The Chemical Age

A Weekly Journal Devoted to Industrial and Engineering Chemistry

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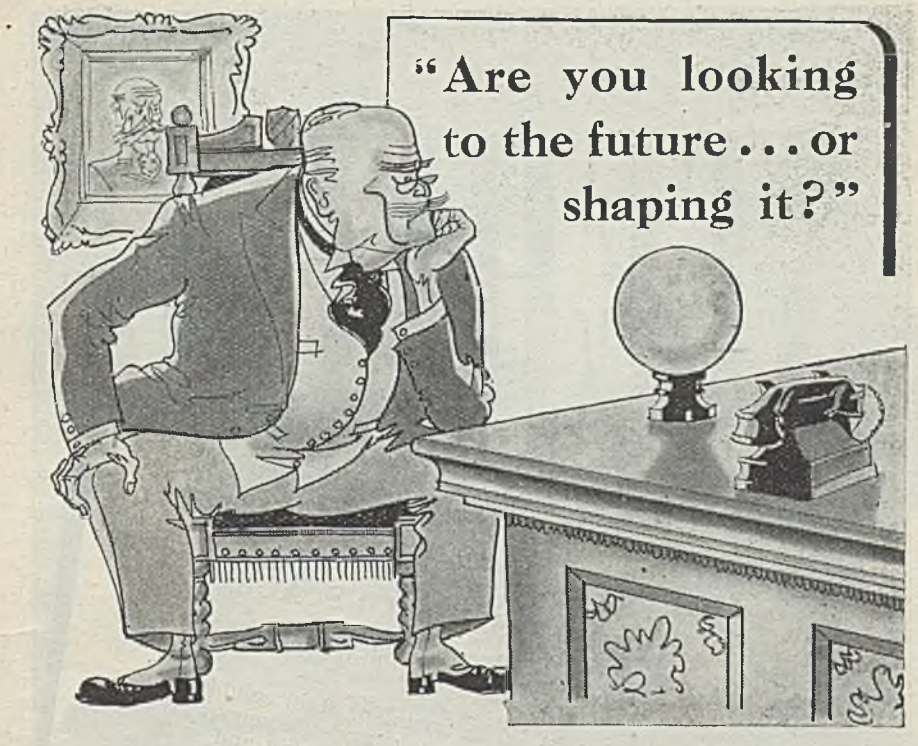

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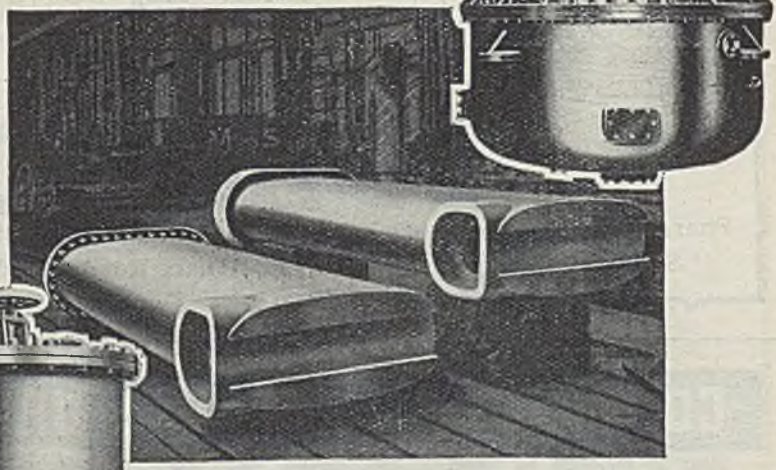

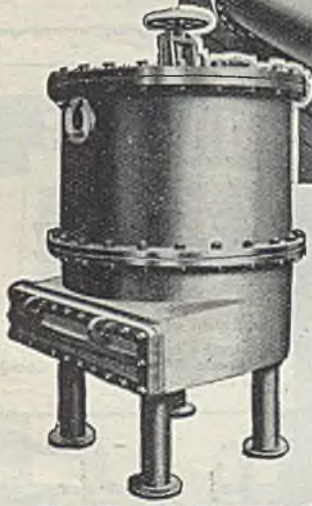

ILLUSTRATIONS.

TOP RIGHT. Jacketed Paddle Mixer.

CENTRE. Retorts in Heat-Resisting Cast Iron.

LOWER LEFT. Sulphur Burner.

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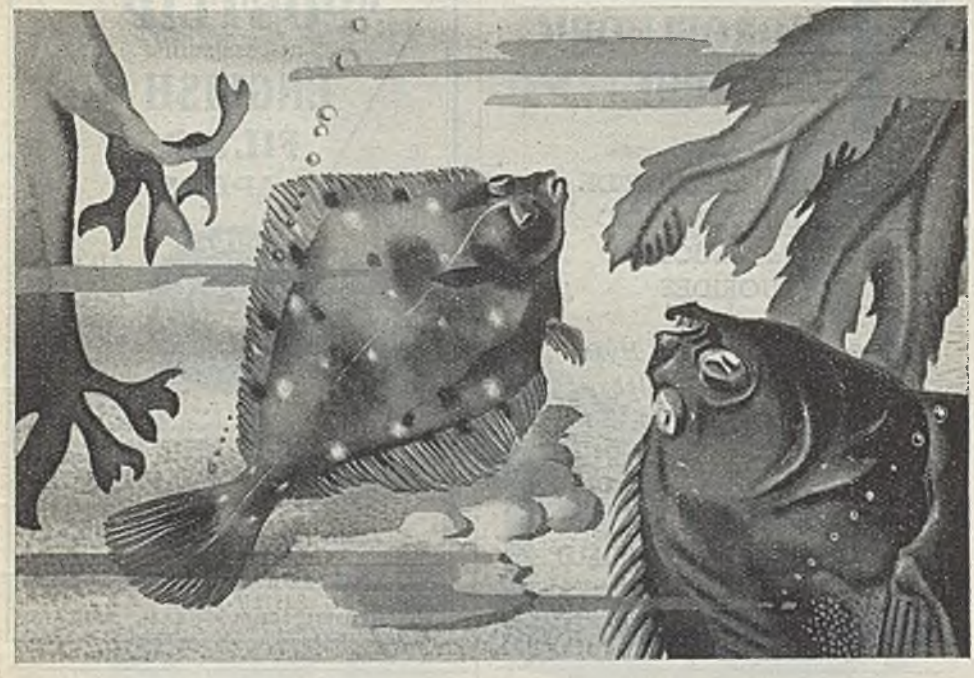

eyes upon the Flatfish . . .

he commences his life content with a normal symmetrical body and eyes set each side of his head. Later on, his body flattens, and then begins the strange migration of an eye, which travels over the top of the head, to finish its journey alongside its companion. During this extraordinary proceeding, the mouth, too, undergoes a change in location. Nature has conceived some queer developments !

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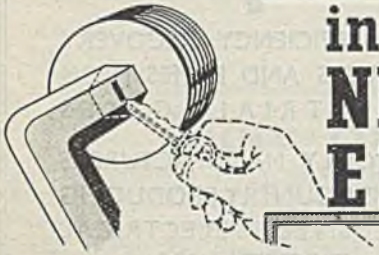

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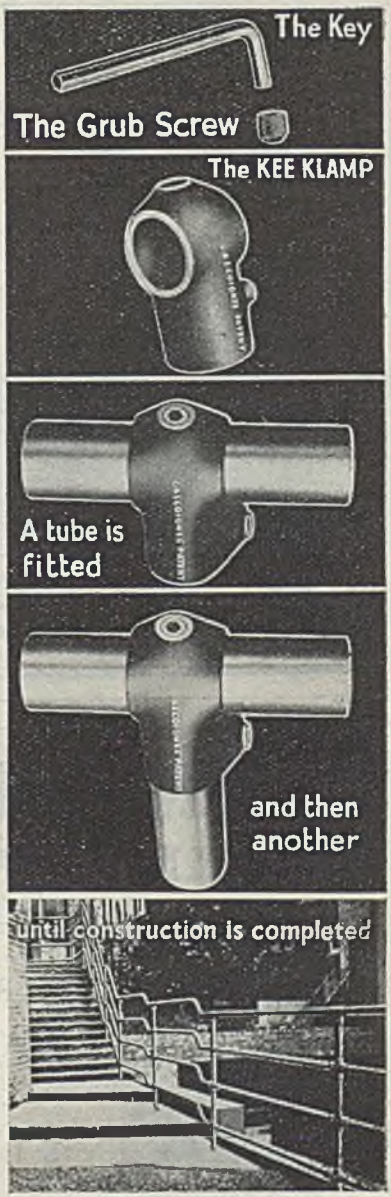

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The Chemical Age

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More Haste, Less Speed

THE statement issued by the Federation of British Industries on the Government's industrial policy demands careful study. On the one hand we are faced with a demand from certain members of the Government that this country, in peace time, should observe an austerity as rigid as during the most difficult years of the war, in order to concentrate on export trade; on the other hand, we have Ministers urging us to increase production by putting forth greater efforts. Many in this country are now working harder than they did during the war. Among these are to be found technical men and others engaged on creative work, key men without whom industry is powerless. As opposed to these men we have the picture of trade unions demanding shorter hours with higher wages and of miners playing instead of producing the coal which the nation needs. The Monthly Digest of Statistics shows that while absenteeism among the miners was only 6.7 per cent. before the war, it averaged 16.3 per cent. for the first half of 1945 and 17.04 per cent. for the last half of that year.

We do not necessarily blame the miners for not working as many days a week as other members of the community. We are bound to blame the miners' leaders for leading their followers to suppose that the miner's-dream-of-heaven is just round the corner—a heaven in which everything will be given them and in which it appears that they will be able to do everything except work. Nevertheless, and making allowances for the inevitable slackening after a great war, we are led to ask whether the "home austerity" policy of the Government is the right one. It has been urged that the reason for the low output in the mining industry is a shortage of food. Figures have been published showing a direct relation between the food consumed by Belgian miners and their output. Whether this thesis will bear examination we do not profess to say, but there is no doubt whatever that, although Britain may not be so badly off as the Continent of Europe, British rations are disappointing and not conducive to hard manual labour.

It has been represented to us that the cause of absenteeism in the mines is the shortage of goods. The argument runs that the miner will only work to produce as much money as he needs. Neither he nor his family are able to spend more than he can earn in four days' work; consequently, he works only four days. Is it, in fact, becoming clear that

On Other Pages

once the incentive for work is taken away mankind in the mass will not work?

Another aspect of the same problem is that of nationalisation. Under national ownership, with profits guaranteed by the State, there cannot be the same incentive for hard work as there is under private ownership. There cannot be the same incentive to technical progress and to research. There cannot be any great incentive to apply the results of research if that involves taking trouble and risk. The history of the Civil Service has shown us that, great as its value may be for purposes of administration, its dominant characteristic is an unwillingness to take the slightest risk of being proved wrong or to incur the smallest breath of adverse criticism, lest the future prospects of the individual in the Service be impaired. Doubtless a newly nationalised industry will not show Civil Service characteristics for a few years: the machine is still operating and the flywheel of progress, set going under private enterprise, will keep it running for a time. Shall we find, however, that once the incentive to enterprise is removed by nationalisation, mankind in the mass will cease to show enterprise?

These considerations cause us to be very favourably impressed by the statement put forward by the F.B.I. The F.B.I. "rejects completely the conception that the nationalisation of industry is in the interest of employment, of production, or of the consumer." The nationalisation of the coal mines, as set forth in the Government's Bill, leads the F.B.I. to feel that its endeavour "must be to ensure that the great dangers and disturbances inherent in this vast structural change are reduced to a minimum." It is urged that the Government should concentrate its immediate efforts on the economic situation of 1946. The position is grave, and the outlook in the economic sphere is as critical as it was in the military sphere at the time of Dunkirk. By the end of 1946 we must have laid the foundations necessary for the re-establishment of equilibrium in relation to our oversea payments. Unless we can make much faster progress in restoring our production than is yet apparent we may well be face to face with calamity.

Our belief that the shortage of consumer goods is acting as a brake on production is confirmed by the emphasis placed by the F.B.I. on the production of goods for the home market. The memorandum says: "We are satisfied that an increase in goods for the home market at the earliest possible moment will be a direct incentive to production and thus quicken the essential increase in our exports. As supplies for home consumption become increasingly available, there must be a corresponding transfer of spending power from the State to the individual by reductions of personal taxation."

The impression that we have received from the first six months or so of the life of the present Government is that it is in so much of a hurry to put Socialistic theory into practice by way of socialising industry, that it is but fiddling while Rome burns. The country need be under no misapprehension as to the ultimate objective. The coal industry is being given powers under nationalisation to undertake all manner of subsidiary manufactures, and there is no reason to suppose that once private enterprise has shown how to produce chemicals from coal a Socialist Government will not transfer the whole manufacture to the coal-mining industry. The writing is clear upon the wall. It is the evident purpose of members of the present Government, whatever they may say to the contrary, ultimately to bring all industry under the direct control of the State. We are not satisfied that Russia is a good model for Britain to follow: the conditions are very different: but that is quite obviously the present trend.

Peradventure in the course of years State ownership of industry will generally be found throughout the world to be inevitable—grim though such a prospect may be. If it is so discovered there can be little doubt that this country must follow the general lead. With the F.B.I., however, we plead that natural evolution should be allowed to be the governing factor in this change-over and not the possession of a temporary majority in Parliament, which does not represent an absolute majority of those voting in the country. Whatever decision the Government may take upon the final delimitation of the nationalisation programme, the Federation "cannot too strongly emphasise the complexity and seriousness of the secondary effects flowing from decisions to nationalise." In the Federation's view, which we thoroughly support, "the risk to the national economy of rushing the programme cannot be justified: the difficulties can only be mitigated by the fullest deliberation."

NOTES AND COMMENTS

Empire Science

ONE valuable outcome of the war, from the British scientist's point of view, is the great increase in co-operation between the scientific men of Britain, of the Dominions, of India, and of the Colonies. It is perhaps not without significance that the movement originated, physically at any rate, in America, when in 1943 the various scientific missions of the British Dominions which were then present in North America moved into the same office in Washington as the British Central Scientific Office formed two years previously under Sir Charles Darwin. These divers missions soon federated to form the British Commonwealth Scientific Office, and this not only effected a great saving of time and administration, but also led to a great deal of friendly collaboration between representatives of the various Dominions, each man dealing with the branch in which he happened to be most skilled. A lively atmosphere of research was created, with day-to-day discussion of problems. All that valuable combined effort was too good to be wasted; and it is excellent news to hear that an Empire Scientific Conference, organised by the Royal Society, is to be opened in London by the King on June 17. It will move, on three successive Saturdays, to Cambridge, to Oxford, and back to London.

Interchange of Information

NATURALLY, the primary purpose of the conference will be to provide an opportunity for the exchange of views on all manner of scientific problems which are of importance to various parts of the Empire, and to establish means of achieving the most practical measure of collaboration between the scientists of the different parts of the Commonwealth. The affair does not stop at mere theory, however: this conference will be followed immediately by the Commonwealth Scientific Official Conference, the duty of which will be to discuss the details of practical measures to be taken to organise and promote this collaboration. It is suggested that the Commonwealth Scientific Office should be maintained in peace and that something on the lines of the Washington office should be established in London. Economic and industrial development, as well as academic research, would come within the purview of the organisation. It should be emphasised that, while this second conference is official, the Royal Society's conference will give scientific men the opportunity of expressing their individual views, especially at the informal evening discussions which it is proposed to hold. Some special points of interest to be discussed are the factors affecting human life in industry under tropical conditions, and the nutritional status of the indigenous peoples of the Colonies.

Food Yeast Progress

IT is just a year since Dr. A. C. Thaysen presented his paper on the production of food yeast from Empire sources before the Royal Society of Arts, and technical details both concerning the Teddington pilot plant and the Jamaica project of the West Indies Sugar Co., Ltd., appeared earlier (*see* this journal, 1944, *51*, 125; 1945, *52*, 395). The project has now become an accomplished fact, and the news has recently come through that the first supply of food yeast from the Jamaican factory has been earmarked for the undernourished populations of Malaya and Hong-Kong, where the need is indeed great. It is proposed to send further quantities at a later date to the half-starved peoples of the European continent. It is believed that the factory in Jamaica is not yet turning out its full output; but when this ideal has been achieved, 12 tons a day of a food rich in proteins and in vitamins of the B complex will be produced. It has been reckoned that production on this scale will be sufficient to feed daily more than 1¼ million people whose diet is deficient of the constituents present in the yeast. Thanks to the abundant supply of molasses in the country of manufacture, and to the special machinery contrived for the factory (with the aid of an interest-free loan from the British Government), the food yeast can be produced at less than 1s. per lb. "over the counter," or about ¼d. per person per day. The question now is whether an economic supply of yeast for fodder can be manufactured from cheap cellulosic materials such as wood-pulp or straw-pulp. Successful experiments with wood hydrolysis have been carried out in the U.S. and Scandinavia, and there has been

technical progress in this direction even in our own country.

China Clay

IN order to meet the export demand for china clay from Cornwall workmen will have to be imported into the district, according to the report of a Working Committee on China Clay which has just been issued as a White Paper. This year's total demand will probably amount to 750,000 tons, but the present labour force of 2400 is not capable of turning out more than 410,000 tons, which will just about satisfy the home demand, leaving unfulfilled export requirements totalling 350,000 tons. Last year the output was 280,500 tons, of which 116,000 were exported. Various remedies to improve the situation have been suggested by the committee. As in many other industries, an amelioration of the conditions of work would help. Nowadays few young men enter the industry because, owing to the better education they have been receiving, they are not content to start as "kettle boys," doing odd jobs and making tea. Unlike in many industries, there are few, if any, canteens provided for the workers, most of them relying on the characteristic Cornish pasty; and a supplementary allowance of meat and fats would greatly enhance the food-value of this diet. Furthermore, it is stated, more suitable coal for drying and the greater use of excavators would go far towards increasing output. Another recommendations was that not fewer than 400 German prisoners-of-war should be directed into the industry.

A College of Managers

THERE is no gainsaying the fact that business efficiency to-day, whether in the chemical industry or any other field, calls increasingly for managers with wider outlook and more manifold experience than yesterday. Keeping labour in the shops and laboratories at work with a gradually increasing output is recognised as being insufficient. The need is arising for greater technical and scientific achievement, so much so that in order to create production processes that show economies in manufacture it will be necessary to resort to the mechanics of applied science. All this enhances the value of efficient management, both as regards deciding the policy of development and, more particularly, the actual planning of production schedules. Industrialists are realising this more and more and we feel there will be general approbation of the proposed establishment of a civilian staff college, providing a three months' course, in a mansion near Henley-on-Thames, given by Lord Hambleden. The Board of Trade is examining the possibility of co-ordinating and emphasising existing facilities for training in management and the present proposal should do much towards producing practical results.

Screw Threads

THE solution of a problem which has wide commercial ramifications and has been outstanding for a century was attempted in Ottawa last autumn by the Combined Production and Resources Board, on which the U.K., Canada, and the U.S.A. are represented. The subject is the unification of engineering standards, and a report of the proceedings (printed in Washington) has now been released by the Ministry of Supply. It includes recommendations on a wide range of subjects, notably on various types of screw threads. Detailed agreement is recorded in the matter of acme threads, buttress threads and instrument threads, while substantial progress is recorded in the consideration of special threads for high duty studs in light alloys, pipe threads, and screw threads for gas cylinders. The most outstanding recommendations are those concerned with the general problem of arriving at a common screw-thread form and associated ranges of diameters and pitch for general engineering use in countries employing the inch system of measurement. As in all matters of standardisation, there will inevitably be adjustments to be made in all the countries concerned, but the view was unanimously expressed by the delegates to the Conference that if a common standard is to be achieved, then the recommendations made in the report represent the solution involving the minimum overall readjustment. The British Standards Institution has been officially invited to give early consideration to the recommendations of the report, and copies may be obtained from them on application.

Commercial production of penicillin will be taken up in Italy next year, according to a statement by Signor Bergami, the Commissioner for Hygiene in the De Gasperi Government.

A New Guide to Britain's Economy

Monthly Digest of Statistics

(*from a Special Correspondent*)

THE publication, by the Central Statistical Office, only six months after the end of the war, of the first issue of the *Monthly Digest of Statistics* (H.M.S.O., 2s. 6d. net) is tantamount to the almost complete removal of the war-time statistical blackout. It is a fulfilment of the promise, given at the time of the issue of that remarkable statistical document, "Statistics relating to the War Effort of the United Kingdom," in November, 1944, "to release further information as soon as circumstances permit," and the new digest should go a good way towards compensating for the lack of information which has hampered intensive post-war planning. In the comparatively narrow compass of not quite 100 pages, a unique wealth of statistical information on every aspect of the country's economic life is presented with clarity and great technical skill. Statistics on employment, finance, external trade, wages and prices, and fuel and power, have long been available through separate departmental sources, but the value of the new digest lies in the fact that these series of figures, as well as a number of new or revived data, have, for the first time, been brought together in a single volume.

A War-time Creation

The Central Statistical Office was created during the war as an important organ of the Cabinet Offices. Its public performance was limited, during the war, to the publication of the above-mentioned White Paper on the war effort, and to the valuable annual White Papers on the national income. Since the speedy publication of statistical information will in future be indispensable for an efficient conduct of the country's economic affairs, the work of the C.S.O. will undoubtedly grow both in volume and in importance. Those who are inclined to fear that the creation of new Government departments must lead, *ipso facto*, to enhanced bureaucracy, will be surprised to learn that the C.S.O. is run by a staff of some twenty qualified statisticians.

The digest—extracts from which, so far as they directly concern the chemical and metallurgical industries appear below—is divided into eleven sections, devoted respectively to employment, fuel and power, raw materials, manufactured goods, building, agriculture and food, external trade, merchant shipping, inland transport, finance (in continuation of the Bank of England Statistical Summary), and wages and prices. A companion volume, entitled *Definitions of Items and Units*, is a useful and indeed necessary guide to those who wish to make permanent use of the digest, which, incidentally, contains an excellent index.

A Changing Pattern

Although the new digest will come very near to a fulfilment of its aim, which, according to the introductory notes, is "to show the changing pattern of the economic activity of the country," it does not contain *all* the information that might be included to provide an accurate picture of the country's economic life on one hand, and a basis for future policy on the other. For instance, no figures are given to show changes in productivity (except for coal), or the cost of living, and criticism has already been voiced both on the omission of certain stock figures, and on the presentation of many figures in weekly averages, instead of in absolute figures. However, since the scope of the digest is to be revised from time to time, these omissions may well be rectified in due course.

The digest contains a great wealth of information for those connected with the chemical and metallurgical industries, but considerations of space do not permit a reproduction in tabular form; however, an interesting picture nevertheless emerges from a general summary. The estimated number of persons employed in explosives, chemical, coke oven and by-product works (figures in thousands) rose from 174.3 in June, 1939, to 466.0 in June, 1943, declined by the middle of the following year, to 408.7, and fell further to 338.9 in June, 1945. The latest monthly figure refers to November, 1945, when 249.0 were employed, of which 101.5 were female workers. Employment in the iron and steel industry rose from 175.5 in June, 1939, to a peak of 212.8 by mid-1943, and fell to 191.5 by November, 1945. The corresponding figures for the manufacture of non-ferrous metals read: 55.9, 114.4, and 78.9, respectively. It is of interest to note that employment in the manufacture of scientific instruments rose from a mere 48.3 in mid-1939, to 82.3 by June, 1944, and was well maintained with 76.8 in the middle of 1945; the latest (November) figure being 64.9, with a surprisingly high proportion (30.5) of females.

The section dealing with raw materials will be studied with special interest, for it contains a wider range than appeared before the war. Production of iron ore (ferrous content of home-produced ore

equal to about 30 per cent.) amounted (weekly averages in thousand tons) to 273 last year, compared with a peak figure of 376 in 1942, and a production, in 1939, of 227. Pig-iron output, on the same basis, fell from 153 in 1939 to 137 last year, and production of steel ingots and castings declined, between 1939 and 1945, from 254 to 227. Detailed statistics follow concerning the production of finished steel goods, but figures for steel stocks have been omitted in the digest, although they were recently published by the Iron and Steel Federation. Statistics for the production, consumption, and stocks of non-ferrous metals form the next three tables, showing that production of virgin aluminium reached its war-time peak in 1943 with a monthly average of 4.64 thousand tons, compared with 2.08 in 1939. The most recent figure, that for November, 1945, is 2.48. There were 33,300 tons of tin in the country in December, 1945, 60,700 tons of refined lead, 115,000 tons of zinc concentrates, and 135,300 tons of virgin copper last November.

Chemical Statistics

Figures pertaining to the production, consumption, and stocks of chemicals and fertilisers occupy tables 43 to 46, the source being the Board of Trade and Agricultural Departments. However, it seems that the compilers of the digest have not yet become sufficiently aware of the important rôle played by the chemical industry in the country's whole economy: for no other explanation can be offered for the conglomeration of "molasses, chemicals and fertilisers," and "molasses and chemicals," in tables 43 and 44, the two remaining tables being devoted to "chemicals and fertilisers." A revision of this section should be undertaken forthwith; compared with the heavy industries and the textile industry, the chemical industry has been treated in a cavalier way. In addition to statistics on sulphuric acid, spent oxide, and ammonia, other important industrial chemicals, organic products, especially solvents and dyes, as well as pharmaceutical goods, should be included. A further omission that should not go unnoticed concerns statistics regarding domestic production of petroleum (both natural and synthetic) as well as imports. In this respect, the digest lags seriously behind similar United States or continental European publications, and its usefulness to industry and the public alike would be increased by a revision.

Although sulphuric acid production statistics regularly appear in THE CHEMICAL AGE in full, readers may be reminded that output rose from (monthly averages, thousand tons) 111.4 in 1935 to 133.3 in 1939, and reached a wartime peak in 1942 with 152.9, which level was approximately maintained in the two subsequent years. The latest figure (November, 1945) is 145.2. Superphosphate output reflects the growing domestic fertiliser demand: the November, 1945, figure stands at 81.8, compared with 71.6 in 1944 and 37.5 in 1939. Consumption of pyrites, which amounted (monthly averages, thousand tons) to 26.1 in 1939, rose to 28.0 in the following year, but there was a gradual decline to 18.6 in 1944, while last November's figure is given as 16.4. Consumption of sulphur for the manufacture of sulphuric acid rose from 7.7 in 1939 to 12.8 in 1941 and further to 14.3 in 1944, and the November, 1945, figure of 14.0 reflects the continued heavy demand for sulphuric acid. As regards phosphate rock, 68.3 were used last November for fertiliser manufacture, while 3.18 were destined for industrial purposes. The corresponding figures for 1944 and 1940, respectively, read as follows: 51.1 and 3.01; 36.9 and 3.90; no data are available for 1939. Deliveries to farms of basic slag run at 52.6 last October, compared with 43.1 in 1944 and 33.6 in 1939, while the corresponding figures for lime amount to 314.9 (in September last) 312.5, and 125.2. Stocks of pyrites amounted to 97 in November, 1945, and those of sulphur for sulphuric acid manufacture to 66.0, those of sulphuric acid to 85.5, while ammonia stocks, excluding ammonia produced in by-product factories and converted directly into ammonium sulphate, amounted to 5.07.

Trade in January

Chemical Exports Up

ACCORDING to the Board of Trade accounts for the month ended January 31, 1946, imports of chemicals, drugs, dyes and colours were valued at £1,163,054, as compared with £2,198,512 in January, 1945, a decrease of £1,035,458, and the monthly average of £1,134,291 for 1938, an increase of £28,663. The principal suppliers were the U.S.A. (£211,433), Spain (£190,518), Canada (£145,710), and the Argentine Republic (£120,304).

Exports for the month ended January 31, 1946, were valued at £4,820,350, as compared with £2,482,446 for January, 1945, an increase of £2,337,904, and with the monthly average of £1,856,649 for 1938, an increase of £2,963,701. Most went to British India (£628,002), the Argentine Republic (£333,723), Egypt (£304,453), and Australia (£300,387).

Seventy per cent. of the rubber consumed in North America in 1946 will necessarily be synthetic rubber produced in America, according to Mr. George W. S. Kitchener, president of the B. F. Goodrich Rubber Co. of Canada.

South African Chemical Notes

Summary of Latest Developments

(from Our Cape Town Correspondent)

THE shortage of sugar in South Africa has concentrated attention on the restrictions imposed on manufacturers under the Food and Drugs Act. Despite the fact that in Britain and America the use of saccharine in foodstuffs is permitted, its use in South Africa is restricted, apparently because of the opposition of the sugar industry. It is not known how the regulation forbidding the use of saccharine was originally drafted. Now faced with a drastic sugar shortage, local industries are being inconvenienced by this law. The sugar industry seems to realise this and has not raised the objections to the use of saccharine that the dairy industry has been raising to the introduction of margarine.

Sulphonation of Coal

The latest report of the Fuel Research Institute states that several methods of sulphonation were carried out on the local coal to determine whether favourable results could be obtained. The sample was screened between 25 and 36 B.S.S. mesh before and after sulphonation. Activity was tested by the amount of copper absorbed by the gm. from 50 c.c. of copper sulphate solution containing 0.0047 gm. copper per c.c. Treatment with concentrated sulphuric acid gave a product with an absorption of 0.40 gm. of copper per gm. Better results were obtained with chlorsulphonic acid at 100°C., which gave an activity of 0.050 gm. copper per gm. Owing to the troublesome foaming and caking which accompanied these methods, attempts were made in 1942 to sulphonate in the gaseous state with SO_3. Poorer results were obtained, as the coal charge appeared unsaturated even after eight hours' sulphonation in this manner. The investigation was resumed in 1943, the coal being treated with gaseous SO_3, which was synthesised from SO_2 and oxygen over platinised asbestos in a tube, immediately preceding the sulphonation retort. In preliminary tests one coal was treated under various conditions until satisfactory reaction conditions had been found. These were then adopted as standard procedure and were applied in testing a number of coals. Eleven samples were selected which could be considered reasonably representative of the types of coal found in South Africa. The activity value obtained compared favourably with values quoted in literature. It appeared, therefore, that even duff might be suitable as a raw material. Selection could not simply be based on activity, but factors such as SO_2 consumption and the hardness of the product would have to be taken into consideration.

The production of turpentine gum in the Tokai, Cape Peninsula, forest reached a new level in 1945, a total of 6000 gals. being tapped from the pine trees. Tokai pines proved of inestimable value during the war when supplies of turpentine from oversea were limited. The tapping of the pines during the last four years has become a feature of the work of the Forestry Department at Tokai.

Extensive deposits of chromitite are situated in the central Transvaal in two belts. Sales increased steadily to 44,443 tons in 1929, and then dropped to about half that figure. In 1934, however, all previous figures were exceeded by an output of 49,907 tons. During 1935, the record figure of 76,505 tons was reached. Thereafter, the output of the mines was considerably extended. During the war much of the output was sent to the United States.

Cement Manufacture

Although there is no general surplus of cement in South Africa now, the output of the two cement factories in the Cape Western Province greatly exceeds the demand there. As a result, cement is being exported to other African territories. Nine factories are now operating; the present output is over 1,000,000 tons a year, and two companies are enlarging their plants. In 1943 more than 123,000 tons were exported for such operational uses, and the following year the rate was stepped up by more than 50 per cent. At the end of 1944 the export of cement for operational purposes ceased, and the shortages which the Union had suffered were gradually overtaken.

A considerable expansion of Southern Rhodesia's cement manufacturing industry and the possibility of establishing a factory at Gwanda are envisaged in investigations now being made by the Industrial Development Commission. The largest known limestone deposits in Rhodesia, suitable for the manufacture of cement, are situated 20 miles south-east of Gwanda on the main line to West Nicholson.

The enormous increase in industrial and other land values in Johannesburg is indicated by the fact that the General Chemical Corporation, which early in 1945 bought 39.28 acres near Industria for expansion purposes at a cost of £72,680, equal to £1850 an acre, has recently been offered £5000 an acre for the purchase of 20 acres of the site.

Australian Drugs

War-Time Production from New Sources

BY developing production from hitherto untapped native sources, Australia has made great strides in its output of important drugs.

One of these is hyoscine, which was used extensively to bring relief to people trapped under debris in bombed British cities and towns. It was also found of value in preventing sea-sickness among our sea-borne invading forces.

When *Duboisia* leaves arrive at the factory, workers dealing with them must be protected by respirators and goggles against contact because of the high content of hyoscine.

The normal dose is only 1-150th of a grain and the first order—six ounces urgently required for the treatment of shell-shock—found Australia rather nonplussed. There was nothing like that quantity in the whole country. Hitherto, hyoscine and its companion alkaloid, atropine, were almost exclusively obtained from the belladonna and datura plants, but some years ago they had been found to be present in an indigenous Australian tree, the corkwood (*Duboisia*). Australian Government scientists, co-operating with the Reader in Pharmacy at Sydney University, hastily made experiments with the corkwood. As a result, eight ounces of hyoscine were produced within a month by one of the country's leading manufacturers of drugs.

That was not all. The experiments showed that the two varieties of corkwood trees, *Duboisia myoporoides* and *Duboisia Leichardtii*, produce up to 3½ per cent. of alkaloids, against less than 1 per cent. from belladonna and datura. The corkwood tree was not only a new source of the drugs, but a far better one. Although early production was only on a laboratory scale, the cost was far less than the price of £25 an ounce quoted by American drug manufacturers who had been approached in the first instance.

The firm fulfilling the Australian order rapidly built up its production of hyoscine until the time came when it was able to supply all the needs of the Western Allies. At the end of the war, a quarter of a ton had been sent away, with a total value of £30,000, every ounce being carried by aeroplane in 50-oz. glass containers, with specially devised plastic covers. Not an ounce was lost in transit, the only casualty being one container destroyed in a London post office during an air raid.

The output of atropine has marched side by side with that of hyoscine, and the firm now has a modern factory, capable of producing all the hyoscine the world requires, and very nearly all its atropine needs. Production costs are even lower than before the war.

There are not many horse-chestnut trees in Australia, and the war put a stop to the importation of the nuts, thus holding up the manufacture of aesculin, a glucoside valuable because of its peculiar property of shutting off that part of ultra-violet rays which cause sunburn, and passing that part which is beneficial. For that reason aesculin is important in the manufacture of sunburn creams for high-altitude flyers, workers on high buildings, and troops in the tropics.

A Fortunate Discovery

Australia soon found a substitute in *Bursaria spinosa*. A chemist of the Council for Scientific and Industrial Research noticed fluorescent streaks floating down a creek in South Australia, and traced them back to a *Bursaria spinosa* plant. Experiments showed that it was an excellent source of aesculin, and very soon production was in full swing. Once again, the new source of supply was found to be far better than the old, for *Bursaria* produces 5 per cent. of aesculin, as compared with 0.5 per cent. from the horse-chestnut.

When war broke out, Australia's stocks of morphine were dangerously low, and the Turkish supply was soon cut off. Fortunately, one far-seeing manufacturer had established a poppy plot on his experimental farm, and was able to supply seed for the immediate setting up of other poppy

farms in Australia, under the supervision of the Council for Scientific and Industrial Research. A new technique pioneered in Europe for producing morphine directly from the dry poppy capsule, instead of by extraction from the laboriously collected dried poppy juice or opium, was adapted to Australian conditions, and large-scale agricultural methods were utilised, including the use of a modified wheat header-harvester. Two years of drought caused substantial failure of the poppy crop, but the work went on, and Australia is now capable of supplying her own needs of morphine and codeine.

Australian druggists have been producing caffeine, too. They experimented with wastes and hairs from tea factories, and their experiments were so successful that they later imported special cargoes of tea refuse from Ceylon. To-day, Australia can supply all her own needs of this drug.

Fatty oils presented another problem. War in the Mediterranean cut off most of the world's supplies of olive oil, and the resulting scarcity in Australia made chemists turn their minds towards the production of a substitute. It was suggested that there might be a useful source of oil in the kernels of apricot seeds left over after jam-making and canning. Experiments proved that this was so. The chemists produced an excellent sweet oil, with a faint flavour of almonds, that was quite the equal of olive oil for cooking purposes, and very valuable in the manufacture of cosmetics.

One firm erected a special plant for treating the stones, and designed an expeller for obtaining the oil, once the stones had been washed and cracked. From 1940 to the end of the war, they dealt with something like 100,250,000 stones. Every drop of the resultant oil was bought by the American Army for use in cooking.

Hopes are entertained of large supplies of "home-produced" quinine. Before the war, Australia's cinchona plantations were at Aiyura, in the mountains of New Guinea, and were only in the experimental stage. Most of the world's supply of quinine came from Java. When the Japs poured south, not only was the Java supply cut off, but the New Guinea plantations were threatened. The Council for Scientific and Industrial Research decided to experiment with new areas. This was most difficult as the cinchona thrives only in certain very infrequent conditions. The scientists decided, however, upon places on the Atherton

Crystals of hyoscine hydrobromide.

Tableland, high up in the tropical part of North Queensland, and plantations were founded. Specially selected cinchona seeds, the result of American experiments in the Philippines, were germinated at South Johnstone, packed in travelling boxes and flown to their new home in the New Guinea highlands. Except for a few killed by frost as the plane flew over the hills, they flourish there now, a sound basis for Australia's quinine production in the future.

MIDLAND TAR DISTILLERS

As briefly stated in The Chemical Age on March 2, the Midland Tar Distillers, Ltd., are issuing further ordinary shares as a first step towards providing capital for their expansion and reconstruction programme, mostly in connection with their central works at Oldbury. We now learn that this programme covers a wide field. Early items include a Foster Wheeler tube still for the continuous distillation and fractionation of crude tar, designed on the most up-to-date lines, and capable of distilling more than either of the existing units of this type, together with a large installation of storage tanks for the raw material and the bulk products. A new and up-to-date research and development laboratory is also high up on the list of new items. A plant for the recovery of CS, from crude benzol "fronts" from the present benzol refinery has been practically completed and several new plants are now in development.

The M.B.V. process is a chemical method whereby the natural film of oxide on the surface of aluminium may be increased to provide improved resistance to chemical attack. A new data-leaflet about the process was recently issued by the British Aluminium Co., Ltd., of Salisbury House, London Wall, London, E.C.2.

New Range of Waxes

Commercial Production to Begin Soon

BY the end of this month, a start is to be made at Bridgend, South Wales, in the manufacture of a new range of waxes—collectively known as Abril—which are claimed to be in many respects superior to natural waxes.

The outcome of research over a number of years by a team of British scientists working in the Blackpool laboratories of a leading firm of manufacturing chemists, Abril has as its basis by-products of the margarine, soap and other fat-splitting industries of this country. The resultant waxes are held to be free from those imperfections and inconsistencies of natural waxes which have hitherto presented problems to many industries. Moreover, whereas the highest melting-point of natural wax is 88° C., one particular Abril has a m.p. as high as 250° C., which should prove of considerable advantage for insulation purposes in the electrical and radio industries. The addition of a comparatively small amount of Abril to paraffin wax enables the melting point of the latter to be raised appreciably.

Non-Toxic

All the Abril waxes are non-toxic—a distinct advantage—and they will be marketed in flaked form so that they can be used immediately. If so required, they can be supplied almost colourless.

Some of the most interesting types of Abril are still in the experimental stage, but those already perfected and ready for production on a commercial scale are considered capable of producing immediate benefit in a wide range of spheres, including the electrical and textile industries; paints and distempers; car, floor and furniture polishes; cosmetics; gramophone records; wallpapers; carbon paper and stencils; leather finishes; printing inks, etc. The plastics industry is also thought likely to benefit greatly by the development of Abril.

A large block of 38 single-storey widely-spaced buildings—comprising the major portion of the Bridgend Royal Ordnance Factory—has been allocated for the production of Abril and it is expected that when production is in full swing there will be employment for more than 3000 workers, including over 100 qualified research workers, with assistants. The proprietors—The Abril Corporation (Great Britain), Ltd., 25 Hanover Square, London, W.1—attach considerable importance to research and plan to spend ten per cent. of the annual turnover to that end.

It is hoped that by the end of this year the initial production "target" of 1250 tons will have been reached comfortably. The "target" for 1947 is 2500 tons and that for 1948 between 10,000 and 15,000 tons. For the present the proprietors are concentrating on export trade. Orders have already been received from Sweden, Holland, Denmark, Belgium, and France, in addition to which considerable interest has been evinced in America and Canada.

Royal Institute of Chemistry

Annual Meeting and New Officers

FOLLOWING the anniversary luncheon at the Savoy Hotel, London, the annual meeting of the Royal Institute of Chemistry will be held in the Lecture Room of the Royal Society, Burlington House, at 3.15 p.m. on March 12.

At the last meeting of Council the following nominations were made for the ensuing year:

Dr. G. Roche Lynch was unanimously nominated for election as president. The following were nominated for re-election as vice-presidents: Mr. A. L. Bacharach and Dr. William Cullen. The following were also nominated for election as vice-presidents: Professor H. V. A. Briscoe, Mr. G. Elliot Dodds, Professor Alexander Findlay, Mr. A. J. Prince. Dr. D. W. Kent-Jones (who succeeded Mr. J. C. White at the beginning of the year) was nominated for election as honorary treasurer.

Nominations of the following for election as General Members of Council were received: Dr. J. O. Cutter, Dr. T. F. Dixon, Dr. H. H. Hodgson, Mr. S. J. Johnstone, Mr. J. A. Oriel, Dr. E. Vanstone, Mr. P. N. Williams. The following were nominated for re-election as General Members of Council: Professor F. Challenger, Mr. R. C. Chirnside, Dr. J. F. J. Dippy, Dr. H. J. Emeléus, Mr. A. T. Green, Professor J. M. Gulland, Professor D. H. Hey, Dr. J. G. King, Professor G. F. Marrian, Dr. J. H. Quastel, Mr. F. Scholefield, Professor A. R. Todd, Mr. Harry Weatherall. Ballot having been taken, the following were also nominated for election as General Members of Council: Professor J. W. Cook, Dr. C. J. T. Cronshaw, Mr. M. B. Donald, Dr. A. G. G. Leonard, Mr. E. T. Osborne, Dr. G. L. Riddell, Professor E. K. Rideal, Dr. F. Roffey, Professor J. L. Simonsen, Mr. R. W. Sutton, Mr. George Taylor. Four of the following nominees are to be elected as censors: Mr. Lewis Eynon, Professor Alexander Findlay, Professor Sir Ian Heilbron, Mr. Bernard F. Howard, Dr. Harold Moore.

Membership of the Institute, it is announced, stood, at the end of 1945, at 9641 (3248 Fellows, 6393 Associates), compared with 9182 (3003 Fellows, 6179 Associates) at the end of 1944. A steady rise has been recorded since the end of 1939, when aggregate membership amounted to 7554.

Anodic Oxidation of Aluminium

Report on Progress Overseas

by W. G. CASS

INTEREST in this important branch of metal surfacing and protection, and experimental results have lately been reported from France, Italy, Russia, and the U.S.A. In France, Dr. J. Hérenguel deals with the work of Lacombe and Beaujard for the Commission Technique des Etats et Propriétés de Surfaces des Métaux (*Chim. et Ind.*, Dec., 1945, 389) in which some attempt was made to clear up certain outstanding difficulties and unexplained features of the anodic process brought out from time to time by inexplicable defects of quality and appearance.

The remarkable qualities of the extremely thin film of alumina naturally formed on the surface of aluminium are noted and some account given of the various methods by which this is supplemented by artificial oxidation methods. Of these there are many, but the sulphuric acid anodic method now predominates. It offers certain advantages, such as precise control and flexibility to meet varying conditions or requirements as well as economy. At the research laboratories of L'Aluminium Français at Chambéry, and of Professor Chaudron, methods have been devised for anodic coating of aluminium wire. In such case rapid growth of coating is essential to keep pace with wire travel, and the coating must not be at all brittle. These conditions may be satisfied by using suitable electrolyte containing chlorides, together with high current density.

Study of Film Formation

In their latest work, Lacombe and Beaujard began by studying film formation, using aluminium of the highest purity electrolytically polished before oxidation. At the start of oxidation and under high magnification, the film, of course, being extremely thin, interference colours were noted which were different for different alumina crystals. For this two reasons were suggested: (a) if alumina is optically isotropic, differences in colour may be attributed only to differences in film thickness, due to variable rate of growth of the alumina film on each aluminium crystal; (b) if, on the other hand, alumina is optically anisotropic, differences in coloration may be attributed either to differences in thickness of film or in refractive index. Such anisotropy may be shown in the case of thick films of 10μ or more by examining aluminium and alumina respectively between crossed nicols. But it seems fairly certain that thickness of film is quite uniform, so that anisotropy must be due to differences in crystal orientation in the metal itself. Support for this view is said to be afforded by examination, in polarised light with parallel transmission, of a film separated from its base; and it is further supposed that the alumina film is biaxial, the bisector of the optical axes being always vertical to the metal surface.

It is concluded generally from these various optical tests that each crystal of aluminium produces an anisotropic oxide film, apparently non-crystalline and of non-cubic structure, the constituent grains of which have a common axis of orientation which would be vertical to the surface of the metal, as is the case with other electrolytic deposits.

Use of X-Ray Methods

Since these conclusions were considered to contradict those of some previous workers, a further study was made by X-ray methods; *e.g.* (i) Debye-Scherrer; (ii) a modified Seeman-Bohlin mounting to increase dispersion; and (iii) the monochromatic curved quartz arrangement of Guinier. Diagrams thus obtained showed that alumina, if not amorphous, is at least very finely crystalline, and the diffraction rings are clearly in the position corresponding to γ-alumina. These diagrams were independent of the crystalline state of the metal immediately below. Thus, in structure, the alumina film may vary very slightly between completely amorphous and very fine or micro-crystalline, is pseudo-cubic, and is orientated towards the surface of an aluminium crystal having axes vertical to the metal surface. There is no question then of epitaxis, but there is an orientation relation between the oxide and its basic support.

Dr. Hérenguel proceeds to deal with the connection between metallographic structure and the appearance and properties of the oxide film, and discusses at some length the effect of preferential solution of constituents, or supersaturated solutions, precipitation, and the phenomenon of *réticulage* or network. As he quite correctly points out, the appearance and properties of anodic films are largely functions of the metallurgical factors governing production. Mechanical faults masked in the various operations beforehand are revealed by anodic oxidation, so that the parts intended for this treatment must be prepared with extra care; otherwise the anodic process may be held responsible wholly or partly for defects present before oxidation begins. A full report on the work of Lacombe and collaborators

has been issued by the Commission Technique.

Some Russian Work

In a small book on "Oxide Coatings on Metals" (*Acad. Sci. U.S.S.R.*, Moscow, 1944) Professor A. G. Samartsev devotes a section to anodic oxidation of aluminium (pp. 91-104). He justly points out that a lot of work has been done by various investigators, but the mechanism of coating formation is still by no means fully explained. On the basis of his own experiments he concludes that, with electrolytic oxidation in sulphuric acid—as well as in other electrolytes—aluminium at first passes into solution, forming a pre-anodic layer of liquid which hydrolyses, with formation of an aluminium hydroxide coating on the surface of the metal. With continued electrolysis this hydroxide coating dehydrates and acquires a porous structure.

Finally, the oxide film appears as a perforated compact network of extremely thin capillary canals, which supposedly are preferentially orientated in the direction of current. To the extent that the hydroxide and oxide of aluminium appear as dielectrics—and there can be no doubt as to this in the case of the oxide (alumina)—the whole current will evidently pass through the pores of the coating. Accordingly, the interior of the pores will develop an appreciable amount of heat (Joule effect), which should facilitate the removal of water from the hydroxide. The author briefly discusses these views, but devotes himself mainly to a description, with graphs, of the results of tests mainly with a 20 per cent. sulphuric acid electrolyte, with a c.d. of 2.4 amp./dm^2; also under varying conditions of concentration, c.d., temperature, and certain other factors, such as rate of rotation of stirrer in the oxidising bath. Experimental work with Duralumin and Silumin is included, together with some notes on dimensional change through painting or other finish.

Effect of Impurities

In a paper on "Performance and Structure of Anodic Coatings on Aluminium" (*Iron Age*, 1945, November 22, p. 75) F. Keller and J. D. Edwards, of the Aluminium Research Laboratories, U.S.A., state that anodic coatings are something more than a mere strengthening of the natural film. They also, like Lacombe, attempt to correlate structure with important properties such as resistance to corrosion. The coatings on pure aluminium are substantially the oxide (alumina), continuous and transparent. Such a film, produced for example by the Alumilite process with a sulphuric acid electrolyte, can be separated from its base by mounting in plastic and removing the metallic aluminium from the back by grinding and polishing. If it is then examined through the microscope very few opaque spots will appear, and these, if present, will be due to traces of iron or silicon, where the purity is up to 99.95 per cent. If less pure, say 99.2 per cent., the dark-coloured areas will be considerably increased, and appearance, colour, and corrosion-resistance be accordingly modified. Coatings by this process are from 0.0001 to 0.0006 in. thick, *i.e.*, from 100 to 1000 times as thick as the natural film.

Formation of the anodic film and its properties depends on constituents present in aluminium and its alloys. Some of these alloy elements remain practically unchanged during electrolytic treatment, *e.g.*, silicon; and micrographs show the silicon particles occupying the same relative position in the film as in the orginal metal or alloy; but with $CuAl_2$ and β Al-Mg, these are either oxidised or dissolved much more rapidly than the aluminium matrix. Coatings containing appreciable amounts of these tend to be thin, rough, and porous. $FeAl_3$, α Al-Fe-Si, and MnAl, are generally only partially dissolved or oxidised, and particles thereof, unchanged or partly oxidised, remain in the film and likewise affect its structure and properties.

Reflecting Surfaces

These oxidation characteristics of the constituents are important when it is desired to obtain a bright reflecting surface. With high purity aluminium this can be done by electrolytic polishing or brightening, as in the Alzac process. Here the reflectivity is about 90 per cent. Anodic coating of such a surface means some loss in reflectivity, but with a coating 1.6 mils in thickness it was still 84 per cent.

As coatings grow in thickness, with continued anodic treatment, weak spots may be eliminated by growth of oxide around unoxidised constituent particles and over holes and partly oxidised constituents, especially in the case of wrought products. Although this would seem to reduce porosity it is still true that thick coatings are porous, the pores extending inwards almost to the oxide/metal interface and facilitating entrance of the electrolyte carrying current and forming oxide. Comparatively low magnification, say × 1000, does not definitely show these pores. They appear somewhat indefinitely as vertical striations from the metal upwards. Near the surface of the coating there is a zone in which the oxide changes in appearance, and where chemical attack by the electrolyte has broken down the walls of the pores so that structure becomes spongier.

With the electron microscope, and magnifications up to × 110,000 or more, the pore centres could be clearly seen and examined. According to present theory, which seems to be confirmed by these examinations, there is a very thin barrier layer of oxide at the base of the pores, separating them

from the metal. A count of the pore centres shows there are over 1000 million per sq. in., but these are large enough to permit entrance of an aqueous solution carrying current; and though perhaps too fine to admit solid particles except in a finely colloidal state they allow the coating to be coloured by dye adsorption.

From the point of view of metal protection it is more important for the pores to be closed or sealed by subsequent treatment, *e.g.*, with chromate solutions which also improve bonding for paint. Simple hot-water rinsing will seal the pores and make the coating non-adsorptive and non-staining. The oxide coating protects against abrasion if not too sharp or hard. Abrasion resistance increases with thickness, but sealing with hot water lowers this resistance slightly. The anodic coatings are extremely efficient against corrosion, and naturally this depends on continuity which increases with thickness up to a certain point. This protection has been shown in the usual salt-spray and atmosphere exposure tests (*see* for example, A.S.T.M. Report of Committee B7, Appendix II: "Comparison of Performance of Anodic Coatings exposed to Salt Spray and Weather," 1945, including tests under severe service conditions).

Use of Sulphamic Acid

Brief reference should be made to a fourth study of anodic oxidation, namely, the use of sulphamic acid in electrolytic metal refining and plating and in the anodic oxidation of aluminium. Cupery (*Ind. Eng. Chem.*, 1938, *30*) described the production of this acid on a commercial scale, as a result of work by the Grasselli Division of the Du Pont Company, and at the same time indicated some of its possible industrial applications. Its use in the electrochemical field has been investigated also by Mathers and his students in the U.S.A., and by Piontelli of Milan University in Italy. The former studied the electrodeposition of lead from solutions of lead sulphamate with addition agents, on which some work has also been undertaken in Canada by A. H. Wilson Busby of the Consol. Min. and Smelt. Co., Ltd. (*Trans. Amer. Electrochem. Soc.*, 1939, *76*, 371, and 1940, *78*, 420); while Piontelli covered a rather wider field in the electrodeposition of several metals from sulphamic acid solutions, also more particularly the anodic oxidation of aluminium (*Korr. u. Metallsch.*, 1943, *19*, 110-113).

The Italian writer points out that, notwithstanding much new study of anodic oxidation by means of X-ray and electron-diffraction methods, the structure and properties of the anodic film are not yet by any means satisfactorily explained. He does not pretend to add much by way of explanation, but considers the two following propositions fairly established: (a) Anodic oxidation of aluminium is possible only with electrolytes in which oxygen-containing anion is present; and (b) the electrolyte must have a certain but not too strong solvent action on aluminium and on the film or coating.

The latter is essential for obtaining an appreciably thick coating; with too weak solvent action, oxide formation ceases after a short time and the coating is presumably too thin. Some unpublished work of the author shows that the kinetics of aluminium solution under varied surface conditions, in sulphamic acid, are somewhat analogous to its solution by sulphuric acid, though in some ways there are wide differences.

Piontelli's Process

Piontelli claims to have obtained good results from the use of saturated sulphamic solutions, and considers that the fundamental difference between these solutions and those of sulphuric acid are chiefly, if not entirely, due to the widely differing action of the SO_4- and NH_2SO_3-anions. Oxidation proceeds as in the chromic acid baths for aluminium treatment. Potential is apt to rise quickly to high values, and must be controlled, as in the chromic baths. The temperature range is 30-40° C., and, as would be expected, higher temperatures involve the risk of too violent action, or etching, on the metal. Current density is lower than with sulphuric acid and should not exceed 100 amp./m². Thickness of coating, for the same length of treatment, is less than with sulphuric acid; but the coatings are less porous and more dense. Even without subsequent sealing or finishing good protection against corrosion is claimed. The process is briefly as follows.

Five seconds' immersion in NaOH (500 g./lit.) at 50°: rinse in flowing water: 5 seconds' immersion in 50 per cent. nitric acid at 50° C.: water rinse: anodic oxidation at 35° C. in saturated sulphamic acid solution—prepared at 20°—with gradually increasing voltage during 45 minutes up to 45 v. After another water rinse the oxidised parts are tested for corrosion resistance in the usual media, *e.g.*, salt- or sea-water spray, salt solutions (3 per cent.), etc. After 15 months' immersion in a 40 g./lit. NaCl aerated solution the samples showed no change.

Piontelli's work for metal deposition generally is covered by Italian Pat. 368,824 (appln. date Dec. 15, 1938) with addition patents 381,860 and 388,592. (*See* also *La Chim. e l'Ind.*, 1939, *21*, 478, and 1940, *22*, 65; *Metallurgia Ital.*, 1942, *34*.)

It may be worth while to add that there does not appear to be very much to report as new from Germany in regard to anodic oxidation of aluminium. Herrmann-Zurbrügg's new (3rd) edition of *Die Bearbeitung des Aluminiums* (1943), lithoprinted by Edwards in U.S.A. in 1945, contains a chapter on the subject which is mainly devoted to processes based on fairly old patents of the Vereinigte Leichtmetalle A.G., Ver. Aluminium Werke A.G. (oxalic), and others.

French Chemical Notes

Maintenance of Improvement in Supply Position

REFERENCE was made in THE CHEMICAL AGE on January 19, 1946, to the improved situation in the chemical industry in France, mainly owing to increased supplies of coal and the stepping-up of imports of raw materials. Although there are still several reasons why excessive optimism is unjustified, latest advices indicate that the improvement is being maintained and some effort is being made to correlate the estimated needs with the likely production during this year. At present it is estimated that only about 20 per cent. of the total requirements are being met, compared with 14 per cent. for the whole of industrial production, and 41 per cent for manures, which have been allowed priority.

Sulphuric Acid

The production of 50,000 tons of sulphuric acid monthly compares with needs totalling 1,200,000 tons. Installations are in the course of reconstruction, but are still insufficient and lack of pyrites continues to hold up production. About 800,000 tons of pyrites will be needed in 1946, only 20 per cent. of which can be supplied by France herself. Imports are also delayed.

Production of soda carbonate is limited by coal supplies. Although 500,000 tons is the figure required in 1946, only 30,000 tons is to be imported, which will leave a big gap between supply and demand.

Pre-war consumption of copper sulphate was about 80,000 tons. Present need is for 100,000 tons, and electricity again governs production. The amount to be imported is 20,000 tons.

Chlorate needs are estimated at 60,000 tons. Present production is 60 per cent. of the 1938 figure of 42,000 tons. Imports from Germany amount to 200 tons a month.

Agricultural needs in 1946 require 490,000 tons of nitrogen manure compared with present French production of 90,000 tons. Before the war, production of superphosphates was 1,200,000 tons, while present requirements are for 5,000,000 tons. Production now is 700,000 tons, and 30,000 tons are to be imported from Belgium.

Pre-war sulphur production capacity was greater than the consumption, which was about 75,000 tons. Electricity shortages have limited present output to 80,000 tons, and imports have also been delayed, but the outlook in this direction is considered good.

Paint production has risen steadily since August, 1944. Thanks to imports of linseed oil, benzene, solvents, glycerine, etc., production in December, 1945, was 10,000 tons, which is 70 per cent. of 1938 figures. Although requirements are double pre-war; it is thought that production will be satisfactory. Cellulose paint, however, is in very short supply, and imports will be necessary if the automobile export programme is to be carried through.

Recovery in the organic chemistry industry is mainly dependent on the supply of raw materials, such as benzene, phenol, etc. Synthetic tannins, auxiliary textile products, plastics, etc., were very bady affected by shortages of these products during 1945, but there has been an improvement since war production has almost entirely ceased, and imports have been received. Raw material needs for 1946 are reckoned at about 18,600 tons. Tar and benzol production in 1945 was about 40 per cent. of 1938 figures due to the coal position.

In 1946 it is hoped that increased coal supplies will enable textile requirements for about 650 tons of dyeing materials a month to be satisfied. About 746 tons of plastics were produced in November, 1945, against a monthly average of 1046 tons in 1938. The tremendous growth of the use of plastics, however, means that production is still far below requirements.

Methanol production has also gone up, being 1000 tons against 660 tons in 1938, but demand is for 1,800 tons. It is thought that given sufficient coal, production could be boosted to 2000 tons.

Domestic Sulphur

To replace the imported sulphur from Italy and Louisiana which in normal times is imported into France, but which has not been arriving since the beginning of the war, *L'Industrie Chimique* (1946, No. 343, p. 303) suggests that the deposits in S.E. France should be further explored. Those at Apt, Malvézy, and Les Camoins (near Marseilles) have proved disappointing, but it is contended that in the Manosque district there are deposits which have been completely neglected, though it was announced that work was to have been re-started there in 1939. Justification is claimed for optimism about these deposits, as nine profitable veins have been located there (in the mine of Le Largue), seven of which were grouped together and possessed a workable thickness of 10 feet. The richest sections of these veins revealed a sulphur content of 28-30 per cent., while the poorest parts showed 10-15 per cent., giving an average of 20 per cent., comparable with that of many Sicilian mines. It is claimed that a total reserve of 2,000,000 metric tons could be easily worked, sufficient to satisfy French demands for many years to come.

Thermodynamic Survey

The Use of Energy-Balance Equations

At a meeting of the North-Western Branch of the Institution of Chemical Engineers, on February 18 at Manchester College of Technology, Mr. E. Woollatt read a paper on "Some Aspects of Chemical Engineering Thermodynamics." He divided his paper into three sections: (i) a brief survey of fundamental principles; (ii) the development, and (iii) the use of steady-flow energy-balance equations.

In the first section, the stored or total internal energy of a system was taken as a property of the system and as equal to the heat supplied plus the work done by it, which together are not properties of the system. Heat and mechanical work are the forms of energy usually considered in chemical engineering and they appear in reversible and irreversible forms; a reversible change is very small and is carried out slowly, representing a series of equilibrium states along a definite path. An irreversible change, however, may take the form of external or of internal mechanical or thermal irreversibility, or of irreversibility due to electrical resistance, and leads either to a conversion of mechanical to thermal energy or to a decrease in the temperature of a quantity of thermal energy, thus causing a loss in the availability of that energy. In these connections, the first and the second laws of thermodynamics were considered and an adiabatic change was defined as one in which no heat is exchanged with the surroundings.

Problems of Flow

The lecturer then developed energy-balance equations for steady-flow processes which were taken as continuous with no change in their conditions; an overall or first-law balance, a continuity equation, and a second-law or mechanical energy balance including the differential form of Bernoulli's equation completed this section of the paper.

In the third section, these equations were used in problems such as the flow of compressible and of incompressible fluids, adiabatic throttling, the movement and compression of gases, stagnation pressures and temperatures, steam-power plants, and fluid heaters. An incompressible fluid was regarded as one in which the pressure drop is less than 10 per cent. of the lower absolute pressure. Adiabatic flow through pipes was irreversible, but the flow of compressible fluids through nozzles was assumed to be adibatic and reversible, corrections for the deviations from this state being made by the use of suitable coefficients. Adiabatic throttling of a gas through a constriction was a limiting case of flow through an inefficient nozzle. The compression of gases and of vapours, also the flow of energy through a power plant, were regarded as a set of steady flow problems when a large number of cycles are considered. This valuable survey concluded with lists of formulæ and references.

Industrial Exhibition

First in London since the War

THE first post-war industrial exhibition in the London area was held throughout this week at the Renault Works, Western Avenue, Acton. Organised by the local Chamber of Commerce, it had the dual purpose of making known the war production efforts of industries in the neighbourhood and showing how these are now settling down to cater for the needs of the community at peace. With more than 450 factories, large and small, Acton claims to be the largest industrial centre South of the Midlands, and upwards of 60 firms took part in the exhibition. Their enterprise was warmly praised by Mr. W. Leonard, Joint Parliamentary Secretary to the Ministry of Supply and Aircraft Production, when he performed the opening ceremony on Tuesday in the unavoidable absence of the Minister.

Among the exhibitors were Nordac, Ltd., chemical engineers, whose display of acid and corrosion-resisting plant for pickling, plating, etc., included a small pickling tank of mild steel, lined with Nordac acid-resisting rubber and acid-resisting tiles, and heated and agitated by a submerged-flame burner, with fume-extractor unit; a plating tank of mild steel lined with chemical lead by S. Porter & Co., Ltd. (associated with Nordac, Ltd.); and a Nordic Noristaltic glandless acid pump, designed for pumping corrosive liquids. Other attractive displays, of a different character, were staged by Pepsodent, Ltd.; Lightalloys, Ltd.; and Durion, Ltd., electro-chemical depositors.

PRICES OF OILS AND FATS

There will be no change in the prices of unrefined oils and fats and technical animal fats allocated to primary wholesalers and large trade users during the four weeks ending March 30. Linseed acid oil is not at present available, and the price of linseed oil foots remains at £42 per ton, naked ex works.

The only change in the prices of refined oils and imported edible animal fats allocated to primary wholesalers and large trade users during the eight weeks to April 27 is that South American oleo oil increased by £20 per ton to £90 per ton c.i.f., duty paid, in hardwood barrels or tierces; if in softwood barrels, £2 5s. per ton less.

Parliamentary Topics

Raw Materials for Plastics

IN the House of Commons last week, Lt.-Col. Sharp asked the President of the Board of Trade how present supplies of phenol, cresol, and woodflour compared with those available before the war; whether increased supplies would soon be made available to the plastics industry; and the conditions under which plastics manufacturers could obtain import licences for such raw materials.

Sir S. Cripps: Supplies of phenol available to British industry are 50 per cent. higher than in 1939. United Kingdom production of natural phenol, which depends upon the amount of coal carbonised, is now at its maximum, and steps are being taken to increase the home production of synthetic phenol. Import licences are being issued to plastics manufacturers in order to cover the balance of their needs.

United Kingdom production of cresol is now slightly higher than in 1939 and the output of grades suitable for plastics manufacture is at its maximum. There is no possibility at present of importing cresol suitable for the plastics industry, since there is no producing country with any surplus.

Home production of woodflour is estimated to amount at present to about two-thirds of the pre-war output; arrangements have been made for increased production, and import licences are being issued to cover the full requirements of firms in the plastics industry up to June 30.

Cornish Tin

In reply to questions from Commander Agnew and Mr. Douglas Marshall as to why the report of the committee set up to advise on the Cornish tin industry had not been published, Mr. Shinwell stated that the inquiry of the committee of technical experts appointed by his predecessor included an investigation into the affairs of a named undertaking, and that it was not customary to publish reports in such circumstances. He further stated that the information which had been made available to him by eminent mining professional men would not be of much value to the tin industry at the present time; but he gave an assurance that he realised the importance of providing for the tin-mining industry in Cornwall. He was very anxious, he said, to exploit all our mineral resources.

Mr. Marshall also asked the Minister of Supply whether, in view of the need to revive the Cornish tin industry in the interests of the necessity to save imports, he would guarantee for five years a minimum price for British-won tin. Mr. Leonard replied that, in the absence of any clear indication of the future level of world tin prices, it was not possible to accept this suggestion.

Fuel Oil Duty

Colonel Erroll asked the Chancellor of the Exchequer whether, in view of the fuel shortage in this country, he would consider reducing the duty on imported fuel oil. Mr. Dalton said he had noted the suggestion, but must not anticipate his Budget statement.

Paludrine

Dr. Morgan asked the Secretary for the Colonies whether ample supplies of paludrine had been made available for trial use in tropical colonies; whether adequate records were kept of the results of treatment in the West Indies; and whether he or his appropriate advisory committee had considered setting up factories in selected colonies so that full supplies of this drug might always be available on the spot.

Mr. Creech Jones: Important trials of the efficacy of paludrine in the treatment and control of malaria are in progress in Australia, but not so far in the Colonies, although my advisers are in close touch with developments. The question of large-scale manufacture does not arise until the trials have reached a more conclusive stage.

Calcium Content of Flour

Mr. P. Freeman asked the Minister of Food what proportion of chalk was added to the national loaf; and from where it was obtained in South Wales.

Sir B. Smith: Calcium in the form of *creta preparata* is added to flour at the rate of 7 oz. of calcium to 280 lb. of flour. The mills in South Wales obtain their supplies of calcium from the Swanscombe Works, Northfleet, Kent.

Chemical Exports to Spain

In reply to a question from Mr. Gallacher, Sir Stafford Cripps stated that in the six months, July-December, 1945, exports of chemicals, drugs, dyes, and colours to Spain amounted to £524,000.

Imports from Spain

In answer to Capt. Swingler, Sir Stafford Cripps gave the following figures for imports from Spain (among others) in January last: potassium chloride, 232 cwt.; iron ore 825 cwt.; rosin, 48 cwt.; superphosphate of lime, 120 cwt. The total value of imports from Spain in that month was £1,778,000, of which £1,023,000 was accounted for by oranges.

Penicillin Payment to U.S.

Captain Blackburn asked the Minister of Supply whether the British Government

would have to pay royalties to U.S. firms for the use of deep fermentation processes, now in operation at Speke, for penicillin production.

Mr. Wilmot replied in the negative, but said that a lump sum was paid to a United States firm in return for their help in designing the plant and giving initial advice as how best to operate it.

Camphor

Mr. William Shepherd asked the President of the Board of Trade what supplies of camphor had been received from Japan since the defeat of that country; and what further supplies were arranged for the next six months.

Sir Stafford Cripps explained that camphor comes from Formosa, which is now separated from Japan and at present under Chinese Military Government. No trading with Formosa was yet possible, but the possibilities of an early resumption were being investigated.

Lithopone

Mr. Drayson asked the President of the Board of Trade why, at the present moment, lithopone was in shorter supply than at any time during the war.

Sir S. Cripps: Our supplies of lithopone have increased since the war. Production during recent months has been at a higher rate than at any time since 1941 and every endeavour will be made to maintain it at as high a rate as possible.

Casein

Squadron-Leader Hollis asked whether the Board of Trade had sanctioned the production of plastic mats, etc., out of milk; and how much milk it was estimated would be used during the next 12 months for these purposes.

Sir S. Cripps: Licences have been, and will continue to be given for the manufacture from casein of goods which are essential for the home market and for export. Casein is the only plastic material which has a high milk content, but it is imported from South America, and there is no drain on supplies of home-produced milk.

German Technical Reports

Further List

APPENDED are details from the latest list of industrial reports by the Combined Intelligence Objectives Sub-committee (CIOS).

CIOS XI—12. *Production and use of Aerosols* (1s.).

CIOS XXVII—6. *I.G. Farben, Schkopau*: Manufacture of styrene and polystyrene (1s. 6d.).

CIOS XXVII—15. *I.G. Farben, Schkopau*: Manufacture of acetaldehyde (6d.).

CIOS XXVII—59. *Underground German Liquid Oxygen Plant, Wittring* (2s.).

CIOS XXVII—95. *Heraeus Vacuumschmelze A.G., Hanau*: Metallurgical products. Beryllia reduction process (1s.).

CIOS XXVIII—29. *Chemicals made at Schkopau Works*: Chlorine, aluminium chloride, vinyl and polyvinyl chloride, phthalic anhydride (1s. 6d.).

CIOS XXVIII—57. *Deutsche Erdöl A.G. Erdölwerke "Nova" Dachs II Plant, Ebensee, Austria*: Production of low octane gasoline and diesel fuel (1s.).

CIOS XXX—72. *Leipziger Leichtmetall Werke-Rackwitz, Rackwitz*: Aluminium and magnesium fabrication (2s.).

CIOS XXXI—30. *Krupp-Lurgi Low-temperature Carbonisation Plant, Wanne-Eickel* (1s.).

CIOS XXXII—21. *Aluminium from Clay* (1s. 6d.).

Houdrane

New Paraffin Hydrocarbon

HOUDRANE, a paraffin hydrocarbon of the empirical formula $C_{18}H_{34}$, has been analysed by the hydrogen lamp method and found to have 15.11 ± 0.03 per cent. hydrogen, with an H/C ratio equal to 2.120 ± 0.005, as against the theoretical figures of 15.137 per cent. and 2.125, respectively, according to workers of the Houdry Process Corporation of America.

Although its structure is not definitely established, it is a highly branched hexadecane, with about as many carbon atoms in its branches as in the main chain. Only a few of the 50,000 or more possible isomeric hexadecanes are known, and none has properties identical with houdrane. The best known hexadecane is the normal hydrocarbon or cetane.

In its properties, houdrane shows appreciable difference from cetane. Whereas cetane solidifies at +18.1°C., houdrane remains liquid well below 0°C. and solidifies to a glass only at about −78°C. The boiling point at atmospheric pressure is approximately 40°C. lower than that of cetane.

Prospecting for ilmenite has been carried out for some time past in North Carolina by the Du Pont de Nemours Company and, in view of the ever-increasing demand for titanium, the State Board of Conservation and Development has now broadened the company's contract.

Personal Notes

MR. A. W. AYLING is retiring from the managing directorship of Blundell, Spence & Co., Ltd., at the end of April, for health reasons, but will continue as a director.

DR. A. E. M. GILLAM, D.Sc., F.R.I.C., has been appointed senior lecturer in chemistry at Manchester University, the appointment to take effect in September.

MR. H. SLADE-JONES, export manager of Pilkington Brothers, Ltd., glass manufacturers, St. Helens, since 1943, has been elected chairman of the Liverpool branch of the Institute of Export.

DR. WALLACE P. COHOE, a past-president of the Society of Chemical Industry and past-chairman of the American and Canadian sections, has been awarded the Messel Medal for 1946. He will receive the medal at the annual meeting of the Society in July and deliver his Messel Lecture.

MR. M. PHILIPS PRICE, M.P., has been elected chairman of the Parliamentary and Scientific Committee, and SIR WAVELL WAKEFIELD, M.P., vice-chairman, thus settling one of the ties reported at the annual general meeting. CAPTAIN RAYMOND BLACKBURN, M.P., joins Major Maitland as joint honorary secretary.

COUNCILLOR JACK ASHLEY, who was the youngest member of the National Executive Council of the Chemical Workers' Union, having been elected in March, 1945, at the age of 22, is giving up some of his public work on medical advice and has tendered his resignation from the Council, but will continue as chairman of Widnes branch of the C.W.U.

DR. J. A. V. BUTLER, who on April 1 will take up his duties as Courtauld Research Fellow in the Courtauld Institute of Biochemistry, Middlesex Hospital Medical School, was appointed Lecturer in Chemistry at Edinburgh University in 1927. He held a Rockefeller Fellowship in the Rockefeller Institute for Medical Research, Princeton, N.J., from 1939 to 1941 and for three years after that he was Executive Officer to the British Central Scientific Office in Washington.

Officers of the Society of Chemical Industry Food Group for the 1946-47 session have been elected by the committee to take office after the annual general meeting on April 17 as follows: Chairman and hon. editor of Food Group Proceedings, MR. T. RENDLE; vice-chairman, DR. H. E. COX; hon. treasurer, DR. J. R. NICHOLLS; hon. secretary, DR. J. H. BUSHILL. Mr. E. B. Anderson resigned from the committee during the past session, and Messrs. W. B. Adam, V. L. S. Charley and W. B. Walker will retire. Two of the vacancies will be filled by the committee and the other two by election by the members, whose nominations should reach the hon. secretary by March 21.

MR. P. J. BOVILL, of Newton Chambers & Co., Ltd., has been re-elected chairman of British Disinfectant Manufacturers' Association for 1946. The other officers are: Vice-chairman, MR. T. C. BETTERIDGE, Cooper McDougall & Robertson, Ltd.; honorary treasurer, MR. R. A. BLAIR, Burt, Boulton & Haywood, Ltd.; honorary auditors, MR. A. E. DUSSEK, Dussek Bros., Ltd., and MR. F. C. SEAGER, William Pearson, Ltd. Elected members of the executive committee are: MR. R. G. BERCHEM, Jeyes Sanitary Compounds Co., Ltd.; MR. A. J. BLACK, Lysol, Ltd.; MR. R. A. BLAIR, Burt, Boulton & Haywood, Ltd.; MR. G. DODD, Monsanto Chemicals Co., Ltd.; MR. KNOWLES EDGE, William Edge & Sons, Ltd.; MR. V. G. BIBBS, William Pearson, Ltd.; MR. W. MITCHELL, Hull Chemical Works, Ltd.; MR. J. E. WELLS, Sanitas Co., Ltd.

Obituary

DR. AUGUSTUS EDWARD DIXON, M.D., F.C.S., who died at Sidcup, Kent, on March 3, aged 85, was Emeritus Professor of Chemistry at University College, Cork. Born in Belfast, and educated there and at Trinity College, Dublin, and Berlin University, he had spent his academic career in Ireland, having been lecturer at Trinity College, Dublin, and holding the Chair of Chemistry at Galway before proceeding to Cork. In 1900-05 he was a Member of Council of the Chemical Society.

MR. DOUGLAS WAIT, whose death on March 4 has been announced, was general manager of National Titanium Pigments, Ltd., of Luton, of which company he had been a director since 1928. He was particularly well known in the paint industry. A member of the Council of the Association of British Paint, Colour and Varnish Manufacturers, he was for many years an examiner for the City and Guilds Institute in paint technology and served also as lecturer at the Borough Polytechnic.

Of the caffeine manufactured in Brazil in 1944, 125,287 kg. were exported in the first ten months of that year, it is now officially reported. Of this, 86 per cent. (108,093 kg.) went to the U.S., while Argentina took 2000 kg., Sweden 1500, Spain 550, Great Britain 499, and Portugal 395. Ten caffeine factories are established in Brazil, of which six use maté as raw material, while two employ coffee and two cocoa. It is expected that the 1945 total of caffeine production will exceed the 200,000 kg. made in 1944.

General News

Production of tinplate by Richard Thomas and Baldwins at their famous Melingriffith Works, Ebbw Vale, was restarted this week.

I.C.I. Plastics have been allocated a Government factory at Rawtenstall. It will employ 450 people on the production of Perspex.

The list of prices of non-ferrous scrap metals issued by the Ministry of Supply for the three months to March 31 now applies until April 30.

Severe damage was caused on Thursday last week by a fire at the works of T. W. Ward, Ltd., Savile Street, Sheffield. Magnesium alloy was one of the chief difficulties the fire brigade had to face.

Six Norwegian scientists are on a visit to this country, as guests of the British Council, with the purpose of meeting British scientists and visiting universities, scientific institutions and factories.

The address of Mr. Hugh Griffiths and of the British Carbo-Norit Union, Ltd., has been changed to 14, High Holborn, London, W.C.1 (temporary telephone, CHAncery 8521).

The Control of Sulphur (No. 5) Order, 1946 (S.R. & O., 1946 No. 302), reducing the maximum price of sulphur ground from crude sulphur by 25s. per ton, came into force on March 7.

The British Drug Houses, Ltd., have been allotted one of the 30 ex-Government factories allocated to industrial firms in recent weeks, it is announced. Situated at Poole, Dorset, the factory will employ 700 in the production of laboratory chemicals.

Licences to prospect for oil have been granted to the D'Arcy Exploration Co., Ltd., in respect of two areas in West Lothian and adjoining counties amounting to 197 and 150 square miles. Detailed maps may be inspected at the offices of the Petroleum Division, M.F.P., 7 Millbank, London, S.W.1.

Purchases of stocks of tin concentrates made in Malaya by the Tin Ore Buying Agency totalled 3200 tons up to the end of January, on a basic tin price of £300 per ton f.o.b. Malayan port. As from February 16, there has been a readjustment of the deductions made by the agency against the producer; the treatment charge (hitherto paid by the agency) is now included among the deductions, but the other agency charges have been substantially reduced. The concentrates bought are to be smelted in Malaya.

From Week to Week

Borax Consolidated, Ltd., are returning to London on March 9. Their address will be Northgate House, 20-24 Moorgate, London, E.C.2. (telegrams, Colemanite, Telex, London; telephone, CENtral 0381).

Newcastle Chemical Industry Club held its 27th annual meeting on February 27, when a full programme of activities was arranged for the coming year. Most of the principal officers were re-elected, but Mr. H. K. Thurston succeeds Mr. Scott as hon. librarian.

Bootle's first Chamber of Commerce is to be inaugurated on March 20. Among primary objects of the new venture are the encouragement of suitable new industries to the town, taking advantage of the present trend towards industrial expansion on Merseyside.

The Stockton-on-Tees chemical works of Athole G. Allen, Ltd., are to begin the manufacture of barium compounds for paint colour making, etc., also dyestuff intermediates for the making of aniline dyes. During the war, the works turned out 33,000 tons of T.N.T. for munitions.

Yet another alteration must be made to the notice concerning B.S. 1225—Analysis of Zinc and Zinc Alloys—which we received from the British Standards Institution (*see* pp. 116, 229). The price of this British Standard is 2s. post free, not 3s. 6d. as therein stated.

Judd, Budd, Ltd., distributors of solid fuel, whose original offices were destroyed by enemy action, and who have since been at 15 Trinity Square, E.C.3, have now moved to new permanent offices at 9-11 Copthall Avenue, London, E.C.2 (telegrams: Judbud, Stock, London; telephone: MONarch 9071).

Arising out of a report that 5000 gallons per day of waste fluid from the penicillin factory at Barnard Castle was being taken and discharged into the sea outside West Hartlepool at a very good place for crabs and lobsters, the standing committee of the Tees Fishery Board has instructed their chief water bailiff to obtain a sample of the fluid from Barnard Castle for analysis.

Belief that a greater use could be made of Britain's raw materials than by the export of coal was expressed by Professor H. W. Melville, of Aberdeen University, when he recently addressed Aberdeen Rotary Club. He instanced the possibility of developing synthetics, which, while valuable in themselves, would also allow the development of by products such as tar and its derivatives.

Arrangements are being made, the Royal Institute of Chemistry announces, for two summer courses to be held under its auspices at Liverpool University from July 9-13 inclusive. One course will be on "Oils and Fats," under the direction of Professor T. P. Hilditch, F.R.S.; the other on "Spectroscopy," under Professor R. A. Morton. Further particulars are to be announced later.

Foreign News

Bauxite occupied a prominent place among minerals exported by Brazil during the war.

Italy received recently considerable quantities of copper sulphate from the United States.

It is reported from Holland that a new periodical dealing exclusively with high polymeric substances has just been published.

The Belgian Congo exported 1071 tons of uranium ore, valued at $2,000,000, to the United States in 1940.

A new research institute for plastics has recently been erected in Columbus, Ohio, by the Du Pont Company.

The Aluminium Company of America has agreed to grant the U.S. Government free use of all its production patents.

The French ferro-alloy supply position is reported to have become easier recently, permitting an output of special steels adequate to cover current demand.

Fire which broke out in one of the leading Norwegian copper mines, belonging to the Röros Kobberverk, caused loss valued at several hundred thousand kroner.

A rich deposit of manganese ore has recently been discovered near Manganets, Russia. Plans are in hand for the erection of a new plant.

Fibre-glass yarn, in a special form, has been successfully used to fill root canals of teeth, it is reported in an American dental magazine.

Mexican Government geologists have reported the discovery of uranium deposits at Guadalupe and Puerto Delaire in Chihuahua State.

Factories to produce penicillin are to be established in Poland, Czechoslovakia and Yugoslavia under the auspices of U.N.R.R.A. It is hoped that production will reach 15,000-20,000 units of penicillin a month.

British buyers have notified their intention of purchasing 8000 tons of Madagascar graphite, reports *L'Industrie Chimique* (February, p. 32), while Italians have made an offer for 4500 tons. With the French Colonial franc standing at 100 to 170 French francs, the price of Madagascar graphite should stabilise itself at about $90 per ton, as compared with $105 for the Ceylon product.

The construction of electron microscopes has been taken up by a Swedish company and the first instrument has been completed for Lund University.

A new trade agreement between Poland and Austria provides for the exchange of Polish coal and coke against graphite, soda and magnesite.

Brazil's imports of sulphur during January-August, 1945, totalled 15,796 metric tons, the major part of which came from U.S.A.

The output of Norway's nitrate industry equals the pre-war volume and on an annual basis amounts to the equivalent of more than 600,000 metric tons of calcium nitrate.

The Peruvian Government plans to exploit iron-ore deposits in the centre of the country and to construct an ore port in the bay of San Juan.

The recent discovery of a large deposit of magnesite in the district of Iguatú, in the State of Ceará, N.E. Brazil, is of especial importance to that country, in view of its proximity to a railway leading to the coast.

Soviet geologists are searching for new rare and radio-active metals in the Ural Mountains, where new deposits of coal, petroleum, chrome and bauxite have recently been opened up.

From Belgium comes the news that the country's glass industry is anxious to enter the field of scientific and optical glass manufacture. The necessary apparatus and equipment may be transferred from Germany.

The Government of India has decided to sell its properties and machinery attached to the Koh-i-Sultan sulphur mines in Baluchistan, as well as sulphur stocks laying at the Nokkundi railhead.

A war-tested stainless steel, with improved hardening quality and workability, has been introduced into the peace-time market by the Carnegie Illinois Steel Corporation, of Pittsburgh, Pennsylvania.

By the use of a resin binder to hold the fibres together, raw cotton has been turned into fabric cotton, without spinning or weaving, in a New Jersey mill, as a result of which great changes in textile practice is expected.

Production has now started in the nitrogen fertiliser plant at Houdeng, Belgium, which was completed shortly before the war. There are now eight Belgian fertiliser plants, with an output of synthetic nitrogen totalling about 8000 tons.

DDT will be used in Panama to combat malaria. The co-operation of Canal Zone authorities has been offered in exterminating the malaria-carrying mosquito and it is stated that army planes will spray DDT on mosquito-breeding areas.

Chilean nitrate production during the third quarter of 1945 reached its highest total in at least three years. Output was 338,400 metric tons, compared with 237-700 for the like period of 1944, and 273,000 for the third quarter of 1943.

The Czechoslovak Government has issued a statement according to which the Czechoslovak authorities have established full control over the Jachimov uranium ore and radium mines after the Red Army's withdrawal from Czechoslovakia. Output of uranium has been resumed.

Scientists of the U.S. Department of Agriculture are hopeful of soon producing a new antibiotic, a germ-stopping substance of the penicillin family, found in the pure culture of the bacteria that cause one of the most troublesome of bee diseases, the American foulbrood.

Trialkylsilyl sulphates (methyl and ethyl), the first examples of sulphuric acid esters of silanols, have been made by workers at the Department of Chemistry, Pennsylvania State College (*J. Amer. Chem. Soc.*, 1946, *68*, 156). The sulphates were obtained by the action of fuming sulphuric acid on hexaalkyldisiloxanes.

Imports into Eire of chemicals, drugs, perfumery, dyes and colours in 1945 were valued at almost £400,000 more than in 1944, according to statistics just issued by the Department of Industry and Commerce in Dublin. In December, the value of the imports was £203,788, making a total of £1,836,217 for the year.

Mr. Emile Labat, of Mauritius, has discovered a method of making quicklime—vital for neutralising the acid soil of Mauritius—at one-fifth the cost of the present system. Mr. Labat's invention consists of a continuous kiln worked either by wood or electricity, which converts sand from the island's coral-reef shores into good quicklime. Four of the kilns would supply the whole of the colony's requirements for its sugar industry. Previously, lime for agricultural and industrial and building purposes was obtained from the calcination of corals picked up in the lagoons and worked in rudimentary kilns.

Forthcoming Events

March 12. Chemical Engineering Group (S.C.I.) and Institution of Chemical Engineers. Apartments of the Geological Society, Burlington House, Piccadilly, W.1, 5.30 p.m. Mr. A. R. Morcom: "Fluid Flow through Granular Materials."

March 12. Royal Institute of Chemistry. Savoy Hotel, Strand, W.C.2, 12 p.m. Anniversary luncheon, Lecture Room, Royal Society, Burlington House, Piccadilly, W.1, 3.15 p.m. Annual general meeting.

March 12. Society of Chemical Industry (Yorkshire Section). Leeds University, 5.45 p.m. Annual general meeting. Dr. L. J. Burrage: "Benzene Hexachloride—its Chemical and Insecticidal Properties."

March 13. Institute of Fuel. Institution of Mechanical Engineers, Storey's Gate, S.W.1, 6 p.m. Mr. Oliver Lyle: "Inefficiency."

March 13. Institute of Welding (West Scotland Branch). 39 Elmbank Crescent, Glasgow, C.2, 6.30 p.m. Mr. H. Martin: "Welding of Non-ferrous Metals."

March 13. Institute of Welding (North London Branch). East Ham Technical College, 7.30 p.m. Dr. E. G. West: "Metallurgical Aspects of the Welding of Light Alloys."

March 13. Society of Chemical Industry (Cardiff and District Section). Technical College, Newport, 6.45 p.m. H. W. Cremer: "Modern Trends in Chemical Plant Design."

March 13 and 14. The Institute of Metals. The Institution of Civil Engineers, Great George Street, London, S.W.1, 10.30 a.m. Annual general meeting. Official business, followed by papers. Afternoon session begins 2.30 p.m. and morning session on March 14 at 10 a.m.

March 13. Society of Chemical Industry (Food Group). Rooms of the Chemical Society, Burlington House, Piccadilly, W.1, 6.30 p.m. Drs. J. B. Hutchinson and R. G. Booth: "Phosphatase Activity as an Index of Heat Damage in Cereals"; Mr. H. N. Ridyard: "The Absorption of Aneurin (B_1) on Sand"; Dr. C. H. Lea: "A Note on the Effect of Tinplate and of Lacquered Surfaces on the Oxidative Deterioration of Butterfat."

March 14. The Chemical Society. Manchester University, 6 p.m. Original papers.

March 14. Royal Institution of Great Britain. 21 Albemarle Street, W.1, 5.15 p.m. Sir Henry Dale: "Chemical Transmitters of the Effects of Nervous Impulses—III."

March 16. Institution of Chemical Engineers (North-Western Branch). College of Technology, Manchester, 3 p.m. Messrs. C. Buck, T. Hayes and R. R. Williams: "Design, Erection and Operation of Pilot Plant."

March 18. Tar Industry Meetings. Queen's Hotel, Leeds, 1. National Road Tar Committee, 4 p.m.; National Pitch Committee, 6 p.m.

March 18. Association of Austrian Engineers, Chemists and Scientific Workers in Great Britain. 69 Greencroft Gardens, N.W.6, 7.15 p.m. Dr. M. F. Perutz: "Crystallised Proteins."

Company News

Roslin Chemicals, Ltd. (375,660), 28 King Street, Cheapside, E.C.2. Name changed to Roslin International Trading Company, Ltd.

Selmer (Projectiles), Ltd. (359,211), 1 and 1a Newton Street, W.C.2. Name changed to Selmer (Chemical) Co., Ltd.

Blundell, Spence & Co., Ltd., report a profit of £96,726 (£71,508) for the year to October 31 last. Dividend payable on preferred stock will amount to £5000; ordinary dividend will be 6 per cent. (same), plus bonus of 2 per cent.

Borax Consolidated, Ltd., announce net profit of £357,238 (£396,333) for the year ended September 30 last. Dividends are unchanged as follows: deferred ordinary, 7½ per cent.; preferred, final of 3 per cent., making 6 per cent.

British Enka reports a net profit of £48,314 for 1945, which reduces the debit balance to £262,849. In order to eliminate the debit balance and create a reserve of £49,651 against patents, etc., the company is to reduce its capital from £1,250,000 to £937,500. This is to be effected by cancelling 5s. per share on each of the issued 1,250,000 £1 shares. Immediately upon the scheme becoming effective, the 15s. shares are to be sub-divided into three 5s. shares and the capital restored to its original amount by the creation of 1,250,000 5s. shares.

Commercial Intelligence

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

Mortgages and Charges

(Note.—The Companies Consolidation Act of 908 provides that every Mortgage or Charge, as described therein, shall be registered within 21 days after its creation, otherwise it shall be void against the liquidator and any creditor. The Act also provides that every company shall, in making its Annual Summary, specify the total amount of debt due from the company in respect of all Mortgages or Charges. The following Mortgages and Charges have been so registered. In each case the total debt, as specified in the last available Annual Summary, is also given—marked with an *—followed by the date of the Summary, but such total may have been reduced.)

MONCKTON COKE & CHEMICAL CO., LTD., Barnsley. (M., 9/3/46.) February 13, £100,000 debenture, to Industrial & Commercial Finance Corporation, Ltd.; charged on 637a Barnsley Road, Newmillerdam, Wakefield, land, buildings, railway sidings, etc., at Lundhill Lane, Havercroft, Felkirk, on a certain lease and agreement and fixed plant, machinery and fittings upon above premises. *Nil. October 12, 1945.

F. G. H. LABORATORIES, LTD., Dublin, manufacturing chemists and druggists, etc. (M., 9/3/46.) February 12, £1,000 debenture, to A. A. Morrissey, Dublin, and ano.; general charge. *Nil. October 1, 1945.

New Companies Registered

Dyne Chemical Works, Ltd. (404,746).—Private company. Capital, £100 in £1 shares. Manufacturers, etc., of chemicals, etc. Directors: S. Sidnick and A. Bernitz. Registered office: 220 Stamford Hill, N.16.

Macclesfield Chrome Plating Co., Ltd. (405,092).—Private company. Capital, £1000 in £1 shares. Chromium, electro and nickel platers, metal polishers, etc. Subscribers: A. Collinge (first director), Grey Winds, Chester Road, Woodford, Cheshire; Mrs. P. M. Collinge.

Wharfedale Chemical Manufacturing Co., Ltd. (405,367).—Private company. Capital, £10,000 in £1 shares. Manufacturers of and dealers in industrial and other chemicals, etc. Directors: A. W. Bentley; R. J. Blincow. Registered office: 7-8, Poultry, E.C.2.

Abril Corporation (Gt. Britain), Ltd. (405,199).—Private company. Capital, £10,000 in £1 shares. To acquire the business of manufacturers of wax and chemicals for use in industry, being part of the business now carried on by Koray, Ltd. Directors: A. Liss, J. Liss, H. Liss, S. Liss (all directors of Koray, Ltd.). Registered office: 25 Hanover Square, W.1.

Jewsons Plastics, Ltd. (405,079).—Private company. Capital, £50,000 in £1 shares. Manufacturers of and dealers in plastics, plastic compositions and chemicals of all types, etc. Directors: R. Jewson, P. W. Jewson, J. H. Jewson, C. B. Jewson, C. J. Kowen, E. S. Lister, H. P. Davies. Solicitors: Cozens-Hardy and Jewson, Norwich.

Nu-Enamel (1946) Ltd. (404,989).—Private company. Capital, £5000 in £1 shares. To acquire the goodwill, etc., of the business formerly carried on by Nu-Enamel, Ltd. (in liquidation) and to carry on the business of manufacturers of and dealers in paints and stains of all kinds, etc. Subscribers: W. C. Richardson; W. Patterson. Registered office: Hadrian Works, Haltwhistle.

Chemical and Allied Stocks and Shares

BUSINESS in stock markets has tended to increase, but movements in most sections remained small and indefinite in character. Sentiment was aided by a number of factors, particularly by the increased strength of British Funds, while industrials reflected continued talk that the next Budget is likely to bring tax concessions and perhaps abolition of E.P.T. Home rails

were better on the opposition to nationalisation expressed at the meetings; on the other hand, iron and steel shares have been dull on unconfirmed rumours earlier in the week that the Government might include the industry in their nationalisation schemes. A number of further dividend increases benefited industrial shares, as did talk that the tendency will be for a more liberal dividend policy to be followed than during the war years. On the other hand, financial results indicate that in some directions reconversion difficulties are making for lower earnings.

Chemical and kindred shares were generally well maintained, with Imperial Chemical at 40s. 9d. Fisons were 53s. 6d. and B. Laporte strengthened to 84s. 4½d. General assumption is that the Imperial Chemical dividend will again be limited to the 8 per cent. basis of recent years, but that shareholders may benefit more fully from Dominion income-tax relief. British Oxygen were good at 86s. 9d., and, prior to the financial results, Borax Consolidated deferred were firm at 48s. 9d. United Molasses receded to 49s., and Distillers at 118s. 6d. lost part of an earlier rally. British Plaster Board eased to 32s. 9d., but Metal Box shares moved higher at 96s. 10½d.

British Glues and Chemicals 4s. ordinary held their rise to 14s. 1½d. and, among plastics, De La Rue were higher at £10 5/16, British Industrial Plastics 2s. shares at 6s. 10½d., and Erinoid 5s. ordinary at 13s. 6d. On the other hand, fears that the industry may not be outside nationalisation plans, caused uncertainty in the iron-steel section, Guest Keen (42s.), Colvilles (25s. 3d.), and Stewarts and Lloyds (56s. 6d.) moving back moderately. Allied Ironfounders, however, rose to 60s. on the company's big interest in production of equipment for the building industry, etc., while for a similar reason, Radiation rallied sharply to 61s. 3d., and General Refractories to 22s.

A rise to 57s. 6d. in Boots Drug accompanied a general improvement in shares of companies with big retail shops and interests, the assumption being that in due course benefit will be derived from improved supplies of goods, implied by the easing of the Government's "austerity" policy. Beechams deferred were 23s. and Griffiths Hughes 53s. 9d., while a sharp rise of 3s. to 33s. in Aspro shares was attributed to a revival of vague market talk of merger possibilities (later denied). Textiles developed an easier tendency, with Bradford Dyers 25s. 6d., Bleachers 13s. 3d., and Calico Printers 20s. 1½d., but Courtaulds at 54s. 3d. regained part of an earlier decline. British Drug Houses were 49s. and W. J. Bush changed hands up to the higher level of 85s., but elsewhere, Burt Boulton have eased slightly to 24s. 6d. In other directions, English Electric became active and rose to 54s. 6d. on the statements at the meeting. Greeff-Chemicals 5s. ordinary were 10s. 6d. Turner & Newall at 84s. 4½d. rallied after an earlier decline, but Lever & Unilever at 51s. 6d. were slightly lower on balance.

Oil shares became easier under the lead of Anglo-Iranian, which at 96s. 3d. lost ground on the news from Persia. Both Burmah Oil and Shell were moderately lower on balance.

British Chemical Prices

Market Reports

A FIRM tone continues to be maintained in the London industrial chemicals market and reports from all sections indicate a fairly widespread demand. Makers' deliveries to the chief consuming industries are going forward with regularity, although in one or two industries the movement is below consumption capacity. Quotations for ground sulphur are reduced by 25s. as from March 5, 1946, but the price position generally is unchanged and the undertone firm. Activity in the soda and potash compounds remains steady and a good call persists for the heavy acids and the lead oxides. The demand for coal-tar products is not less than a week ago and a steady volume of buying orders is circulating both for home account and for shipment. Pitch continues in active request.

Manchester.—The cotton textile and allied trades in Lancashire are absorbing fair quantities of a wide range of heavy chemicals, and fresh inquiries from this and other leading outlets have been reported on the Manchester market during the past week. Specifications covering actual deliveries have been coming forward satisfactorily. Inquiries from shippers have been fairly numerous and actual business on export account is developing steadily. Prices pretty well throughout the range of both light and heavy chemicals are on a steady to firm basis. Among fertilisers, sulphate of ammonia, the compounds, and superphosphates are going forward in good quantities, and plenty of interest is being displayed in most of the coal-tar products.

Glasgow.—A considerable volume of business was done in the Scottish heavy chemical market during the past week, in spite of the difficulties which are everywhere being experienced. Export orders are being met satisfactorily, although shipment presents some difficulty. In the home trade, prices remain firm and there is considerable demand for all raw materials connected with plastics, textiles, and the paint and rubber trades.

Price Change

Sulphur.—Per ton, ground, £13 15s. to £14 15s.

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