed with aluminium. Among its most common applications is in giving yellow and brown tints to glass and to pottery glazes. It is also used in manufacturing iridescent glass and as a mordant in dyeing silk and wool. Certain uranium compounds are used in chemistry, photography, and medicine.

Chemically-pure uranium is difficult to prepare, but recently metal of 98 per cent. purity has been made in the form of a powder by the hydride process. It is also made by heating a mixture of the oxide U_3O_8 with aluminium, or, in a purer condition, by the action of sodium on uranous chloride in a steel bomb.

Pitchblende Occurrences

Among the most important uranium ores, uranite, or pitchblende, occurs massive in metalliferous veins in Canada and the Belgian Congo, at Jachimov in Czechoslovakia, and Johanngeorgenstadt in Saxony. Carnotite occurs mainly as a canary-yellow impregnation in sandstone in Western Colorado and Eastern Utah. Autunite, which has been reported in South Dakota, Utah and Nevada, may have commercial significance as a source of uranium, but has a comparatively low radium content.

As until recently it was the extraction of radium which was the primary purpose for which the pitchblende ores were mined, the uranium salts obtained after treatment of these ores were really by-products of radium extraction. The ore, having been roasted, is mixed with sodium carbonate (sometimes sodium sulphate) or a mixture of sodium carbonate and nitrate, and the mixture fused in the reverberatory furnace. As a result, certain salts, such as sodium uranate, sodium vanadate, sodium arsenate, sodium molybdate, etc., are created. When the fused mixture is cold, it is washed with hot water which dissolves out the uranium salts. This extract is treated with an excess of sodium carbonate which serves to precipitate out certain metallic carbonates, leaving behind in solution uranyl carbonate. This solution is then boiled after neutralisation with dilute sulphure acid and, after evaporation, a heavy yellow precipitate known as sodium diuranate ($Na_2U_2O_7.6H_2O$) is obtained. This is the basis for the isolation of the uranium itself.

In obtaining uranium from carnotite, the powdered ore is fused with potassium hydrosulphate and the fused mass when cold is washed with water. Crystallisation of the resulting solution produces double sulphates of vanadium and uranium which, after reduction by zinc and sulphuric acid, leave a solution to which ammonia and ammonium carbonate are added. These precipitate out the vanadium, and the solution left after being boiled precipitates out ammonium diuranate.

For both minerals there are, of course, alternative methods, but those mentioned are the most usually employed. Similarly, there are various methods of treating the uranium oxides produced in order to isolate uranium metal. Electrolysis has been employed and so has reduction of the oxide by powdered aluminium in the thermite process. A typical method employed is that of J. F. Goggin, who reduced uranium chloride with a 10 per cent. excess of metallic calcium. The work was performed in an alundum crucible set with a nichrome-wound reduction bomb, which was itself inserted in a steel cylinder from which the air had been exhausted. This gave a very pure product.

Physical Characteristics

Uranium itself, when extremely pure, is a silvery metal, having a slightly bluish tinge. If in powdered form it is grey-black in colour. Its specific gravity appears to be in the region of 18.33 to 18.4. It is soft enough to be easily abraded with a file, does not scratch glass and, if it has absorbed a little carbon from the crucible, is capable of being tempered. It is ductile and malleable. Its melting point is uncertain, being given at 1600° by one authority and 1850° by another. Its electric resistance is approximately 62.0×10^{-6} ohms at 180° C. When iron is not alloyed with it, it is non-magnetic, though later investigators claim that it is possibly a little paramagnetic.

Chemically, uranium possesses a great affinity for nitrogen and readily forms a nitride. It is stable at ordinary temperature in dry air. It is slowly oxidised when left unprotected by the ordinary atmosphere. Its specific heat is 0.02765. When heated in air in powdered form, it ignites at about 150-170° C. and flares up fiercely to form U_3O_8. It is attacked by numerous acids with varying speeds.

The Canadian Deposits

The Eldorado Gold Mines, Ltd., of Canada and the Union Minière du Haut Katanga of the Belgian Congo are at present the largest producers of uranium and have an agreement in force for meeting the demands of world's market on an equal basis. The Eldorado Mine in the Great Bear Lake district controls probably the richest and largest deposits of pitchblende, which were discovered in 1930, the ore being of so high a grade that in winter it is brought out of the district by aeroplane. This discovery of pitchblende by Gilbert LaBine at a point north-west of Echo Bay, Great Bear Lake, was one of the most romantic events in mineral exploration. Considering the remoteness of the region, its severe climate, and the many handicaps which hamper mining operations there, the establishment of a modern plant capable of handling 100 tons of ore a day and permanently employing more than 100 men, is a remarkable achievement. The deposits of La Bine Point are about 40 miles south of the Arctic Circle.

The pitchblende is found in three almost parallel zones of complex character in altered pre-Cambrian rocks associated with granite, which possibly is the source of the mineral. A processing plant was built at Port Hope, Ontario, which is 3000 miles from the mine, and treatment started on a 17-ton shipment of hand-picked pitchblende in 1931. In 1940 Eldorado Gold Mines ceased operation at its properties at Great Bear Lake and a month later discontinued its operation of the property at Contact Lake, owned by Bear Exploration and Radio, Ltd., a statement being published to the effect that concentrates were available in sufficient amount to carry the refinery at full capacity through 1941. Towards the end of 1941, however, it was announced that in spite of large stores of pitchblende, the mine at La Bine Point would reopen as the result of increased demand for radium and uranium; five large research institutes were then working on the atomic disintegration of uranium. The Port Hope refinery, with an annual capacity of 108 gm. of radium and 8000-10,000 tons of uranium compounds, was again placed in full operation.

Uranium ores containing a high percentage of radium occur at Shinkolobwe in the Belgian Congo, where the ores are oxidised uranium minerals with some pitchblende and uranitite. Katanga uranium ores are normally treated in Oolen in Belgium, output varying with world requirements. While

Canada and the Congo between them are capable of satisfying the total world demand, uranium ores are also produced in the United States, Czechoslovakia and Germany. America's leading producer is the U.S. Vanadium Corporation at Uravan, Colorado, where a new modern plant was built in 1940 to recover uranium from tailings from the vanadium plant, the total capacity being 50 tons a day. Both uranium and radium are also by-products of the Union Carbide and Carbon Corporation.

The Jachimov (Joachimsthal) mines of Czechoslovakia are estimated to contain over 300 gm. of radium still unmined, and at present are producing from 180 to 190 tons of pitchblende annually, yielding about 5 gm. of radium. No statistics are available on their uranium production.

In 1941 it was announced that deposits in the south-eastern parts of the province of Närke, Sweden, had been found to have a high uranium content and would become one of the world's principal sources of radium and uranium. Among other countries where uranium ores are found are Australia, South Africa, Madagascar, Portugal and the U.S.S.R. The only authentic occurrence of pitchblende in the Union of South Africa is in the Gordonia district. Uranium ores occur in many parts of the Union, but cannot be considered of economic value.

Empire Uranium

Search and research concerning uranium is going on intensively. Great Britain's contribution to the supply of pitchblende has always been small, though it was from the South Terras pitchblende mine, between St. Austell and Truro, Cornwall, that Dr. Pochin, a French chemist, gained the experience that enabled him to become head of the great refinery at Port Hope. More news of Empire uranium comes from Australia. At Mount Painter and Radium Hill, in the wilds of South Australia, is one of the few deposits, and the latest report is that the ore can be mined, but the uranium is difficult to extract. In British Guiana uranium ores have been found and Imperial Institute geologists are at present investigating them. The discovery was made in the bed of the river Marmiswau, a tributary of the Rupununi River, in Kanaku Mountains.

Increasing production and greater competition brought the price of radium down from a peak of $135 per mgm. during the first world war to under $20 in 1930. In 1941 radium was quoted at $25-30 per mgm., yellow uranium oxide at $1.65 per lb. and black uranium oxide at $2.55 per lb. These prices may be compared with the present prices per lb. of other so-called "Minor Metals," *e.g.*, tellurium, $1.75; titanium, $6.50-$7.00; tungsten (99.5 per cent.), $3.50-$4.00; molybdenum powder, $2.60-$3.00; zirconium powder, $7.00.

Oil from Shale

Research in the U.S.A.

AFTER several years' intensive experiments, Socony-Vacuum Oil Co. scientists have worked out a new method of extracting petroleum from shale.

The new process, which has been placed at the disposal of the U.S. Bureau of Mines, does not claim to compete in cost with the extraction of crude natural oil, but it makes an extra supply—some 90,000 million barrels of petroleum—available in case of emergency. It is estimated that the mining and crushing of oil-containing shale (principally found in Colorado, Utah, and Wyoming) will cost an average of $2.20 a ton. This, coupled with added costs of transport, refining, and other incidental expenses, would result in a total of $3.75 to $4 a barrel, or approximately four times the current cost of producing natural petroleum.

During the experiments Socony technicians extracted between 17 and 40 gallons of oil from each ton of shale, the highest yield being 15 per cent. by weight. The new method employs a retort—a long vertical container—nearly 67 ft. high. The shale is preheated at 260°C. by the counter-current flow of hot gases which sweep the vaporised oil from the retort.

Compared with conventional retorting methods, where the shale is heated in individual batches by external firing of metal or refractory vessels, the new method not only avoids agglomeration of the solid material in the retort, but it provides a continuous flow and offers possibilities for reduced retort construction and maintenance.

The principle of the retorting procedure consists of passing the crushed raw shale through a tower counter-current to a stream of heating gases, raising the temperature of the preheated shale to about 530°C. Once the shale is fed to the top of the retort through a suitable feed leg, it flows by gravity.

The heating gases are fed into the lowest part of the retorting zone. Oil vapours and escaping gases during the process are taken off at the top and the oil is recovered in a series of condensers. Low pressure steam is introduced just above the spent shale to cool it and recover heat for retorting. The crude shale from the retorting process is described as waxy, highly unsaturated and high in sulphur and nitrogen.

In the actual process of fuel extraction about 60 per cent. of the oil is recovered in a hot condenser at a temperature of about 150°C., and the remaining 40 per cent. is obtained as an emulsion with a condensed stream to a water-cooled condenser at about 18°C. The emulsion is broken relatively easily in a centrifuge to obtain water-free oil.

Montecatini To-day

Notes on the Growth and Post-War Prospects of the Group

From our Rome Correspondent

THE Montecatini concern, founded in 1888 to exploit a small copper mine at Montecatini in Val di Cecina, is to-day the largest industrial chemical group in Italy, employing thousands. To recount the history of the development of Montecatini, even in summary form, would be too much a matter of ancient history; it would not be out of place, however, to indicate its development throughout the years in order the better to explain how the Montecatini group has become, to-day, an assembly of closely linked interests whose origin is due to industrial needs and not merely to the desire to amalgamate companies.

The foundation of the group, as has already been indicated, was due to mineral production. To the original mine there was united in 1910 the copper mine of Fenice e Capanna, and about the same time the exploitation of the pyrites deposits of Boccheggiano was begun. In that year the engineer Guido Donegani was nominated managing director of Montecatini; his first project was to affiliate the company with the Italian National Union of Pyrites Mines. He was active in furthering the extraction of this mineral, attacking the competition of Spanish pyrites production with results which cannot better be illustrated than by the two following figures: in 1910 pyrites production from the Italian mines of the Maremma amounted to 110,000 metric tons, whereas in 1940 the figure exceeded the million. Not unnaturally the company's interest in the Maremma mines led them to give attention also to the lignite deposits in the same district which in 1942 were producing a monthly output of 22,500 tons. Pyrites development led the company also to concern itself with the production of sulphur, notably from the sulphur deposits in the Romagna.

Also in the field of minerals the Montecatini group became concerned with the production of lead and zinc in Sardinia, where in 1943 it took over the Soc. Montevecchio and the Fonderia di San Gavino which it reorganised and modernised. In 1941, 30,000 tons of blende and 28,000 tons of galena were extracted from these mines, the material being largely worked in the foundries of San Gavino and Porto Marghera. In the former 20,000 tons of refined lead were produced in 1941, and 12,560 kg. of silver, the Sardinian galena having a high silver content. Recently, production here suffered severe restrictions owing to transport difficulties. In Sardinia also, Montecatini exploited barytes deposits, while in Apulia bauxite was extracted from the mines of San Giovanni Rotondo to the quantity of 200,000 tons per annum. To-day, all these mines are theoretically in a productive state, and all that is required for them to resume full activity is the necessary hydro-electric power, which, in fact, is being provided in increasing quantities as time goes on.

TABLE 1.—SUPERPHOSPHATE PRODUCTION

The condition of the Montecatini plants in April, 1945, is shown in the following table, on which is indicated also the actual production during the month of April.

Site of Works	*Damage* %	*Present Condition*	*Production April, 1945* ('000 kg.)
Assisi[2]	40	Immediate reopening not expected	—
Bagnoli[2]	20	Copper sulphate in production; Superphosphate from July	—
Barletta[2]	—	Working	18.000
Bicocca[2]	21	Working	15.000
Brindisi[3]	5	Working	—
Cagliari S. Gilla[2]	—	Working	15.000
Campello Clitunno[3]	60	Immediate reopening not expected	—
Campofranco[2]	—	Working	20.000
Castelfiorentino	70	Immediate reopening not expected	—
Civitavecchia	90	Immediate reopening not expected	—
Crotone[1]	30	Working	2.000
Licata	70	Working from July	—
Livorno[1]	90	Immediate reopening not expected	—
Milazzo	40	Repaired and now working	14.000
Montemarciano[1]	80	Probably not to be reopened	—
Orbetello	30	Working from July	—
Piano d'Orta	90	Immediate reopening not expected	—
Pontecagnano[3]	10	Working	—
Portici[2]	10	Working	14.000
Porto Recanati[3]	55	40 per cent. production from July	—
Rifredi[2]	60	Rebuilding being planned	—
Roma Tuscolana	5	Rebuilt and working	—
Taranto[1]	5	Working	—
Tommaso Natale	—	Working	25.000

Production in subsequent months is likely to increase progressively up to a figure of 347,000,000 kg. in December, 1945, if the necessary materials for reconstruction come to hand in time, and if it is found possible to obtain the requisite electric power.

[1] Requisitioned. [2] Partially requisitioned. [3] Recently derequisitioned.

The transition from the mining industry to the chemical industry appears perfectly logical and simple, since pyrites is a principal raw material for the production of sulphuric acid, while sulphuric acid itself is the key product for an infinite number of other processes, among which—a matter of the greatest importance for Italy—is the production of the superphosphates necessary to agriculture.

Table 2.

Works	*Products*	*Date of Reopening*	*Monthly Capacity* ('000 kg.)
S. Gilla (Cagliari)	Superphosphate and sulphuric acid	20/3/45	25,000
Campofranco	Superphosphate	10/7/44	20,000
	Sodium fluosilicate	—	—
Tommaso Natale	Superphosphate	4/11/44	25,000
	Sodium fluosilicate	—	—
Milazzo	Superphosphate	14/1/45	12,000
	Sulphuric acid 66° Be	14/1/45	1,700
Bicocca (Catania)	Superphosphate	1/3/45	16,000
Licata	Superphosphate	8/45	21,000
Taranto	Superphosphate	—	17,000
Brindisi	Superphosphate	Requisitioned	31,000
	Copper sulphate	5/45	50,000*
Barletta	Superphosphate	18/2/45	32,000
	Battery acid	—	—
Barletta T. ...	Tartaric acid	Partly requisitioned	2,000
Pontecagnano	Superphosphate	Partly requisitioned	12,000
Portici	Superphosphate	—	19,000
	Sulphuric acid 66° Bé	3/7/44	2,100
	Battery acid	—	—
	Muriatic acid	—	1,600
	Sodium sulphate	—	1,200
	Potassium alum	Autumn/45	1,500
	Aluminium sulphate	—	1,500
Bagnoli	Superhosphate	5/45	26,000
	Copper sulphate	5/2/45	100,000*
Roma Tuscolana	Superphosphate	1/5/45	16,000
	Aluminium sulphate	6/45	750
	Sulphur ...	23/4/45	3,000
Orbetello	Superphosphate	1/5/45	27,000
Rieti ...	Oleum	Requisitioned	12,500
Porto Recanati	Superphosphate	Requisitioned	36,000
Castelfiorentino	Superphosphate	Projected	—
	Magnesium sulphate	8/45	3,000
Rifredi	Superphosphate	Projected	—
	Muriatic acid	5/45	3,300
	Anhydrous sodium sulphate	5/45	2,600

* Annual capacity.

Superphosphate production, which started in 1919, developed to such an extent that at the outbreak of the present war the annual figure of 2,100,000,000 kg. had been reached. The war, of course, in its destructive passage has had a most detrimental effect on this branch of production, and in view of the importance of the product to the welfare of the country, Montecatini has made every possible effort to bring its superphosphate plants back into full activity, to such an extent that in April, 1945, a monthly output of 12,000,000 kg. had been attained in the part of Italy which had then been liberated —about a quarter of normal production (*see* Table 1). With the fertiliser industry it was natural to combine the development of the manufacture of fungicides, in particular copper sulphate. On this last material and on its possible substitutes a great deal of research has been done in latter years in Italy, both in State establishments and in private industrial research stations, including that of Montecatini at Novara.

The branch of the chemical industry, however, in which the technical organisation of Montecatini has made its greatest mark is in that of nitrogen products. In 1921 a pilot plant for the production of ammonia by the Fauser process was established. In 1923 Montecatini's production of ammonia was 15 kg. a day and since then enormous strides have been made, with the construction of the vast plants at Sinigo, Crotone, Coghinas, Bussi, and—the largest of all—at San Giuseppe di Cairo (*see* The Chemical Age, 1939, *40*, 177). These important nitrogen plants have served not only for the output of their own product but also as a basis on which to build plants for new applications and new products. There may be mentioned, for example, the recently installed works at Merano for the production of methyl alcohol, that at Crotone for potassium nitrate, and others for disodium and trisodium phosphate and caustic potash, and also a plant at Novara (the seat of the Montecatini Research Institute) for the manufacture of urea.

In 1922 Montecatini undertoook the production of calcium carbide, cyanamide, and calcium cyanamide, new factories being built in various parts of Italy together with the power stations necessary for providing the requisite electric energy. In this way Montecatini became interested in the production of hydroelectric and thermoelectric energy, one of its most important installations being that of Il Toce. The production of carbide led naturally to acetylene and then to the manufacture of acetic acid, acetic anhydride and acetone. Plant for the production of hydrochloric and nitric acid and their derivatives, for sodium and chlorine, silicates, cryolite, zinc and magnesium fluosilicates, ammonium sulphate, arsenicals, carbon disulphide, methyl alcohol, formaldehyde, and so on.

It will thus be easy to see how it came about that the Montecatini group extended its activities to the manufacture of plastic materials, including rubber substitutes, of dyes and pigments, adhesives and gelatine, pharmaceuticals, rayon and nylon, and eventually to the production of aluminium which in the two establishments at Mori and Bolzano reached a capacity of 30,000 tons per annum.

To conclude this note it is interesting to examine Table 2, which indicates the stage which the reconstruction of the various Montecatini establishments had reached in those parts of Italy which were liberated before the final offensive.

Films in Science

Successful Conference in Yorkshire

SUCCESS attended the week-end "Film in Science" Conference, at the Technical College, Huddersfield, organised by the Scientific Film Association, on August 31-September 2. Mr. Geoffrey Bell, deputising for Mr. Arthur Elton, president of the Association, who was abroad, said that the conference gave an opportunity for many different users of scientic films to state their needs and problems. The S.F.A. could bring to a focus the growing scientific culture partly represented by Scientific Film Societies all over the country.

Miss Dorothy Grayson, B.Sc. (Educational Representative of the British Film Institute), speaking on "The Science Film in Education," said that one of the duties of science was to protect people from making blind assumptions. Films should fall into three categories: those which dealt with established sciences; those presenting the facts as known, with some attempt to derive conclusions from them; and those which gave education in doctrines and values. Mr. W. F. Andrews, M.Sc., B.Sc., A.R.I.C. head of the Department of Chemistry, Physics and Biology, Doncaster Technical College, speaking on "Scientific Film Needs in Technical Training," said there was need for three types of film covering the requirements of primary, secondary and advanced technical training. Mr. H. Richmond, B.Sc., head of the Mining Department, Doncaster Technical College, described the "Film Strip in Technical Training," emphasising its value for revision purposes On the Saturday afternoon the "Film as an Instrument of Scientific Research" was described and demonstrated by Mr. Derek Stewart, Kodak Research Laboratories, and in the evening Mr. Basil Wright, producer at Crown Film Unit, talked on "Film Production."

In an illustrated lecture on Sunday, Dr. W. T. Astbury, F.R.S., director of the Textile Physics Laboratory, Leeds University, speaking on "X-Ray Adventures among the Proteins and other Molecular Giants," gave a lucid account of this field of molecular physics, garnished with a pleasant wit. This and his working models of various protein and fibre molecules brought the audience fully round to Dr. Astbury's conviction that the quest for ultimate knowledge was a dramatic and exciting adventure. This, he emphasised, was a point of view which the scientific film should put over. The mere imparting of knowledge was not enough.

During the conference delegates inspected an exhibition of projectors and visual-aid equipment; and the scientific film review, broadcast by the B.B.C. in the Sunday evening Science Magazine interested many. The conference ended with a long programme of scientific films.

TREATMENT OF CHROMITE

The effect of variables in the chemical beneficiation of chromite ores has been the subject of investigations by the U.S. Bureau of Mines. Experiments were carried out to test certain phases of the selective reducing and leaching process for the enrichment of low-grade chromite ores. They can be roasted with carbon to obtain selective reduction of the contained iron and the reduced iron can then be removed by acid leaching of the roasted products to produce residues with higher chromium. Thus, some chromite ores or concentrates that originally contained too much iron to be acceptable for the production of ferrochrome can, by this treatment, be rendered marketable as "high-grade" chromite, which, as specified by the Metals Reserve Co., of Washington, must have a minimum Cr : Fe ratio of 2.5 and Cr_2O_3 content not less than 45 per cent.

FATTY ACIDS IN LIQUID ROSIN

The occurrence of palmitic acid in liquid rosin has been established by previous tests. Recent investigation by the Swedish Chemical Society (*Svensk Papperstidning*, 1945, *12*, p. 302), shows that a higher fatty acid is also present, of the approximate formula $C_{24}H_{48}O_2$. Very likely this is carnaubic acid, to judge from the melting point of the acid (72.5°C.), and that of its ethyl ester (50°C.). Further particulars are awaited, this acid not having so far been known as a constituent of liquid rosin.

Sulphuric Acid during the War

Statistics of British Production and Consumption

STATISTICS relating to the production of sulphuric acid in the United Kingdom and Eire from January, 1940, to June, 1945, inclusive, have now been published by the National Sulphuric Acid Association, Ltd. The figures are based on data supplied by and issued with the permission of the Ministry of Supply (Sulphuric Acid Control).

Total plant capacity during the period under review varied from 1,495,000 tons of 100 per cent. H_2SO_4 in 1940, to 1,769,000 tons in 1944. For the first half of 1945 the corresponding figure was 867,000 tons. The peak was reached in 1943, when the total attained the figure of 1,789,000 tons. It should be noted that the estimation of plant capacity takes into account not only structural factors but also the type of raw material in use and the condition of repair of plants. A subdivision of the capacity is made under the heads of "trade" plants and Government plants; and an interesting feature is the steady and rapid increase in the latter. From a plant capacity which remained constant at 9,000 tons from 1930-1939, the Government figure rose to 23,000 tons in 1940, 51,000 tons in 1941, 130,000 tons in 1942, 187,000 tons in 1943, and 194,000 tons in 1944, all the plants concerned being of the Contact type and, with a few exceptions early in the war, burning sulphur only. From an analysis of the figures it will be seen that the trade plants oscillated around an average of 1½ million tons. The latest figures (January-June, 1945) are: Trade 772,000, Government 95,000 tons.

Contact Plants Increase

When these plants are sub-divided into Chamber plants and Contact plants, it is seen that the proportion of Contact plants increased steadily throughout the war years. Taking U.K. plants only, the percentage in rate of capacity in 1939 was 66 per cent. for Chamber plants, 34 per cent. for Contact plants. The percentage of Chamber plants decreased steadily to 50, while that for Contact plants has risen to the same figure, and in 1945, for the first time, the rate of capacity of Contact plants (843,600 tons 100 per cent. acid per annum) exceeds that of the Chamber plants (837,400). The majority of the Contact plants are congregated in the West, from Lancashire to South Wales, though they are predominant also in the North of England. In Northern Ireland there are no Contact plants, and presumably this applies also to Eire, though the fact is not specifically stated.

The peak of actual production was reached in 1940, with a total tonnage of 1,234,400, to attain which figure about 84 per cent. of the total capacity was worked. Since the beginning of 1942, approximately 78 per cent. of capacity has been worked, with an annual tonnage of slightly over 1,200,000 in each year; the first half of 1945 maintains this average. The tonnage produced in Chamber plants has fallen from 771,200 in 1940 to 674,400 in 1944, whereas in Contact plants it has risen from 464,200 in 1940 to 546,900 in 1944.

Detailed tables give the quarterly production of sulphuric acid and oleum during the period, and a graph shows the rate per day during each month for 1943-1945. The average daily production varied slightly from 3425 tons in 1943 to 3468 in 1944 and 3464 in 1945. An analytical table gives details of the consumption of sulphuric acid and oleum in trade use in the United Kingdom. Although there was a sharp upward tendency under the head of explosives, reaching a peak of 137,423 tons in 1942, it is interesting to note that superphosphates provided by far the largest trade use, reaching a maximum of 355,412 tons of 100 per cent. acid in 1942. The peak for sulphate of ammonia—247,588 tons—was reached in 1943. Over 40 classified uses are listed.

Raw Materials Used

A final table gives the details of the consumption of raw materials. These are divided under the heads of pyrites (including converted anhydrite), sulphur, spent oxide, and zinc concentrates. The great increase in the amount of sulphur imported for Government Contact plants is noticeable from the end of 1940; and the amount was maintained at a high level up to the second quarter of 1945. The importation of pyrites for Government plants ceased after the middle of 1943.

It should be noted that, generally speaking, "Government" plants include R.O.F.s, Agency Factories and other Government-financed plants.

Drilling operations are reported to have established the presence of haematite at a depth of 40 ft. a few miles from Boskop on the main Johannesburg-Kimberley railway line, where prospecting has been going on for the past seven or eight months. Although this deposit does not compare in quality with those at Thabazimbi and Pretoria, it is rich in silicates and is expected to have a number of commercial applications.

Radioactive Gauge

Thickness Test without Penetration

GAMMA rays from 1 mg. of radium are employed in a new device (illustrated in *Chem. Ind.*, 1945, 57, 253) to provide inspection data on pipe-lines, vessels, and their contents without disturbing the material being inspected. Called the Penetron, and developed by the Texaco Development Corporation, the device is capable of measuring the thickness of a wall or locating the liquid level in a vessel without access to the other side of the wall or the interior of the vessel. The instrument weighs about 40 lb. and is operable by one man. It is sold and manufactured by Engineering Laboratories, Inc., Tulsa, Oklahoma. The Penetron need only be placed in a position outside the wall to make any of the measurements cited.

In operation the radioactive source is placed next to the wall of the vessel so that the gamma rays penetrate the wall. Part of these rays are scattered in all directions by the wall material, some being reflected back to the Penetron. The intensity of this " back-scattered radiation " is in proportion to the thickness of the wall.

The radiation picked up by the detector is converted into direct current and measured by an indicating microammeter, the reading of which is converted into wall thickness by means of calibration curves. The calibration curves for a wall of a given composition will vary according to the shape of the wall being measured and, if a curved surface, on whether the measurements are made from the outside or from the inside. The curves are not affected by small changes in the chemical composition of the wall.

With any electronic equipment, failures of tubes, condensers, or other parts of the circuit have to be expected. In order to detect such failures the overall performance of the instrument can be checked by measuring the thickness of a set of concentric half-round steel shells against a calibration curve. The accuracy of the Penetron has been established as ±3 per cent. It should be noted, however, that it measures the average thickness over an area of about 1 sq. in., and thus cannot be used for the detection of pin-holes or pin-hole corrosion.

Liquid-Level Determination

For liquid-level determination the head of the Penetron is placed on the wall of the vessel above the level of the liquid. In this area the back-scattered radiation will be due to the wall of the vessel and, as the head is moved down the wall, the reading remains constant until it reaches a point opposite the level of the liquid, where an increase in radiation indicates the presence of the liquid.

The interface between two fluids of different densities can be located in a similar manner. Fluid densities may also be determined, and by proper instrumentation the Penetron may be adapted to control purposes, and a continuous record of the location of the levels may be obtained by employing a recording device.

Quantitative Spectrochemical Analysis

Application of Polaroid in Russia

A METHOD of quantitative analysis which makes use of two discs of polaroid and a pocket spectroscope has been described recently by Borovik[1] of the Soviet Institute of Geological Sciences, Moscow. It may be used for the determination of all elements which give sufficiently clear lines in the visual province of the spectrum. To illustrate the principle of the method, the determination of lithium is described below.

In front of the slit of a pocket spectroscope of the type which is furnished with an additional side prism, one of a pair of polaroid discs is firmly fixed so that it cannot move in relation to the instrument. The other polaroid disc is placed between the ocular opening of the spectroscope and the eyes of the observer. This second polaroid is fitted with an arrangement for rotating it and a scale for reading the angle through which it is turned. The sample under test may be introduced either into the flame of an arc or spark or into an acetylene burner of the Lundegårdh type, and this light source is placed in front of the fixed polaroid. An ordinary spirit lamp serves as the standard source of light, the spirit containing a small quantity of lithium chloride in solution. This source of light is placed at the side so that its light passes through the reflecting prism on to the slit of the spectroscope. There will thus be seen in the field of view two spectra, one above the other, and by turning the ocular polaroid it is possible to strike the position where the brightness of the lithium line in the spectrum of the sample under test is equivalent to that in the spectrum of the standard source. The reading on the scale is a quantitative characteristic of the brightness of the sample line. In the same way readings are obtained of two standard mixtures containing lithium in concentrations respectively higher and lower than that of the sample under test. It is then merely necessary to carry out a simple calculation, in accordance with Malus's law, to obtain a quantitative result for the lithium content of the sample.

[1] S. A. Borovik, *Trans.* of the All-Union Conference on Analytical Chemistry, 1943, 2, 226 (in Russian).

U.S. Mineral Industry Surveys

Bauxite and Fullers' Earth

BAUXITE production in the United States dropped sharply in 1944 as a result of the accumulation of excessively large stocks and of decreased demand, reports the Bureau of Mines. Output of crude bauxite in 1944 totalled 3,721,135 short tons (3,162,571 tons, dried basis), compared with 8,156,551 tons (6,980,829 tons, dried basis) mined in 1943, a drop of 54 per cent. The 1944 output was valued at $14,402,497, compared with $30,659,900 in 1943. Shipments of crude bauxite from mines to processing plants, consuming plants, and Government stocks in 1944 totalled 3,676,498 tons (3,124,605 tons, dried basis) a decrease of 53 per cent. from 1943. The following table shows production of crude bauxite in the United States for the years 1940-44 (in short tons).

TABLE 1.

Total United States :—	*Amount*	*Value* ($)
1940	571,057	1,754,000
1941	1,215,250	4,675,500
1942	3,381,207	12,981,400
1943	8,156,551	30,659,900
1944	3,721,135	14,402,497

The quantity of ore treated in processing plants decreased by 45 per cent. in 1944, and totalled 1,577,346 tons of crude bauxite compared with a peak figure of 2,852,471 tons in 1943. Total recovery of dried, activated, and calcined bauxite was 1,251,128 tons, a drop of 50 per cent. from the 2,518,338 tons recovered in 1943.

During 1944 shipments of crude bauxite and processed bauxite from mines and processing plants to consuming industries totalled 3,022,139 short tons (dried equivalent) Of this quantity, 2,615,354 tons were shipped to the alumina industry, including 1,492,594 tons shipped to the Metals Reserve Company stocks. Total shipments decreased by 55 per cent. from those in 1943 (6,661,583 tons).

Main Consumers

Domestic consumption of bauxite totalled 3,874,923 short tons (dried equivalent) in 1944, compared with 5,332,151 tons in 1943, a decrease of 27 per cent. (These consumption figures include calcined bauxite shipped to American-owned abrasive plants in Canada for the manufacture of crude abrasives, which are returned to the United States for final manufacture and consumption.) Consumption of bauxite by industry was as follows: alumina, 3,397,,971 tons or 87.7 per cent., chemicals 150,274 tons or 3.9 per cent., abrasives and refractories, 292,052 tons or 7.5 per cent., and cement, oil-refining, and steel and ferro-alloys 34,636 tons or 0.9 per cent. Of the bauxite consumed 22 per cent. was imported and 78 per cent. domestic ore. The alumina industry used 94 per cent. of all imported bauxite consumed during 1944.

Imports of bauxite in 1944 decreased by 64 per cent. from 1943, dropping to 627,716 short tons, the lowest since 1939. Exports also decreased from a war-time high of 592,300 short tons in 1943, to 236,154 short tons last year, owing to cessation of shipments of aluminium-grade bauxite to Canada. World production of bauxite is estimated to have decreased from 14,602,600 tons in 1943 to 7,664,400 in 1944, or by 48 per cent. The bulk of the decline is accounted for by the large decline of production in the Western Hemisphere—approximately 5,500,000 tons less than in 1943. It is estimated that the United Nations accounted for 72 per cent. of the 1944 output.

Fullers' Earth Recovery

According to the same source, a rapid recovery in the production of fullers' earth is under way. Owing to heavy competition from activated earths and synthetic substitutes, fullers' earth steadily lost ground after 1930. By 1940, output had declined to 146,566 tons, but by 1944 it had risen to more than double that figure. War-time demands for petroleum products, shortages of competitive materials, and new absorbent uses have all contributed to the recovery.

Producers reported that in 1944, 61 per cent. was consumed in mineral oil refining, 8 per cent. for vegetable oil processing, and 31 per cent. for various applications such as in rotary drilling mud, in foundries, as an absorbent of grease on floors, and for filtering and clarifying. Although the Georgia-Florida district produced 44 per cent. of the total tonnage, Texas, with 38 per cent., had the largest output of any individual State. The average value rose from $10.77 per ton in 1943 to $11.9 in 1944.

TABLE 2. RECOVERY OF PROCESSED BAUXITE IN THE UNITED STATES, 1940-44, IN SHORT TONS

Year	*Crude ore treated*	*Processed bauxite recovered* — *Dried*	*Activated, calcined, or sintered*	*Total*	*Dried bauxite equivalent*
1940	505,172	305,324	27,199	332,433	355,968
1941	1,033,414	631,575	162,971	794,546	890,303
1942	1,942,933	1,358,520	185,985	1,544,505	1,633,379
1943	2,852,571	2,132,848	384,490	2,518,338	2,690,690
1944	1,577,346	1,080,367	170,761	1,251,128	1,331,533

A CHEMIST'S BOOKSHELF

A Text-book of Qualitative Chemical Analysis. By Arthur I. Vogel (3rd ed.). London: Longmans, Green. Pp. xii + 578. Figs. 71. 12s. 6d.

Few chemists who have learned their inorganic qualitative analysis since the appearance of the first edition of this book in 1937, will require an introduction to it. The prime concern of the reviewer, then, in dealing with this new edition, must be to indicate in what ways it differs from the previous edition. Since 1937 there have been radical alterations in the attitude towards inorganic qualitative analysis, particularly through the realisation that semi-micro (or, as they are often referred to loosely, micro methods) are by no means beyond the capabilities of the ordinary student. Dr. Vogel, obviously concurring in this view, has included a 56-page section which describes some of the methods to be used on this scale, and adds also an application of his macro-scheme to the smaller quantities. This is in addition to the section on micro-manipulation, already included in the previous edition.

As Dr. Vogel himself points out, there is no sharp line of demarcation between semi-micro and micro methods in qualitative analysis. It would, therefore, be more logical if these two sections were brought together in the book, as otherwise the student may tend to regard the earlier one as having little bearing on the latter. But apart from this criticism, one can only regard the new inclusion with approval.

The section dealing with systematic tests for anions has been extended somewhat, and there has also been added a simplified scheme of analysis for less advanced students. While the reviewer may not always agree with the procedures adopted in the book, it is realised that those which are most suitable for teaching purposes must sometimes inevitably be open to criticism when regarded from a broader standpoint. And for teaching purposes this book is difficult to equal.

Very few errors, and those primarily obvious ones of cross-reference, have been observed. One strong criticism the reviewer would make, which in no way detracts from the scientific value of the book, but is a serious drawback to simplicity in its use. This concerns the system of giving cross-references through the text to section numbers instead of to page numbers. Undoubtedly, this makes for great ease in proof-reading, and if the convenience of the author were the only point to be considered it would be admirable. But in any book a first consideration must be to avoid embarrassing the user. The reviewer's experience is that students in general are apt to disregard cross-references completely, since to follow them up involves the intermediate process of referring to the Table of Contents. This experience has been supported by inquiries made among other users of the book. As a consequence, it is urged that Dr. Vogel should seriously consider, in future editions, the elimination of this method (which is becoming more common in text-books, and, we believe, originated in America) in favour of the more conservative, but undoubtedly more convenient page-references.

Accurate Glass Tubing

Chance Brothers' "Veridia" Process

GLASS tubes can now be produced with internal dimensions of the highest accuracy, comparable with that obtained by high grade machining of metals, by applying the Veridia process for the manufacture of precision bore glass tubing, developed by Chance Bros., Smethwick. Previously, this could only be achieved by slow and expensive grinding and lapping methods, but the Veridia process achieves high accuracy and uniformity at a lower cost and, in addition, leaves the glass transparent, with a smooth polished finish.

The new process has its most direct application in the production of glass tubing with an accurate circular bore, and tubing is now regularly available in bore sizes from 0.30 mm. up to 30.0 mm. The normal tolerance on the internal diameter is ±0.01 mm. (±0.0004 in.) for standard lengths of about 12 in. If the length is increased, it may be necessary to have a slightly wider tolerance, and tubes up to 48 in. long can be supplied. The ends of each tube are ground square and flat. The process is not limited to the production of tubing with a circular section. Tubes have been produced with square or hexagonal bores; contoured, taper, and stepped bores can also be made, while a recent development is the manufacture of capillary tubing down to 0.065 mm. diameter.

Veridia tubes are being used for pump cylinders, hypodermic syringe barrels, and in high-grade viscometers and thermometers. There are a large number of applications in the field of graduated glass since Veridia tubing can be used without any need for individual calibration and the graduations are uniform. This is very useful where a separate non-calibrated scale must be employed and the dimensional tolerances make it quite possible to secure glass of NPL Grade A quality without trouble or special technique. Veridia tubing is normally made of "Hysil" (Chance GH1). If required, however, tubing can be produced in other glasses to meet special requirements.

The Progress of Microchemistry

Increasing Speed and Accuracy

PAPERS read at the Newcastle meeting of the Microchemistry Group, held in conjunction with the local sections of the R.I.C. and the S.C.I. at King's College on September 15, ranged over a wide field.

Dr. C. C. Miller read a paper on "Inorganic Quantitative Microanalysis for University Students," in which she outlined the type of course which had proved suitable for teaching to undergraduates. Either full micro or semi-micro methods may be taught, depending on the laboratory space and apparatus available. The course in micro methods at Edinburgh University was described in considerable detail.

Micro Filtration

In his paper entitled "A Review of Micro Filtration," Dr. G. H. Wyatt stressed the importance of these methods for the saving of time. In qualitative microanalysis it is often possible to avoid filtration entirely, by the use of capillary tubes or the centrifuge. For the filtration of gases, to render them dust-free, methods have been devised by Pregl, Donau and Hecht, and Briscoe and Matthews, among others. However, the most important applications of filtration are in preparative and quantitative work. Of the ordinary filtering media known to classical chemistry, glass-wool and paper find less use, while cotton-wool and asbestos are of more importance. Many devices using these media, and the alternative sintered plates, were described or shown by the speaker.

Ferrous Alloy Analysis

"Some Aspects of the Microchemical Analysis of Ferrous Alloys" was the title of a paper by Mr. C. Whalley. The French were the first to apply micro methods in steel analysis, for the purpose of examining inclusions and element distribution. By 1938-39 it was possible to estimate manganese, phosphorus, and chromium in small amount, though the results were of a low order of accuracy. It is, however, important that these workers stated that the best methods for this type of work were colorimetric, preferably employing photo-electric measurement. Following this work, Klinger and Koch proposed methods for almost every element in steel. The determinations were in the main colorimetric, but 500 mgm. of sample were required for a complete analysis. This was still on too large a scale, and the work with which Mr. Whalley has been associated set out to lower the sample weight considerably. It was laid down as of paramount importance that the methods should (i) be reliable, (ii) occupy a reasonable time, and (iii) be capable of being carried out by workers who had little specialised training.

Starting from Vaughan's work, a critical examination showed that the methods which he applied for silicon, nickel, molybdenum, and manganese would probably prove suitable for conversion to smaller scale, but for other elements new methods would be required. It is now possible to estimate carbon, sulphur, silicon, molybdenum, chromium, nickel, vanadium, cobalt, tungsten, titanium, iron, and coppper by a schematic method, all the determinations but those of carbon and sulphur being photometric, and requiring only a total sample of 15 mgm. The reduction in scale has largely been rendered possible by devising small absorptiometer cells and other apparatus on an equally reduced scale, for dealing with small quantities of solution. The sensitivity of the methods may be illustrated by the fact that it is possible to gas out 0.01 per cent. of copper from a 4-mgm. sample with sulphuretted hydrogen, and subsequently to recover the copper concerned. A sample of pure iron is always run through in parallel with each steel sample, the results being used for blank corrections, since one is often dealing with a few micrograms of the element being determined.

Combustion Methods

Carbon and sulphur must still be determined by combustion, and considerably larger samples are required for these estimations, of the order of 50 mgm. Special small porcelain boats are employed to hold the sample, and the methods are speedy; for example, it is possible, when the apparatus is in working order, to determine carbon in one sample every twelve minutes. Because of the greater sample weight required, work is proceeding on an absorptiometric method for sulphur, which, though not yet completed, can give fairly accurate values on a sample weight of 10 mgm. Preliminary investigations into a colorimetric method for carbon have also been made, although so far this has not been developed far enough to allow any estimate of its usefulness to be made.

The Huhtamäki concern, well known in Finland's food industry, is erecting a factory for making syrup from cellulose and is planning an output of 1000 tons for 1945. Sulphuric acid supplied by Finnish and Swedish firms is used in the process. Most of the equipment was made in Finland, but some of the machinery came from Sweden.

Personal Notes

Wing-Commander V. R. Ronald has resumed his duties as advertisement manager for the Society of Chemical Industry, having left the Royal Air Force.

Mr. R. G. Thomson has been appointed chairman of Clayton, Son & Co., Ltd., Hunslet, Leeds, in place of the late Mr. Joseph Clayton. Mr. L. Hartley and Mr. S. Cawthorne have been elected joint managing directors.

Edinburgh University Court has appointed Dr. S. W. Challinor, Department of Bacteriology, and Lt.-Col. H. Culumbine, R.A.M.C., Department of Materia Medica, to I.C.I. Fellowships for a period of three years.

Dr. D. E. Wheeler will be leaving his present post as chief chemist to Hardman & Holden, Ltd., and the Manchester Oxide Co., Ltd., in order to take up an appointment with the Wellcome Foundation, Ltd., on January 1 next.

Mr. A. E. Sylvester, governor and managing director of the Gas Light & Coke Company, has been elected chairman of the South-Eastern Gas Corporation in place of Sir David Milne-Watson, who has resigned his position as chairman, though remaining on the board.

Mr. E. Leighton Holmes, M.Sc., A.R.C.S., who has been elected chairman of the London Section of the British Association of Chemists, is now in practice as a consulting and research chemist at Station Road, Irthlingborough, Northants, specialising in problems connected with the supply of water for industrial purposes and the applications of ion exchange resins.

Dr. C. Ainsworth Mitchell is to retire from the editorship of *Analyst* on September 30, and will be succeeded by Mr. J. H. Lane, who has been assistant editor since 1936. Dr. Mitchell has been editor for 25 years, a period of almost continuous expansion of the journal. He has had a long and intimate association with the affairs of the Society of Public Analysts and other Analytical Chemists; he became a member in 1894, served on the Council in 1899-1900 and was secretary from 1925 to 1937. He will retain a literary connection with the Society as honorary librarian.

The following have accepted invitations to be vice-presidents of the North-Western Fuel Luncheon Club: Mr. Miles K. Burrows, M.C., M.I.M.E., M.Inst.F., managing director, Manchester Collieries, Ltd.; Dr. E. S. Grumell, C.B.E., M.I.M.E., F.Inst.F., chief fuel technologist, Imperial Chemical Industries, Ltd.; Mr. R. A. S. Thwaites, B.Sc., M.I.E.E., M.I.C.E., M.I.Mech.E., M.Inst.F., chief engineer and general manager, Manchester Corporation Electricity Department; Dr. F. Kind, M.Inst.Pet., M.Inst.F., managing director, Manchester Oil Refineries, Ltd. Mr. Charles Gandy, B.A., chairman, National Smoke Abatement Society, has offered to act as honorary legal adviser; and Mr. T. A. Tomlinson, M.B.E., M.I.Mech.E., M.Inst.Gas E., M.Inst.F., has given his services as honorary treasurer.

Obituary

Sir Percy Ashley, who died at Buxton on September 13, aged 69, was chairman of the Central Rayon Office. He was principal assistant secretary to the Board of Trade in 1933, and secretary of the Import Duties Advisory Committee. He also acted as vice-president of the British Standards Institution.

Mr. William Barr, B.Sc., A.R.I.C., who died in Glasgow on August 15, aged 25, was an extremely promising young chemist, who shared the Mackay Smith prize of Glasgow University in 1942 and held the Fleming scholarship in 1942-43. Appointed to the staff of I.C.I., Ltd. (Dyestuffs Division), he was assigned as research assistant to Professor Cook, and continued working at Glasgow University until obliged to give up, for reasons of health, in August last year.

Mr. Leroy Egerton Westman, who died in Toronto on July 1, had been editor of *Canadian Chemistry and Process Industries* for 26 years. He graduated at Toronto University in 1914, became a public analyst in 1915 and was then attached to the headquarters Laboratory of the Department of Inland Revenue. He resumed his studies at Columbia University, specialising in food and nutrition. Mr. Westman was for 15 years secretary of the Canadian Institute of Chemistry, and was elected president for 1943-44. He also was chairman of the interim board of the newly-formed Chemical Institute of Canada. During the war, he worked with the Department of Labour, and was nominated associate director of National Selective Service.

The Institute of Fuel has informed us that, owing to food restrictions, the total number of people that can be provided for at their annual luncheon on October 17 at the Connaught Rooms is limited to 600, and that all tickets have now been taken up. Among the speakers at the luncheon, in addition to the President and the two Melchett Medallists, will be the Rt. Hon. Emanuel Shinwell, M.P., Minister of Fuel and Power; Mr. Robert Foot, Chairman of the Mining Association of Great Britain, and Mr. Arthur Horner, National Coal Production Officer.

General News—From Week to Week

The parcel post, "small packets," and "green label" services from this country to Luxembourg have been restored.

The Ministry of Works announces that all restrictions on the use of bitumen, etc., for pipe coating are withdrawn.

French students of the Ecole Polytechnique are to attend the course on Quality Control Methods given by the Ministries of Supply and Production.

The Central Bitumen Pool has left Oxford, and its postal address is now Shell Mex House, London, W.C.2. The Pool is actually domiciled at Norman House, Strand, W.C.2, should personal contact with its officials be necessary.

The Ministry of Food announces that there will be no change in the existing prices of refined oils and imported edible animal fats allocated to primary wholesalers and large trade users during the eight-week period September 16-November 10.

The first Dalton Memorial Lecture—on "Chemistry and Clothing," by Mr. D. A. Clibbens—and a lecture by Dr. F. M. Lea, on "Cement and Concrete," are among the most recent publications of the Royal Institute of Chemistry. Both lectures were delivered last December.

The placing of an order with Newton Chambers and Co., Ltd., for the provision of a purification plant of about twice the present capacity has been approved by Aberdeen Gas Committee. The existing unit has been reported as unequal to the post-war requirements of the city. It is estimated that the developments will cost £101,600.

The North-Western Fuel Luncheon Club holds its inaugural meeting on October 3, at the Engineers' Club, Manchester. Principal speakers are Sir Frederick West (president), Mr. Miles Burrows (vice-president), and Mr. Gordon Macdonald. Membership to date is 151, representative of all branches of the fuel industries. The next meeting has been arranged for November 7.

Col. W. C. Devereux, whose reconstruction plans for South Wales and Cumberland are well known to readers of The Chemical Age, told members of the Town and Country Planning Association last week of the need for "a national master plan and a central planning authority." He did not believe that the responsibility for planning the proper utilisation of our resources could be left at the mercy of civic pride and local patriotism, however well intentioned.

The Library of the Chemical Society, Burlington House, London, W.1., will revert, on October 1, to the following pre-war hours of opening: Monday to Friday, 10 a.m. to 9 p.m.; Saturdays, 10 a.m. to 5 p.m.

Mr. Aneurin Bevan, Minister of Health, last week received a deputation from the Women's Advisory Committee on Solid Fuel, who called his attention to the need for mass-producing the new solid-fuel appliances developed by scientific research, which would consume their own smoke and give continuous burning.

On the proposal of Professor P. M. S. Blackett, the T.U.C. has decided to re-establish its Scientific Advisory Committee, which was a war-time casualty owing to the preoccupation of its members. Professor Blackett remarked that development of atomic enegy would not be so rapid as to make research on more accustomed methods unnecessary.

Gestapo instructions for dealing with British firms included an order to seize all patents handled by I.C.I., concerning whom it is stated: "Direct co-operation or inter-relation between I.C.I. and I. G. Farben is not known except a financial connection with Dynamit Nobel & Co." Most important of all was "the seizure of complete files of the central intelligence department, whose director is John Patterson."

The London Section of the Oil and Colour Chemists' Association announces that, owing to the fact that Professor Andrade has been asked to take part in a delegation of the British Association which is going to a Victory Congress in Paris at the invitation of the French Association, the last of the post-graduate lectures which he is delivering by arrangement with the O.C.C.A. will be postponed from October 25 to October 29. The hour and place remain unchanged (*see* The Chemical Age, September 8, p. 226).

The Scientific Films Committee of the Association of Scientific Workers has revised and printed its catalogue of scientific films. A grading system shows the suitability of each film for various types of audience. This catalogue can be purchased at 2s. 6d. per copy from the head office of the A.Sc.W., at Hanover House, 73 High Holborn, London, W.C.1. The committee is prepared to act in an advisory capacity on the subject of scientific films to scientific and engineering organisations, college societies, schools and film societies.

Oil-exploration licences have been granted to the D'Arcy Exploration Co., Ltd., for four areas in Lancs, Yorks, Notts and Derby. Three of these occupy a rough semicircle extending from Burnley north to Skipton, and thence northward of Otley and east to Tadcaster; the fourth lies in the Mansfield-Chesterfield area.

According to the half-yearly survey of the average weekly earnings in industry, published in the *Ministry of Labour Gazette* for September, average earnings in the chemicals and explosives sector amounted in January to 118s. in the case of men of 21 and over, and to 62s. 1d. in the case of women of 18 and over. The average number of hours worked was 51.7 and 43.5, respectively, with average hourly earnings of 27.9d. and 17.7d.

Foreign News

Out of 18 oil refineries in pre-war France, 14 are reported to have been wholly or partly destroyed during the war.

The Société des Mines d'Etain du Ruanda-Urundi ("Minetain") produced 660 tons of cassiterite, 2.25 tons of wolfram, and 221 kg. of gold in 1944.

A small carbon disulphide plant is planned at Gemlik, Turkey, and equipment estimated to cost approximately T£600,000 is reported to have been ordered.

Tungsten discoveries in the Altai Province of U.S.S.R. have proved to exceed in extent all Russian wolfram occurrences which have been exploited up to now.

The Argentine Government has taken over the German firms of Merck Quimica, with a capital of 1,250,000 pesos (about £780,000), and the Quimica Schering.

A glass that floats has helped to achieve victory. It is used as a buoyant core for life rafts of U.S. Merchant Marine ships. These rafts are constructed of wood and blocks of the new glass insulation, Foamglas, made by the Pittsburgh Corning Corporation.

The Ceylon Government's project to establish a cement industry in the island has been examined by an expert from this country, Mr. R. E. P. Shearer, who has been responsible for setting up several cement factories in various parts of the world, including one at Hong Kong.

A decree providing for the nationalisation of heavy and key industries in Czecho-Slovakia has been submitted to President Benes by his Government. Main branches of industry in question would be mines, electricity, gas, iron and steel, armaments and the chemical industry. Only enterprises employing more than 500 workers are expected to be involved.

The Minister of Mines in Southern Rhodesia recently stated that, though the quantities of iron ore at Que Que had not been accurately determined, there were at least 1,500,000 tons of high-grade ore available, with a larger tonnage of good economic ore.

A new commercial chemical know as 2-4 D, or dichlorophenoxyacetic acid, is claimed to be "death on dandelions," in the picturesque phrase of Dr. K. C. Macdonald, Canadian Minister of Agriculture. One part of 2-4 D to 50 parts of water is sprayed on lawns in a fine mist. Within two weeks, says Dr. Macdonald, the dandelions disintegrate.

A market for 1,500,000 pounds of calcium carbide is estimated to exist in Uruguay during the first year following the close of war, and for 1,300,000 pounds in the second year. Annual consumption averages 1,300,000 pounds. Sweden has been the principal pre-war supplier, but the United States and Canada now lead.

All official restrictions on the use and distribution of industrial alcohol in Canada have been removed, according to a statement by the Dominion Minister of Reconstruction and Supply. The Chemicals Control Order of 1942 diverted Canadian distillery facilities to the production of industrial alcohol, then in large quantities.

Referring to the extensive ilmenite deposits in Ceylon, estimated at between 3,000,000-5,000,000 tons, Mr. D. N. Wadia, the former Government mineralogist, says that the industrial utilisation of the mineral for the manufacture of titanium paints is attracting considerable attention. Local manufacture of finished or semi-finished products might soon be introduced.

Drugs, chemicals and fertilisers imported into Australia during the nine months ended March 31, 1945, totalled £4,105,000 in value (£4,700,000 in the same period to March 31, 1944). Exports of the same commodities were valued at £A1,083,000 (£A911,000). In the year 1939, total imports of chemicals, etc., amounted to £4,109,000 and total exports to £A565,000, the last figure being particularly significant.

For the manufacture of sulphuric acid required in its metallurgical processes, the Rhodesia Broken Hill Development Co., Ltd., has been importing about 2500 tons of iron pyrites monthly from Southern Rhodesia. However, by the end of this year a new plant which should be in operation on the mine will enable to cover the company's acid requirements from its own sulphide ore.

Forthcoming Events

September 25. Institute of Export. Royal Empire Society Building, Northumberland Avenue, London, W.C.2, 1.15 p.m. Mr. W. Wakefield Adam, M.I.Ex., M.I.Mech.E.: "Britain's Coal: Crisis and Opportunity."

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

September 27-28. Faraday Society. University College, Gower Street, London, W.C.1., 11 a.m. General discussion on "Oxidation."

September 28. Oil & Colour Chemists' Association (Bristol Section). Grand Hotel, Bristol. Mr. R. G. Baines: "Ball and Pebble Mills as Used in the Paint Industry."

September 28. Royal Institute of Chemistry (Belfast and District Section). Physics Lecture Room, Royal Academical Institution, 7.30 p.m. Dr. E. M. Mayne Reid: "Chemical Fertilisers."

October 1. Society of Chemical Industry (Plastics Group and Yorkshire Section). Chemical Lecture Theatre, Leeds University (entrance Woodhouse Lane), 6.30 p.m. Dr. W. T. Astbury, F.R.S.: "Macro-Molecules."

October 1. Society of Chemical Industry (London Section). Rooms of the Chemical Society, Burlington House, Piccadilly, London, W.1. 7.15 p.m. Dr. E. S. Hedges: "New Development in Tin and Tin Alloy Coatings."

October 3. Pharmaceutical Society. 17 Bloomsbury Square, London, W.C.1, 3 p.m. Opening of 104th session; inaugural address by the President, Mr. J. C. Young.

October 3. Society of Public Analysts. Chemical Society's Rooms, Burlington House, Piccadilly, London, W.1. 6.30 p.m. Mr. Eric C. Wood: "The Theory of Certain Analytical Procedures, with special reference to Microbiological Assays."

October 4. Chemical Society, Burlington House, Piccadilly, London, W.1. 5 p.m. Dr. U. R. Evans: "Recent Work on Corrosion and Oxidation Reactions."

October 5. Society of Chemical Industry (Plastics Group and Glasgow Section). Royal Technical College, Glasgow, 7.15 p.m. Professor H. W. Melville, F.R.S.: "The Structure and Synthesis of Vinyl Plastics."

October 5. British Rheologists' Club. Engineers' Club, Manchester. 11 a.m. Annual general meeting. 2 p.m. Joint meeting with **Oil and Colour Chemists' Association,** Manchester section. Discussion: "General Rheological Properties of Suspensions."

October 10. Society of Chemical Industry (Newcastle section) and **Royal Institute of Chemistry.** Chemistry Lecture Theatre, Newcastle University. 7 p.m. Dr. H. Baines: "The Choice of Photographic Materials for Scientific Purposes."

October 11. Society of Chemical Industry. (R. & B. M. group and London section). Gas Industry House, 1 Grosvenor Place, London, S.W.1. 6 p.m. Professor E. K. Rideal, F.R.S.: "Some Physico-Chemical Problems in Construction."

Company News

The British Aluminium Co., Ltd., has lowered its interim dividend from 3 to 2 per cent.

Joseph Crosfield & Sons, Ltd., maintained their ordinary dividend at 25 per cent., tax free for 1944, and have announced a net profit of £671,003 (£644,747).

Major & Co., Ltd., reports a trading profit, for the year to March 31, of £19,905 (£8,547). The ordinary dividend has been maintained at 6 per cent.

International Bitumen Emulsions, Ltd., report a profit of £32,555 (£26,015) for the year ended March 31, and are paying a dividend of 8 per cent. (7 per cent.).

Benzol and By-Products, Ltd., have decided to pay off a further one-and-a-half years' dividend arrears on the 6 per cent. cumulative participating preference shares, bringing the payment up to March 31, 1937.

Staveley Coal & Iron Co., Ltd., have made a net trading profit, for the year ended June 30, of £697,847 (£892,122). A final ordinary dividend of 4½ per cent. brings the total to 7 per cent. tax free (same). Forward, £166,620 (£151,059).

Thorncliffe Coal Distillation, Ltd., for the year ended June 30, announce a net profit of £54,744 (loss £36,190). After payment of one year's 8 per cent. preference dividend, £24,050 is carried forward (debit balance of £14,960 brought in).

New Companies Registered

Specialities (Packers) Ltd. (398,418.)—Private company. Capital, £1000 in £1 shares. Bottles, packers and distributors of cleansing preparations, chemicals, etc. Subscribers: Sydney List (first director); R. Kaffrell. Solicitors: Wedlake, Letts & Birds. Registered Office: 64 Newman Street, W.1.

Chemical and Allied Stocks and Shares

LONDON'S savings week diverted attention from stock markets, where business generally was on a small scale, although there was a firm undertone under the lead of British Funds, which responded to the Chancellor's reference to the possibility of still lower interest rates. The rise in gilt-edged influenced markets as a whole, and leading industrials recorded moderate gains, while sentiment generally was assisted by the continued absence of selling. Prevailing assumption, however, is that markets may maintain a waiting attitude pending the result of the important American talks and further indications of the Government's attitude to industry.

Shares of chemical and kindred companies were firm, with the main emphasis on those with important export and overseas connections. Imperial Chemical further strengthened to 38s. 10½d., although now "ex" the unchanged 3 per cent. interim dividend. The market is confidently expecting the 8 per cent. annual basis of recent years to be maintained. Lever & Unilever fluctuated around 50s. pending the dividend decision, but following their reaction on the lower interim, British Aluminium showed a partial rally to 42s. xd. Turner & Newall rose to 79s. 6d. and United Molasses were firmer at 42s., while Wall Paper Manufacturers deferred strengthened to 42s. on market hopes of a higher dividend. Awaiting the results, Murex strengthened to 102s. 6d. A rise in Lautaro Nitrate to 18s. was attributed to talk that the company may experience less competition from synthetic nitrate than before the war. Griffiths Hughes moved higher at 41s. 10½d. The units of the Distillers Co. firmed up to 116s. 3d. on export trade prospects of the group's products.

Iron and steels, as well as textiles, continued to be favoured, with Guest Keen 40s. 3d., Babcock & Wilcox 57s., Clarke Chapman 47s. 6d., and Shipley 24s., while Stewarts & Lloyds deferred were good at 53s. 6d., and Davy Engineering at 35s. responded further to the results and the chairman's statement. Consett Iron were 8s. 4½d. and United Steel 23s. 10½d. Calico Printers were 20s. 7½d. on the past year's figures. Bleachers firmed up to 14s. 6d., while Bradford Dyers were firm at 26s. 10½d. and Fine Spinners 25s. 7½d. Courtaulds have moved up to 54s. 6d. since news of the acquisition of another factory.

B. Laporte were again around 87s., Monsanto Chemicals 5½ per cent. preference 23s., and Greeff-Chemicals Holdings 5s. ordinary around 9s. British Glues & Chemicals 4s. shares continued in request, changing hands up to the higher level of 12s. 6d. A rise in Dunlop Rubber to 52s. 6d. was attributed partly to rumours that the company's rubber plantations are in satisfactory condition. Borax Consolidated deferred remained firm at 45s., British Oxygen were 85s., Barry & Staines 53s. 3d., and Nairn & Greenwich 78s. 9d. Triplex Glass 10s. ordinary were 41s. xd. pending the full results and the chairman's statement. United Glass Bottle kept at 70s., the assumption being that in due course the conservative dividend of 12 per cent., ruling in recent years, may be increased. Forster's Glass 10s. ordinary were 38s. 9d., and among other glass shares Jackson Bros. (of Knottingley) 5s. ordinary further improved, dealings ranging up to close on 22s. Boots Drug firmed up to 54s. 6d. and Timothy Whites to 42s.

British Plaster Board rallied further to 36s. 6d., but cement shares eased and Associated Cement were 54s. 9d. Oils were less firm, Shell receding to 81s. 3d. and Anglo-Iranian to 112s. 6d., while Trinidad Leaseholds were 94s. 4½d., earlier gains not being held.

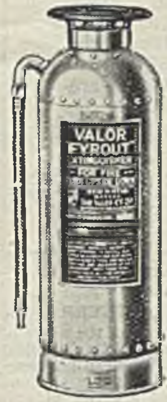
British Chemical Prices

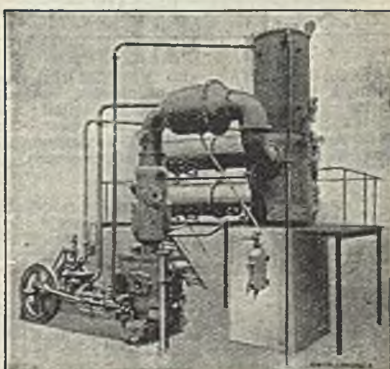
Market Reports

FAIRLY steady trading conditions are reported from the London general chemicals market this week, with a moderate amount of fresh inquiry in circulation for both home and export account. Deliveries against contracts are well up to schedule and the price position remains steady Among the soda compounds nitrate of soda is unchanged in price with good quantities coming into consumption, while the solid grades of caustic soda are being taken up steadily, chiefly against contracts, and a fair inquiry for liquid caustic soda has also been dealt with. Offers of yellow prussiate of soda are still restricted, with values covering a fairly wide range. Bicarbonate of soda is an active section, with deliveries well maintained, and a moderate weight of new business has been well reported in soda ash. The sulphides are moving steadily against contracts and some new inquiry has been recorded. Little change falls to be reported in the market for potash chemicals. Permanganate of potash is in steady request and all offers are readily absorbed. Solid caustic potash and bichromate of potash remain in short supply relative to requirements, while a fair business is being transacted in acid phosphate of potash. No change is reported in the market for coal-tar products this week.

Manchester.—Although in several directions new buying on the Manchester chemical market tends to be rather cautious, bookings during the past week seem to have been somewhat better on the whole. Additional inquiries that are being dealt with include a number from shippers covering a fairly wide range of the bread-and-butter lines, and fresh business is expected to result from these before very long. In the meantime, delivery specifications for caustic soda, soda ash, and salt cake cover fair quantities in the aggregate, and a reasonably steady movement of supplies is reported in the case of alum, carbonate and bicarbonate of ammonia, and the heavy acids.

GLASGOW.—In the Scottish heavy chemical trade during the past week there has been no change in the home market, business maintaining steady day-to-day transactions. Prices remain firm. There is no change in the export position. Inquiries are still being received regularly.





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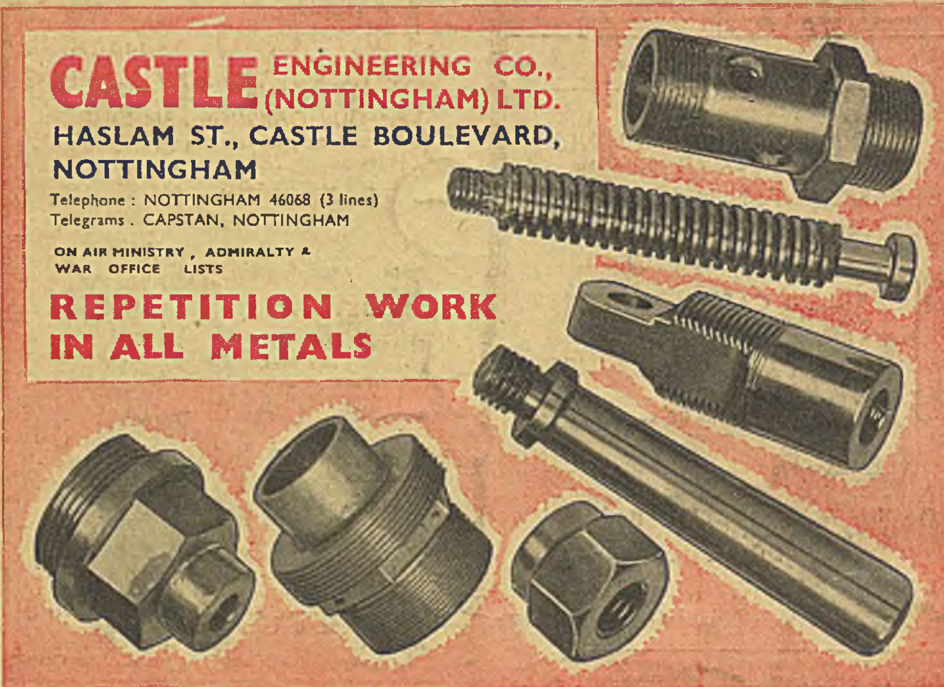

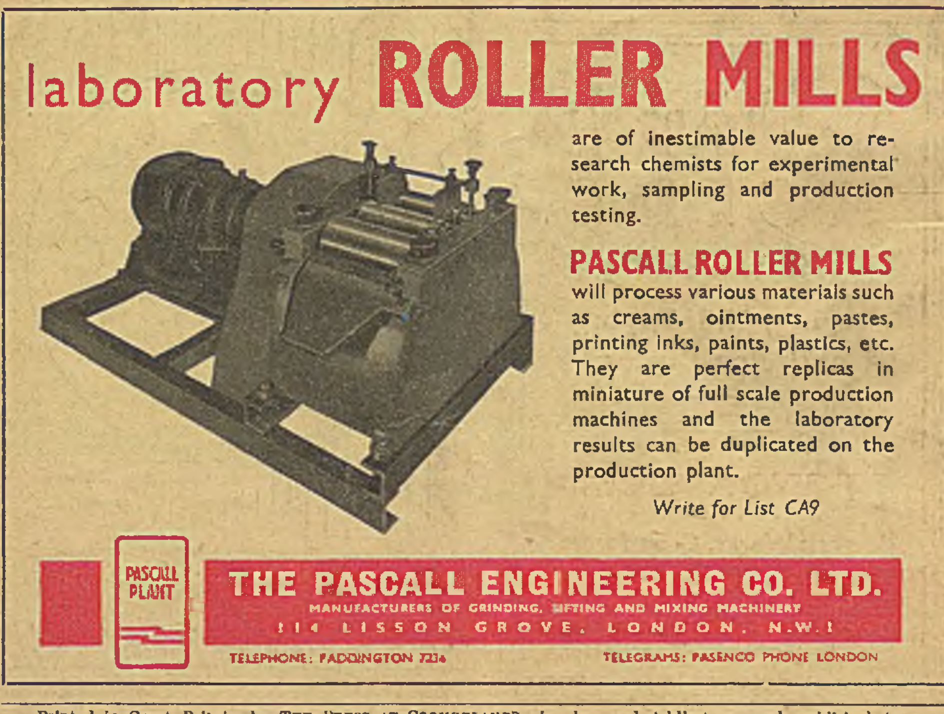

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