The Chemical Age

A Weekly Journal Devoted to Industrial and Engineering Chemistry

VOL. LIV
No. 1389

SATURDAY, FEBRUARY 9, 1946
REGISTERED AS A NEWSPAPER

6D. PER COPY
POST FREE 8D.

The Chemical Age

A Weekly Journal Devoted to Industrial and Engineering Chemistry

BOUVERIE HOUSE, 154 FLEET STREET, LONDON, E.C.4

Telegrams: ALLANGAS FLEET LONDON Telephone: CENTRAL 3212 (12 lines
GLASGOW: 116 Hope Street (Central 3970) BIRMINGHAM: Daimler House, Paradise Street (Midland 0784-5)

THE CHEMICAL AGE offices are closed on Saturdays in accordance with the adoption of the five-day week by Benn Brothers Limited

VOL. LIV
No. 1389. February 9, 1946 Annual Subscription 21s.
Overseas 26s.

The Coal Bill

THE Debate on the Coal Bill has enabled the arguments for and against that measure to be marshalled so that the consumer of coal, who is neither a miner nor a colliery owner, can see where he stands. The chemical industry is interested in the subject not only as a consumer of coal, but also as a consumer of the products derived from coal carbonisation. We may go farther and declare that the coke ovens which are to be brought under the Coal Bill are a part of the chemical industry, and the chemical industry is therefore directly concerned with the provisions of this Bill.

The ownership of the coke ovens is of direct and outstanding importance to the chemical industry The coke-oven owners have always declared that coke ovens should be left outside the nationalisation scheme and should continue to be operated by private enterprise. The miners, on the other hand, declare that the profits derived from by-product coking should be returned to the coal industry in order to increase miners' wages. We deplore the implication in the miners' attitude that the coal industry is being operated for their benefit, and we have little doubt, that the Government will reject that argument.

Although the Minister of Fuel and Power is apparently determined to nationalise the coke ovens, we should raise our voices strongly against any suggestion that the coke ovens should continue to be operated as an ancillary part of the surface equipment of collieries, or that they should be in any way under the control of the coal-mining industry. The coke ovens are part of the chemical industry. Their technique, their equipment, and the use that can be made of their products, are so utterly different from those of any of the other operations of mining, that it is quite evident that few, if any, colliery managers can be equally equipped to manage a coal mine and to direct a by-product coking plant. We cannot believe that the Government intends to throw the coke ovens into the general melting-pot of the coal industry. The coal industry is at the start of an enormous reconstruction programme, which will demand the full energies of everyone concerned. In our view, coke ovens and coal carbonisation generally are also in need of a vast reconstruction and reorganisation, which equally demands the attention of specialists. We hope, therefore, that whether the coke ovens are nationalised or not, they will be kept strictly apart from the coal-mining industry.

On Other Pages

The future of the coke ovens should be linked up either with the chemical industry or with the gas industry.

We freely admit that the iron and steel industry, which is already making its own coke to a very large extent at coke ovens situated at steel works, will ultimately make nearly all its own coke, and that these coke ovens must be considered as an integral part of the steel industry, though in many respects they should remain linked to the carbonising industries in general. The steel industries will have the first call upon coke and gas manufactured at their own coke ovens and must clearly control their operation. Surplus coke and gas, and the chemical products derived from coke ovens, however, must be linked to the general carbonisation industries. We believe that coal carbonisation is about to develop on lines more severely chemical than ever before. There are great possibilities in the production of organic chemicals from coal, and these possibilities are already envisaged by the chemical industry, as has been shown by recent developments sponsored by I.C.I. Coal carbonisation therefore has a great part to play in the development of the national economy. If it is to play this part, it must be regarded as a specialised industry, and not as a means of augmenting miners' wages.

The general conclusion to be drawn from the coal debate is that the consumer of coal will have derived but cold comfort. There seem to be no safeguards whatever for the consumer. It is true that a Consumers' Council is to be set up, but this council has not only no powers, being purely consultative, but it is not to be allowed by the Minister to make public the advice which it gives him. It is essential, in our view, that a proper price tribunal should be set up, which shall have powers far beyond mainly consultative functions. It may be true that the Board "has no interest in favouring one consumer rather than another, nor in maintaining prices at a level which will bring in the largest possible profit," but we seem to have heard this argument before. It is the argument used by the spider to entrap the fly. The working of an apparently similar scheme before the war was certainly neither to the liking of coal consumers nor in the national interest.

The Minister and the Treasury have the unfettered right to determine the price policy of the Board, and in this they are not compelled to consult anyone—not even Parliament. As Mr. Eden put it, what may "happen under the Bill is what often happens under monopolies—the consumer will be fleeced in the interests of the producer, or the Coal Board will go to the Chancellor for financial assistance." Enormous financial expenditure is entailed in the Coal Bill and in the constructional measures necessary to rehabilitate the coal industry. The miners are making increased demands for more wages and shorter hours. There is every likelihood that the price of coal will rise still further—an event which will gravely handicap British industry, especially in the export market. Without safeguards the new coal industry may very well develop all the worst features of a cartel, without its saving advantages. We do not forget that Mr. Shinwell himself said in introducing the Bill: "A bad Government, a bad Minister, or a bad Board could, under the powers available in the Bill, go far to wreck the economic structure of the industry, and thereby, that of the country as well." Out of Mr. Shinwell's own mouth there has been produced the most overwhelming argument for adequate safeguards for the consumer, and for the nation, that have arisen from the whole debate.

ATOMIC ENERGY IN BRITAIN

Replying last week to a question by Mr. Lyttelton, the Prime Minister, recalled the Government's decision to set up a research and experimental establishment at Harwell, near Didcot, to deal with all aspects of the use of atomic energy. This establishment would require fissile material and the Government has had under consideration the most suitable organisation for the production of such material, for this and other purposes. Its object would be speedily to make available material in sufficient quantities to develop our programme for the use of atomic energy. Production of these materials would be under the Ministry of Supply, which was setting up an appropriate organisation. The head of this department would be Air Marshal Lord Portal. Professor J. D. Cockcroft had been appointed director of the research establishment at Harwell, but he would remain in Canada until his successor there had been appointed.

NOTES AND COMMENTS

Policy on Research

IN the main, the statement on the general research policy planned for this country, made at the end of last month by Sir Edward Appleton, secretary of the D.S.I.R., to the Northern Industrial Group, was pretty generally orthodox. However, the northern Industrial Group can certainly congratulate itself on having received a considered reply to the report which they sent last year to the Board of Trade; and this reply embodies the first full-dress statement of the official policy of the Government towards science, and especially towards scientific research of all kinds. A lot of it, of course, has already been promulgated at various times by this Minister or that, but Sir Edward Appleton went, most opportunely, into greater detail, especially in regard to the work of the D.S.I.R. Moreover, he started from fundamentals, beginning with definitions of science and of the scientific method, which he justly claims to be an essentially British "invention." As we see it, the principal operative sentence in his discourse was his affirmation that "the industrial scientist is the man, in this rapidly changing world, most fitted to look out for technical dangers and difficulties which may lie ahead." If the Government really intends to bear this in mind in the future—and it has shown signs of doing so already—there may well be some hope for scientific industry and industrial research in this country.

A Plan for the North-East

NOT unnaturally, as he was speaking at Newcastle-upon-Tyne, Sir Edward Appleton devoted some considerable time to the future of industry in the North-East. His estimate of the reserves of Durham and Newcastle coals was extremely interesting, especially his prophecy that the submarine mines might quite confidently look forward to a productive life of one hundred years. These East Durham coals, though less excellent as coking coals than the famous West Durham seams, are, nevertheless, well up in the coking category and, with increasing research into coal preparation, oven design, and carbonising content, as well as into the utilisation of coke by the metallurgical industries, they may well fill the gap caused by the exhaustion of the older seams. A point that applies not only to the North-Eastern region, but to any compact industrial area of the kind, was the suggestion that Sir Edward made of setting up Regional Joint Research Councils similar to the one already established in Manchester. It is often objected that the D.S.I.R. is too centralised, and the establishment of Joint Regional Research Councils will go far to remove the difficulties occasioned thereby. Combined with an information bureau where the inquirer and information officer can be in personal contact, these regional councils could sift the problems brought before them, and see that they are properly formulated before they reach the D.S.I.R. Science, as Sir Edward said, must help to solve the problems of peace as it has helped to solve those of war, and his comprehensive statement at least provides a reasonable basis on which to start discussion.

Freedom of Publication

LIAISON between Government Departments as to what is to be said about scientific research is evidently highly developed. On the day following Sir Edward Appleton's address in Newcastle, Mr. Herbert Morrison had a great deal of similar news to impart, in London, at the luncheon of the Parliamentary and Scientific Committee; but although he went into considerably less detail, he brought out one or two other points. He assured the Committee that the "Cinderella" days of science were gone, and he commented unfavourably on the repression, whether by the Government or by industry, of scientific freedom to publish. He looked forward to much wider liberty in this respect in the days to come. We trust that these are something more than pious hopes. We hope also that the invitation which he extended to the members of the Committee to visit the research stations of the D.S.I.R. will be extended liberally to others interested; even the technical press might be asked to look around, as in the days before the war when the National Physical Laboratory was thrown open once a year. Mr. Morrison is nothing if not up-to-date, and he referred to the new task that lies before the

Medical Research Council—the examination of the biological applications of fresh knowledge in the field of atomic research, and the study, with the aid of trace-isotopes, of chemical processes in the body.

Exhibition, 1951

PRECEDING him at the luncheon, Lord Samuel, the retiring President, remarked that he was bequeathing two proposals to his successor, Sir John Anderson. One of these was that some kind of machinery should be devised by which this country could be adequately informed of scientific discoveries and their applications in other countries of the world—major or minor. His other bequest was the suggestion that a great exhibition should be held in Hyde Park in 1951 to celebrate the centenary of the one held there in 1851. Mr. Morrison said he welcomed this idea, but made no reference to the earlier suggestion. It was also too early yet, he said, to say much about the deliberations of Sir Alan Barlow's committee, which was working on policies to govern the use of scientific manpower and resources in the next ten years. By the time the exhibition gets going—five years hence—we shall doubtless be told more about this.

An Important Conference

THE end of the war has raised questions about the future which are exercising the minds of people in this country and throughout the world. Because of the part science played during the war, and particularly because of the manner in which the war was terminated, scientists are being called upon to devote their minds to the problems which face mankind. For this it is necessary that discussion of the most important questions should take place, and the Association of Scientific Workers is to be congratulated for calling a conference for this purpose, details of which appear elsewhere in this issue. The introductory session will be concerned with the contribution that science can make towards meeting the needs of mankind.

The Whole Duty of Scientists

THE discussion will have as its background world affairs as they appear at this moment, when the United Nations are meeting. The first session will deal with the implications of the development of atomic power for security and for the welfare of the people and industrial advance. The contribution that modern knowledge can make to man's physical and social needs will be discussed, and the importance of nutritional knowledge and land maintenance will be considered. The respective responsibilities of society and of scientists for the use of scientific knowledge provides the subject matter of the second session, when an attempt will be made to answer such questions as how far are scientists qualified to inform and influence public knowledge and opinion, and to what extent is it their responsibility and how does this fit in with their professional loyalty and attitude towards the principles and regulations governing scientific work. In the last session, the organisational problems of science, nationally and internationally, will be considered. The international organisation of science for security and welfare will be dealt with by one speaker, and the second will devote himself to a consideration of the national organisation required in Britain to provide the adequate planning of scientific resources and the full application of scientific knowledge.

The End of "Francolor"

French Chemical Amalgamation ?

RUMOURS are circulating concerning a projected fusion of the two great chemical concerns of Kuhlmann and Saint-Gobain. Such a step would be facilitated by the arrangements at present being carried out for the liquidation of the assets in France of I.G. Farben. During the occupation, Kuhlmann, Nord, Saint-Denis, and Saint-Clair du Rhône were forced to exchange 40,800 shares from their respective holdings in the Francolor dyestuffs combine with the I.G. Farben. These shares, now recovered, have been specifically exempted from the general confiscation of German assets for reparation purposes, and will be returned to the companies concerned against the surrender of the shares in I.G. Farben which they received in exchange. As a result, the 800-million-franc Francolor combine will be dismembered, and each firm will resume the separate operation of the plants of which they were dispossessed. The formation of Francolor was announced at the end of 1941 (*see* THE CHEMICAL AGE, 1942, *46*, 2), and the essential fact of its creation was that I.G. Farben acquired a preponderant interest in the French dyestuffs industry without any payment in cash.

Progress in Drugs, Fine Chemicals and Biological Products during 1945

by

G. COLMAN GREEN, B.Sc., F.R.I.C., A.M.I.Chem.E.

Mr. G. Colman Green.

AN interesting table has been quoted by the *Pharmaceutical Journal* (1945, April 21, p. 203) from American sources. It sets out a list of ten drugs (or groups of related drugs) in the order of importance assigned to them, first by U.S. physicians in 1910, and second by professors of medicine in U.S. medical teaching schools in 1945. The table is reproduced herewith.

	1910	1945
1.	Ether.	Penicillin; the sulphonamides; the antibiotics.
2.	Morphine.	Whole blood, blood plasma and blood derivatives
3.	Digitalis.	Quinine and quinacrine.
4.	Diphtheria antitoxin.	Ether and other anaesthetics, morphine, cocaine and the barbituric acid derivatives.
5.	Smallpox vaccine.	Digitalis.
6.	Iron.	Arsphenamines.
7.	Quinine.	Immunising agents and specific antitoxins and vaccines.
8.	Iodine.	Insulin and liver extracts
9.	Alcohol.	Other hormones.
10.	Mercury.	Vitamins.

The table reflects the tremendous progress made in biological science as a whole, either in the way of the introduction since 1910 of entirely new medicinal substances such as the antibiotics and the arsenic compounds, or in the way of developing the application of whole groups of drugs where formerly only one was known. It is an interesting feature that of the 1910 list only four items are specifically mentioned in the 1945 list, namely, ether, morphine, digitalis, and quinine.

As befits the opinions expressed in the 1945 list, and in accordance with practice in former annual reviews, we shall proceed to consider first the status of the antibiotics and bacteriostatic substances. While the tempo of discovery, taking the pharmaceutical field as a whole, has possibly become slower during 1945, the year of victory, the pace has, however, been fairly well maintained so far as antibiotics are concerned.

It is still necessary to give pride of place to penicillin, for while, as will be seen, other antibiotics have been developed to the point of commercial production, penicillin remains beyond compare when therapeutic performance and lack of toxicity are balanced. Further, with increasing availability, penicillin is finding new applications in newly dispensed ways. Continuing the story from last year's annual review, expanding world production is to be recorded together with increased availability of the drug for civilian uses especially since the cessation of hostilities. The weight of world production remains preponderantly with the United States where the only economic method by submerged culture fermentation was developed. As has been previously recorded, production was first undertaken in U.S.A., following a visit, in 1941, by Professor Florey, of Oxford, to hand over all information collected to that date in this country, when it was realised that the position regarding man-power, raw materials, and general strategy was too acute in Britain to enable industrial production to be undertaken on a sufficiently large scale. As a natural consequence the U.S.A. finds herself at the end of the war without a competitor in the world markets so far as penicillin is concerned, and from this world market comes an incredibly great demand. "The export market for penicillin is making veterans in the pharmaceutical and drug trade rub their eyes in amazement," states one U.S. trade journal.

U.S. Penicillin Output

The U.S. monthly penicillin output during 1944 averaged 200,000 × 10^6 to 250,000 × 10^6 units. Monthly production has now reached 700,000 × 10^6 units and continues to expand, as the graph on p. 158 shows. One firm alone is stated to be producing nearly 225,000 × 10^6 units monthly, an amount which is nearly equal to the combined output of the seventeen U.S. manufacturers engaged on the project in 1944.

It is expected that the output of U.S. manufacturers will ultimately reach 100 × 10^{12} units per month and that the world shortage will continue for a further two years. The rate of expansion of output appears to be controlled and limited by difficulties in handling essential raw materials.

As to cost, it seems that the drug was selling in March, 1945, at 85 cents per 100,000 units to the U.S. Government, and

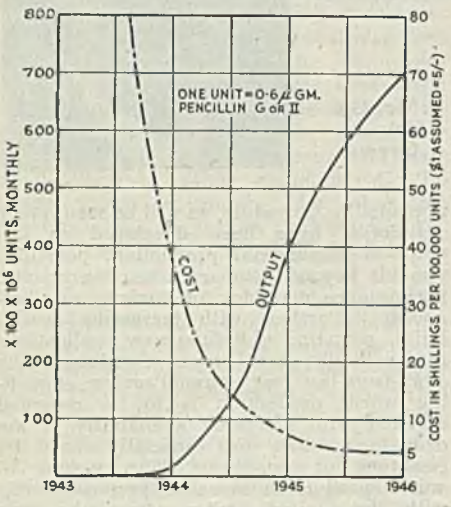


Fig. 1. U.S. Penicillin Production

at $2.40 to $2.60 per 100,000 units to hospitals. These figures are to be compared with $20 per 100,000 units in July, 1943. There is as yet no indication as to how the drug is selling in the retail trade, where it has been available on prescription since September, 1945. The great cut in prices, and the relatively low price now attained, reflects the enormous technical improvements which have enabled this labile material, produced by the organism in such small quantities, to become available in an increasingly pure form as the calcium or sodium salt in 100,000 or 200,000 unit quantities for human and veterinary applications with an eighteen-month expiry date. This latter, of course, assumes that the drug will be stored in optimum conditions with due recognition of its intrinsic instability.

While in U.S.A. (with possible variations between States) penicillin is available in retail trade on prescription, it is reported that it is now offered in Canadian drug stores without restriction and that it is as freely available as, say, aspirin. This is reported to have led to a large demand for penicillin tablets, ointments, and pills.

In Britain the position remains unsatisfactory. Output figures are still cloaked in a veil of secrecy; but it is believed that the penicillin output is still so relatively low that the full demands of hospitals are not satisfied. Technological developments are unsatisfactory in the sense that British production is limited still to the output of a number of "bottle" factories. There is no deep-fermentation plant yet in operation on a commercial scale in this country. We find ourselves in the unfortunate position that the two deep-fermentation factories in the course of erection here are based on American experience and design, with a large number of items of plant actually being imported from America, and with our key-operatives being trained on American plants. It is a particularly bitter pill to swallow that royalties will be paid to the American firm whose process is to be used, in the light of the fact that in 1941 all information held by this country was made freely available to our allies.

New British Plants

Each of the deep-fermentation plants in course of erection in Britain will be capable of producing 100,000 × 10^6 units per month initially, and will presumably be capable of expansion. One of these factories is being built in S.W. Durham and covers an area of 100,000 sq. ft. and will employ 250 people. It is being built by the Ministry of Supply and will be operated by a well-known firm. The other of these factories is, of course, the now historic factory to be erected at Speke near Liverpool. This particular factory was to be the largest for its purpose in the world. A replica of the Commercial Solvents Corporation penicillin plant in the U.S.A., it was to be operated by the Distillers Co., Ltd., on behalf of the Minister of Supply at an original estimated cost of £1,250,000. This factory, according to Government statements, was to have been in production in the early months of 1945; it is not yet in production and, indeed, may not be for some months to come. No excuse has been offered for this prolonged gestation, probably because the demands for information in Parliament have been presented without sufficient determination. The public interest is definitely at stake in this matter. Distribution to hospitals is still at public expense, and the material continues to originate in the high-cost "bottle" factories. The great cut in cost of penicillin in the U.S.A. as the deep-fermentation processes came into operation, which has been indicated above, shows the measure of the saving to be gained by abandoning surface-fermentation methods. Further, unless there has been a change of status which has not been publicly or sufficiently widely notified, the Speke factory, at least, since it is being erected and equipped on Government account, should be brought into production with the minimum of further delay.

Some clue to the financial situation is

afforded by a letter from Dr. F. Hartley, secretary of the Therapeutic Research Corporation of Gt. Britain (*Brit. Med. J.*, 1945, March 3, p. 307), replying to an earlier correspondent who had asserted that penicillin was costing £400 per 900,000 units in this country. Dr. Hartley stated that this figure was in excess by 1000 per cent. and more of the price paid by the Government under the usual contract conditions after the usual cost investigations. If this circumlocution means what the present writer understands it to mean, the cost of penicillin in this country to the sole purchaser, the Government, is calculated to be not more than about £4 per 100,000 units. This is to be compared (assuming contract and costing conditions are reasonably comparable in Britain and U.S.A.) with a price of 85 cents (say, 4s. 3d.) per 100,000 units paid by the U.S. Government to American producers.

Distribution—Here and Elsewhere

As already stated, distribution of penicillin is free of charge to some 200 or so hospitals where adequate laboratory facilities and sufficiently experienced personnel are available. The hospitals are authorised to distribute to other hospitals within their area, and even to private practitioners for administration to patients where hospitalisation is not possible. In March, 1945, the distribution was on the basis of 2×10^3 units per month per 100 beds for patients with acute diseases. It is possible that since the end of the war the quantity distributed may have been improved. This general situation carries with it evidence of a continued scarcity of the drug, in sharp contrast to the situation in the U.S.A. However, whatever the actual situation, we are offered reassurance in the form of the following classic example of parliamentary evasion: "... the new factories under construction will, with those working, provide sufficient penicillin for all foreseeable requirements with the expectation that penicillin will become more widely available for use by doctors in those cases where experience indicates the need for its use."

This statement further carries with it the merest hint of intended restrictions in distribution. Can it be that penicillin preparations will ever reach the retail pharmacist in this country? Or will its distribution, as has been feared by British pharmacists, be routed through hospital pharmacies regionally situated? One thing seems pretty certain: unless there is found to be a marked clinical advantage in the use of penicillin of the form produced by "bottle" plants over the form produced by deep fermentation, the "bottle" plants are already obsolete. So far as is known, the clinical differences between penicillin F and the G and X forms are not sufficient to affect normal commercial considerations although no expert appraisement of this is yet available. The potency of penicillin X is about 900 units per mgm., while penicillin G is 1650 units per mgm., a situation in favour of penicillin G if sale were on a weight basis. On the other hand (*J. Amer. Med Ass.*, 1945, *129*, 257) most strains of hæmolytic streptococci (group A), gonococcus and meningococcus, pneumococcus, and *S. viridans* were considerably more sensitive to penicillin X; most of the staphylococci were equally sensitive to G and X. The deep fermentation produces penicillin G preponderatingly. Surface fermentations yield 40 to 50 per cent. of penicillin X, although in certain conditions this type of fermentation produces penicillin F preponderatingly. It is clear that penicillin sold in and exported from U.S.A. would be the G form.

Towards Synthesis

Since 1941 the question has continually been raised as to whether synthesis of penicillin would be achieved, and whether such a synthesis would be sufficiently simple to form a basis for commercial production with the consequence of rendering obsolete the extensive fermentation installations which have been established or have been contemplated. Clearly the question could be answered only by knowing the degree of success which has been attained in the preliminary elucidation of the structure of penicillin and, on the assumption that this had been achieved, of assessing the practicability of synthesis. Unfortunately, for security reasons, no information was made available, since 1941, with reference to the chemistry of penicillin, until December, 1945. It has been reasonable to conclude from the continued high capital expenditures repeatedly incurred in connection with fermentation plants that no synthesis was likely to be achieved at an early date. It has now been made known in a joint pronouncement of the Medical Research Council (London) and the Committee on Medical Research (Washington) that not only has penicillin synthesis not been achieved—despite the preoccupation of the foremost scientists of Britain and America with the problem—but its precise structure remains in doubt (*Nature*, 1945, *156*, 766). A brief summary of the present status of the chemistry of penicillin has been issued pending more detailed publication at a later date. The empirical formula of penicillin which represents the true molecular weight, is $C_9H_{11}O_4SN_2R$, where R represents one of the groupings shown in the table overleaf.

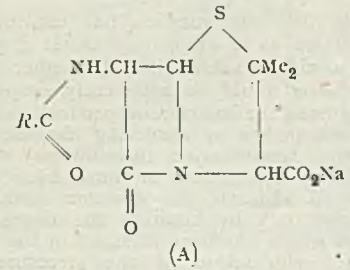
As was indicated in last year's review, penicillin is not a single substance but a group of related substances, the most im-

portant members of which are characterised according to the following table:

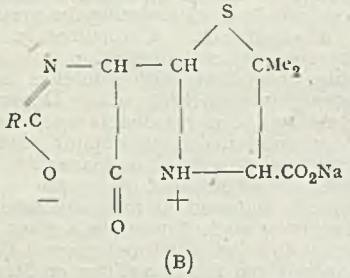
TABLE 1.

Designation G.B.	Designation U.S.A.	R =
I	F	Δ^2-pentenyl ($-CH_2.CH{:}CH.CH_2.CH_3$)
II	G	benzyl
III	X	*p*-hydroxybenzyl
	K	*n*-heptyl
dihydropenicillin-I		*n*-amyl

The actual structure of penicillin is still a matter for conjecture. The structures of simpler derivatives obtained by degradative methods have, in many cases, been confirmed by synthesis and resolution of enantiomorphs. From a consideration of all the facts, views have been formed as to the probable structure of the penicillins and most attention is being directed towards two possibilities in the first of which (A) there is a β-lactam structure, while in the second (B) there is an azlactone grouping:



(A)



(B)

In the light of security considerations in this country it is interesting to find reported by C.I.O.S. teams that the Germans had made, during the war, insignificant progress with penicillin production. Only slight success was achieved by I.G. Farbenindustrie at Höchst and Elberfeld and by Schering elsewhere. All experiments were with surface fermentations. It is doubtful whether 50 × 10^6 units were manufactured in all. At Höchst a Czapek-Dox medium, supplemented with yeast or potato extract, gave a culture fluid titre of 10 Oxford units per ml. (as against about 200 units per ml. in established practice) half of which was lost in working up for calcium penicillin which had an activity of 125 Oxford units per mgm., as compared with anything from 350 up to (rarely) 1100 or 1200 units per mgm. as achieved by the Allies. No information had been obtained on the structure or empirical formula of penicillin.

Information on Penicillin

A number of surveys have become available during the past twelve months which will be only briefly referred to. The first for popular consumption—and very satisfactory for that limited purpose—entitled *The Story of Penicillin*, by George Lacken, was issued in booklet form by The Pilot Press. The second, entitled *A British Triumph—The Discovery and Development of Penicillin*, was issued by the Therapeutic Research Corporation of Great Britain, and was unworthy of the organisation publishing it (making all allowance for current difficulties) and the country in which penicillin was first discovered and manufactured. The third, *A Review of the Present Information concerning Penicillin*, was an excellent little survey published by Abbott Laboratories in the U.S., and directed in the main towards general practitioners there; this issue should set a minimum standard for this type of publication. The fourth is the Lister Memorial Lecture by Sir Howard Florey on *The Use of Micro-organisms for Therapeutic Purposes*, which places the whole problem in historial and scientific perspective from the purely medical angle; this lecture should be consulted by all readers who are interested (*see B.M.J.*, 1945, No. 4427, 635). The fifth is a volume written by S. A. Waksman and issued in this country by the Oxford University Press on *Microbial Antagonisms and Antibiotic Substances*. This is the first extensive study of the phenomenon of antibiosis of which the more striking medical applications and aspects are only a part. It is a scholarly work by one who was among the earliest in the field, and should be in wide demand.

The most satisfactory surveys of penicillin manufacture are still those published in 1944; E. G. Callaham (*Chem. Met. Eng.*, 1944, p. 94, p. 129); and McKeen, Regna and Kiewig (*Trans. Amer. Inst. Chem. Eng.*, 1944, *40*, No. 6). Considerable attention is given in these publications to the problem of the final freeze-drying of the penicillin. Some additional information is also given by Glaxo, Ltd., who have been among the foremost manufacturers in this country. They have indicated (*see Pharm. J.*, 1945, September 29) that the final freeze-drying of penicillin in their process takes place in the following five stages: (1) check and assay of the concentration of calcium penicillin or sodium penicillin in the solution; (2) Seitz filtration into glass flasks; (3) storage in sterilised vials in aseptic con-

ditions; (4) penicillin solution in the vials frozen in specially designed low-temperature refrigerator, and the ice crystals sublimed in a vacuum desiccator; (5) sealing of the vials containing dry powder of standardised penicillin salt. The penicillin is stored at −2°C. until required. In the desiccator the water vapour condensing coils are maintained at −50°C. Only one stage of compression is necessary by the use of the refrigerant "Freon 22." Heat has to be put into the apparatus in order to maintain the temperature of the vials at −20°C., thus preserving a temperature differential without which evaporation would cease. The freeze-drying of penicillin and other biological fluids has been extensively reported upon by Flosdorf and his colleagues, and their original publications should be consulted (*Brit. Med. J.*, 1945, *1*, 216; *J. Immun.*, 1945, *50*, 21; *see* also B.P. 562,470).

Improved Drying Methods

The lyophilic method of drying is clearly very slow and cumbersome and attention has been turned towards improving this situation. In two ways an attempt has been made to concentrate the penicillin solution substantially before starting evaporation. A so-called electronic method has been demonstrated in this country (*see Pharm. J.*, 1945, September 29), in which induced high-frequency currents raise the temperature of the solution to be evaporated, by virtue of its dielectric capacity. The principal feature is that there is no temperature gradient in the solution as with ordinary methods of heating and the technique is, therefore, highly applicable where labile biological materials are to be heated. An apparatus has been demonstrated by which a penicillin solution may be concentrated at a vacuum adjusted to give a boiling point of 10°C. with an output of 50 ml. per hour and a fourfold concentration.

An apparatus based on the same principle has been made in America and not only is a preliminary concentration achieved by this method of heating, but the final vacuum drying is also accomplished by it (*Chem. Eng. News*, 1945, *23*, 1450). The apparatus consists, essentially, of three units. The first unit is a bulk concentrator designed to produce a concentrated solution of 100,000 units per ml. The dilute solution of penicillin is fed to it and boiled by the application of the high-frequency current in a moderate vacuum at 50°F., giving an evaporative rate of 3 litres per hour which is said to be 48 times as fast as the conventional process. With a 2000-watt high-frequency generator, the solution is evenly heated without temperature gradients. The second unit deals with the vials each of which contains 1 ml. (*i.e.*, 100,000 units penicillin) of the concentrated solution from the first unit. The vials are heated from another 2000-watt generator *in vacuo* while being spun at 3000 revs. per min.—an operation which requires 3 minutes. (The purpose of spinning is, no doubt, to prevent frothing as dissolved gases disengage and to present a larger surface for evaporation. The reader is referred to an article relevant to this matter by Greaves—*Nature*, 1944, *153*, 485—entitled "Centrifugal Freeze Drying"). In the third and final unit the last traces of water are removed from the penicillin in the vials by heating by the same system for 30 minutes in a moderate vacuum. The complete installation can produce 2000 vials per hour, each containing 100,000 units penicillin. It is claimed that this output is in excess of that of a conventional plant occupying four times the floor space and costing three times as much.

Challinor and McNaughton (*Nature*, 1945, *156*, 602) have indicated a second possible method of concentrating the penicillin solution prior to the final lyophilic drying. They observed that a frozen penicillin solution when allowed to thaw at room temperature gave fractions which varied in potency, and that the penicillin titre of the thawed fractions varied with the degree of pigmentation. From 400 ml. of a sodium penicillin solution frozen at −25°C., and thawed at room temperature, about 90 per cent. of the penicillin was recovered in the first fraction amounting to about half the original volume. This concentrate could then be sent to freeze-drying. At the same time, by this operation, the titre of the solution was clearly increased. For example, a solution of sodium penicillin of titre 3000 units per ml. could be thus fractionated to give a solution of 5000 units per ml. at which strength it was suitable for parenteral injection directly. The technique is not entirely new. As the authors point out, it was developed earlier by Macfarlane for biological fluids. Moreover, it has probably been used on at least semi-commercial scale in the concentration of fruit juices.

An additional extension of the use of the lyophilic method of drying is in the preservation of stock-cultures of micro-organisms. The culture (usually in the form of spores) is quick-frozen, dried in high vacuum, sealed, and stored at about zero Such cultures have been found less likely to deteriorate or become contaminated than cultures maintained by traditional techniques. Stock cultures of the penicillin-producing strains of *Penicillium notatum* are being maintained by this technique. It is reported that one of the large American-type culture collections is now maintained by this method except in the cases of a few micro-organisms (especially those with very large spores) where the method is unsuitable.

(*To be continued*)

Building and Plant Allowances

New Income-Tax Concessions

WHEN the Income Tax Act, 1945, was passed by the late Government, it was to be brought in on an appointed day in a subsequent Act. That date has now been decided by the Finance Act (No. 2), 1945, as April 6, 1946; but as regards the new allowances for buildings, machinery and plant, any expenditure incurred before the appointed date, but after April 6, 1944, will rank as if it had been incurred after the appointed day.

For the buildings scheme 10 per cent. of the capital expenditure will be allowed, this being called the "initial allowance," with also 2 per cent. yearly called the "annual allowance." The 10 per cent., however, applies only to new buildings (including parts of buildings), but the 2 per cent. applies to all buildings erected less than fifty years before April 6, 1943. In these cases the allowance applies for the remaining years of a life of 50 years, *e.g.*, if a building is 25 years old the case will attract 2 per cent. for each of the next 25 years. For new buildings it will mean that their cost will be written off over a period of 45 years.

Before this Act there existed a special allowance for mills, factories, etc.—originally intended to meet depreciation caused by the use of machinery—which for most trades has been either the amount given under Schedule A Income Tax for repairs, or, if less, that given under the Rating Acts. This allowance is now discontinued, although a concern already receiving it can continue to do so for a period of up to five years if it so desires.

Machinery Allowance

For machinery and plant, there will be a new allowance called an "initial allowance" of 20 per cent. of the capital expenditure. This applies not only to new but also to second-hand machinery and plant. This is additional to what has obtained before: thus the ordinary yearly percentage "wear-and-tear" allowances for machinery and plant continue, plus the extra percentage (applying to all trades) which has been one-fifth, but will for assessment years starting April 6, 1946, become one-fourth additional. Taking, for example, an agreed rate of 20 per cent. p.a., the addition of one-fifth means 24 per cent.; now, with one-fourth added, this will be 25 per cent. It might be pertinent to interpose here, that the "initial allowance" of 20 per cent. applies each time machinery and plant is replaced as well as at the first installation of machinery, etc., after this new Act comes into effect.

If machinery, etc., is scrapped before the whole of the cost has been allowed for taxation purposes, the balance, called a Balancing Allowance, will be allowed. This really takes the place of the existing Obsolescence Allowance; but unlike the Obsolescence Allowance, which applies where machinery and plant is replaced, this Balancing Allowance will apply irrespective of whether it is replaced or not. Consequent on this, however, if the machinery or plant is disposed of at a price in excess of the written-down value, the excess for tax purposes will be considered a profit and will be taxable This would not apply, however, if the amount received were used for the renewal of machinery or plant.

The Position of Patents

The taxation position as regards patents has so far been that in the case of an out-and-out sale for a lump sum, that was not assessable, being treated as capital, although if the user of a patent was transferred for a lump sum it is assessable as it is where the inventor receives income in the form of royalties. Under the new Act, if capital is expended on the purchase of patent rights, an annual allowance will be made of the expenditure spread over seventeen years (if for a specified period that period, if shorter, will apply instead of the seventeen years). But the vendor will be liable to tax on the capital amount and this can also be spread over, but only over six years, not seventeen. If the taxpayer chooses he can be assessed for the whole sum in the year of assessment in which the amount was received. As regards a royalty or lump sum paid in respect of the user of a patent, the tax can be spread over six years, or, if the period is more than two years but less than six, spread over the appropriate number of complete years. Where an inventor receives income from a patent the earned-income allowance applies. These provisions apply only to expenditure incurred after the appointed day except to a modified extent in the case of certain expenses allowed in the devising of a patent, where certain expenses incurred before that day may be allowed.

The new allowance for buildings applies only to industrial buildings, but the new machinery and plant allowance applies to all trades and professions. The special allowance for exceptional depreciation of buildings, machinery, or plant (provided since January 1, 1937) which broadly applies to depreciation through redundancy or the end of the war, is to be given not only in respect of buildings, machinery, etc., which have been sold or become obsolete, but also to any that may be retained but have fallen in value.

Science and Mankind

An Important Conference

A CONFERENCE on the subject "Science and the Welfare of Mankind" has been organised by the Association of Scientific Workers, in co-operation with other scientific organisation. It will last over February 15, 16 and 17, at Beaver Hall, Garlick Hill, London, E.C.4. At the introductory session on February 15, at 7 p.m., Professor Sir Robert Robinson will be in the chair. There will also be speeches by Mr. H. Morrison and representative foreign scientists, and by Professor P. M. S. Blackett. The first session, beginning at 2.30 p.m. on February 16, will be devoted to "The Implications of Recent Scientific Development," with Sir Richard Gregory occupying the chair. A paper on "Atomic Energy" will be read by Professor M. L. Oliphant; Professor Sir Alfred Egerton will lecture on "Chemical Engineering," followed by Dr. H. L. Richardson on "Agriculture."

The speakers on the programme of the second session, on February 17, at 10 a.m., Professors B. Farrington and J. D. Bernal, and Mr. Arthur Horner, will deal with the "Responsibilities of Scientists in Modern Society," the chair being taken by Professor A. V. Hill, C.H. "The Organisation of Science" is the subject of the third session on February 17, at 2.30 p.m., when Dr. Julian Huxley will speak on the "International Organisation of Science," followed by a paper on "The National Organisation of Science," by Professor Blackett. The chairman of this session, Sir Robert Watson-Watt, will give a summary of the work of the conference.

French Chemical Imports

Equalisation Levy Modified

THE recent devaluation of the franc has removed the need for levies on imports into France with the aim of equalising the cost of imported goods with the level of French prices. Accordingly, an announcement has been made in the *Journal Officiel* abolishing such "perequating" levies as from December 26, 1945, except where a note had been provided stipulating that such a duty would be levied.

In certain cases, however, where, as a result of the fixing of a general contract price, the payments to be made will have the effect of bringing the cost prices of the products imported above the French home prices, importers will be able to avail themselves of the Perequation Supervisory Committee, which will make the necessary arrangements with a view to bringing the cost price to the level of French prices. Importers' claims should be addressed to the committee through the Technical Control Office responsible for the imported product.

The following goods under the jurisdiction of the Chemical Industries Control Office become exempt from perequation payments: Fish fats; fixed oils, boiled or oxidised; vegetable oils and fats; artificial perfumes; vanillin; resinates, gums, etc; tar; balsams; natural camphor; raw rubber, latex; manna; aloes; opium; dyes and tannins; sulphur, ground, purified, refined, sublimated; iron pyrites; organic products; arsenious acid; natural borate of lime; borate of soda; carbide of calcium; precipitated sulphur; chromic acid; chromate and bichromate of potassium; chrome oxide; sulphate of copper; sodium products; zinc oxide; glycerine; phosphate fertilisers; nitrogenous fertilisers; cochineal; indigo; prepared dyes; soap, other than perfumery.

The following goods are subject to a perequation payment (rate per cent. in brackets): Sulphide of cadmium (30); resinous oils (50); madder (50); paints and varnishes (50); printing inks (66); activated carbons (50); pure and combined casein (50).

RESEARCH AT STAVELEY

The Staveley Coal and Iron Co., Ltd., have decided to co-ordinate all their chemical and metallurgical research. To achieve this, it has been decided to establish a Central Research Department, which will include the research activities of its subsidiary company, Bradley & Foster, Ltd., Darlaston. The new department will be located at Staveley Works, near Chesterfield, and will be known as The Staveley-Bradley Foster Research Department. It will have as its principal aim the intensification of research and development in all aspects of the manufacture of chemicals and iron and their utilisation.

CEMENT PRODUCTION PLANS

Within the next two or three months a final decision by the Barrow Hæmatite Steel Company is expected as to whether it will enter the field of cement production. For over 90 years the company has produced pig-iron, and its slag bank has been built up during that time. This slag has been found to be eminently suitable for the production of high-class cement. The board is now considering whether to make the slag into cement along with certain other products, such as limestone. The necessary plant would cost about £750,000, and if a subsidiary is formed to operate the cement side of the business, the issued capital would need to be larger than this amount in order to provide working capital.

Sulphuric Acid Production

Six-Monthly Statistical Summary

STATISTICS relating to the production of sulphuric acid in the United Kingdom and Eire (*see* THE CHEMICAL AGE, 1945, September 22, p. 267) from July to December, 1945, have now been published by the National Sulphuric Acid Association.

Total plant capacity for the period under review amounted to 844,000 tons. A subdivision of the capacity is made under the heads of "trade" plants and Government plants, and it is interesting to note that as compared with the last statistical summary the capacity of the Government plants has decreased (from 95,000 tons to 59,000 tons) but the capacity of "trade" plants has gone up from 772,000 tons to 785,000 tons.

More Chamber Plants

When these plants are sub-divided into Chamber plants and Contact plants it is seen that the proportion of Chamber plants used is greater than the number of Contact plants. Taking U.K. production only, the percentage in rated capacity during the six months under review was 52 per cent. for Chamber plants (827,200 tons 100 per cent. acid) and 48 per cent. for Contact plants (761,600 tons). Government plants (Contact only) had a rated capacity of 47,000 tons (3 per cent.). This shows a reversal of the general tendency of the war years. For the previous six months the rated percentage capacity of Contact plants and of Chamber plants was 50 each. In 1939, however, the percentages were 66 for Chamber plants, 34 for Contact plants.

Detailed tables give the production of sulphuric acid and oleum during the period. The total output from "trade" plants amounted to 598,100 tons (Chamber 323,100; Contact 275,000). Government works, operating only Contact plants, produced 9200 tons; Eire plants (Chamber only) produced 18,800 tons. A further table giving the percentage of capacity in operation in the U.K. and Eire (including Government plants) shows that 607,255 tons of acid were made out of a total capacity of 844,000 tons, which is 71.9 per cent. of capacity. The average daily production varied from 2862 tons in August to 3432 tons in November, with a daily average for the six months of 3201 tons, as against 3464 tons in the previous six months.

The consumption of sulphuric acid and oleum in the U.K. during the period amounted to 606,763 tons. Table III gives details of the various trade uses for which it was required. The Eireann consumption over the same period amounted to 17,973 tons, for which 13,901 tons of pyrites and 656 tons of spent oxide were consumed.

Raw Material Consumption

A final table gives details of the consumption of raw materials during the six months. These are divided, as in the previous summary, under the head of pyrites (including converted anhydrite), sulphur (including H_2S), spent oxide and zinc concentrates. Totals in tons for the 6 months were as follows:

	Home Produced	Imported	Total
Pyrites	113,803	11,926	125,729
Sulphur	79,985	1,816	81,761
Spent Oxide	—	—	94,044
Zinc Concentrates ...	—	—	78,761

Returns for the Fourth Quarter, 1945

The following figures, compiled by the National Sulphuric Acid Association, give a summary of the monthly returns concerning sulphuric acid for the United Kingdom and Eire for the period October 1-December 31, 1945. This is the second list of such figures (*see* THE CHEMICAL AGE, 1945, December 8, p. 539) published with the co-operation of the Association.

TABLE I. SULPHURIC ACID AND OLEUM
(Tons of 100% H_2SO_4).

	Chamber only	Contact only	Chamber and Contact
Stock, October 1, 1945...	37,070	24,137	61,207
Production	174,802	149,178	323,980
Receipts	44,373	19,161	63,534
Oleum Feed	—	1,669	1,669
Adjustments	−64	+744	+680
Use	108,810	70,711	179,521
Despatches	108,824	95,192	204,016
Stock, December 31, 1945	38,547	28,086	67,533
Total capacity represented	220,770	178,620	399,390
Percentage production...	79.2%	83.5%	81.1%

TABLE II. RAW MATERIALS (Tons)

	Pyrites*	Spent Oxide	Sulphur and H_2S	Zinc Concentrates
Stock, October 1, 1945 ...	93,026	128,179	39,206	59,550
Receipts ...	70,832	54,259	33,107	38,182
Adjustments	+508	+808	+953	−60
Use	77,518	48,848	42,383	41,966
Despatches ...	559	3,687	682	1,121
	36†	412†		
Stock, December 31, 1945	86,253	130,299	30,261	54,585

* "Receipts" and "Use" include Anhydrite "converted" to Pyrites.
† Used at Works for purposes other than Sulphuric Acid manufacture.,
Note.—The above figures exclude all Government plants, *i.e.* R.O.F.'s, Agency Factories and other Government-financed plants.

TABLE III. CONSUMPTION OF SULPHURIC ACID AND OLEUM

Trade Uses		Tons 100% H_2SO_4 Oct. to Dec.	July to Dec.
60	Accumulators	2,094	4,146
61	Agricultural Purposes ...	798	4,440
62	Benzol (*see* 102)		
63	Bichromate and Chromic Acid	2,521	5,552
*64	Borax and Boracic Acid (*see* 105)		
65	Bromine	1,075	4,091
*66	Chlorsulphonic Acid (*see* 105)		
67	Clays (Fullers' Earth, etc.)	1,744	3,086
68	Copper Pickling	580	1,123
69	Dealers	2,986	5,667
70	Drugs and Fine Chemicals	2,843	5,268
71	Dyestuffs and Intermediates	12,769	23,310
72	Explosives	3,782	11,661
73	Export	180	418
*74	Formic Acid (*see* 105)		
75	Glue, Gelatine and Size ...	90	177
76	Hydrochloric Acid ...	13,115	24,701
77	Hydrofluoric Acid ...	466	955
78	Iron Pickling (including Tin plate)	16,081	32,246
79	Leather	1,151	2,110
80	Lithopone (*see* 85)		
81	Metal Extraction... ...	237	411
82	Oil (Mineral) Refining ...	5,664	10,089
83	Oil (Vegetable) Refining...	1,930	3,688
84	Oxalic, Tartaric and Citric Acids	1,695	3,333
85 & 80	Paint and Lithopone ...	12,948	23,590
86	Paper, etc.	753	1,341
88	Phosphates (Industrial) ...	936	1,975
89	Plastics, not otherwise classified	1,989	3,558
90	Rare Earths	1,674	3,413
91	Rayon and Transparent Paper	21,874	42,844
92	Sewage	2,136	3,996
93	Soap and Glycerine ...	1,002	1,944
94	Sugar Refining	105	212
*95	Sulphate of Alumina (*see* 105)		
96	Sulphate of Ammonia ...	59,194	115,765
97	Sulphate of Barium ...	820	1,622
98	Sulphate of Copper ...	5,993	11,382
99	Sulphate of Magnesium ...	1,692	2,935
100	Sulphate of Zinc	870	1,594
101	Superphosphates	114,904	187,022
102 & 62	Tar and Benzol	3,493	7,400
103	Textile Uses	4,076	7,834
105	Unclassified—*Uses Known	16,514	31,649
	Uses Unknown	5,650	11,215
	TOTAL	329,324	606,763

The southern half of the island of Sakhalin possesses several important industries. In addition to sawmills and rayon and paper factories, the region is reported to have a number of plants manufacturing methanol, acetone, and acetic acid. A considerable part of the fish catch in this area is used for fertiliser material.

Parliamentary Topics

Steel Prices

IN the House of Commons last week, Mr. Cobb asked the Minister of Supply and of Aircraft Production what was the reason for the recently-announced increase in the selling price of steel, and whether the effect that this would have on increased costs throughout industry generally had been taken into account, and whether the increase was based on the performance of the most efficient low-cost producers, or on that of the inefficient high-cost producers.

Mr. Wilmot: The recent increase in the selling price of steel was made necessary by the termination of the main war-time arrangements for stabilising prices which had involved subsidies to meet increased costs of production. The new prices are based on a review of costs of a representative sample of each section of the industry, in which special weight was given to the costs of the more efficient firms and to anticipated economies resulting from the return to normal supplies. The effects on consuming industries were fully considered before prices were raised.

X-Ray Industry

Mr. Skeffington asked the Minister of Supply whether he had formulated plans for the small but efficient X-ray manufacturing industry in this country to play a greater part in both home and export trade.

Mr. Wilmot: I am inviting the X-ray industry to discuss with my department the measures necessary to assist the industry to play an increasing part in the home and export trade. Preliminary inquiries are going forward into various aspects of the problem in consultation with other departments.

Patents Examiners' Reports

Squadron-Leader Emrys Roberts asked the President of the Board of Trade the average length of time between the receipt of an application for a patent by the Patent Office and the issue of the examiner's report.

Sir S. Cripps: The average interval is at present about 20 months. The delay is due to the transfer of the bulk of the technical staff to more immediate and urgent duties during the war and the impossibility, under war conditions, of replacing losses through death and retirement. Since the end of hostilities, special steps have been taken to secure the return of staff and to provide additional staff, but there is still a shortage of candidates with the necessary qualifications, and time is necessarily occupied in training new staff. It will be some time, therefore, before an improvement in the present position can be effected.

Government Scientists

Sir E. Graham-Little asked the Chancellor

of the Exchequer whether he was aware that the proposals of the White Paper, September, 1945, fail to carry out the assurances given by the last Government that the conditions of service, pay and prospects of Government scientific employees should compare favourably with those on the administrative side of Government work, and whether he would take steps to rectify this position.

Mr. Dalton: No. sir. On the contrary, at some points in the scale, scientists will be paid more than administrators.

Science Students

Colonel Erroll asked the Minister of Labour whether he was aware that, at the present time, students of ability and promise were being taken away from the Imperial College of Science and Technology and similar institutions because of the restrictive regulations imposed by him with regard to the number of entrants permitted to university science courses, and whether, in view of the need of training the maximum number of scientific students, he would take steps to overhaul and abolish all regulations which are no longer essential.

Mr. Isaacs: Students at the Imperial College of Science and Technology and similar institutions, who started courses at their own risk, not having been granted deferment, are being withdrawn. While realising the necessity for maintaining the flow of scientists, I must also have regard to the needs of the Forces, and I cannot say, at present, what arrangements will be made for the next academic year, but the whole question is under active consideration.

Technical Institutes (Salaries)

Mr. Haydn Davies asked the Minister of Education whether she was aware of the dissatisfaction among heads of technical institutes, arising from the delay in the pronouncement of her department relating to their salary scales; and whether she could promise an announcement.

Miss Wilkinson: Some delay is arising on the determination of the salaries to be paid to heads of technical institutes under the terms of the Burnham Committee's report on scales of salary for teachers in technical colleges. This is at present inevitable, having regard to the shortage of staff, both in my department and in the offices of the local education authorities. I can only promise that the matter will be pursued with all the speed our resources make possible.

Tung Oil in Nyasaland

Colonel Wigg asked the Secretary of State for the Colonies what plans were being made for creating a tung oil control board in Nyasaland.

Mr. Creech Jones: The Government of Nyasaland is pressing forward with a plan for the development of tung oil production in a largely undeveloped area of the Protectorate. The details are still under discussion, but in the meantime, the expenditure, from the surplus funds of the Nyasaland Government, of £27,000 has been sanctioned, for the opening up, planting and maintenance, for three years, of 500 acres of land, such expenditure to be recouped from whatever organisation is set up on a permanent basis.

Basic Slag Supplies

In reply to Mr. Collins, who asked a question regarding the supply of basic slag for the improvement of pastures and reseeded fields, the Minister of Agriculture said that phosphatic fertilisers, including basic slag, were not at present being released for use on grassland.

Penicillin for Africa

Squadron-Leader Donner asked the Secretary of State for the Colonies whether he was satisfied that adequate supplies of penicillin were now available for civilian use by the medical authorities in all the African Colonies.

Mr. Creech Jones: There is no restriction on the supply of penicillin to the Colonies. Their full requirements can now be ordered through the usual channels.

B.I.O.S. Reports

Colonel Erroll asked the President of the Board of Trade what steps had been taken to bring to the notice of all interested industries, institutions, societies and associations in this country the contents of the reports produced by the British Intelligence Objective Sub-Committee, as a result of inspecting various undertakings in Germany, with a view to ascertaining what scientific developments had taken place therein during the war.

Lists of these reports, as and when they are published by the Stationery Office, are announced weekly in the *Board of Trade Journal*, copies are also made available to the technical Press the reply stated.

Fuel Ministry's Staff

Colonel Erroll asked the Minister of Fuel and Power the number of permanent civil servants employed in his department on the latest convenient date, who were being paid £800 per annum or over; and the number of these who possessed technical qualifications up to the standard of a university honours degree.

Mr. Shinwell: There are in my Department 124 established civil servants in receipt of a salary of £800 per annum or more excluding war bonus. Of these, 36 are graduates of universities or possess technical qualifications of an equivalent standard.

Personal Notes

MR. E. C. EVANS has retired from the British Iron and Steel Research Association.

MR. J. E. BAILEY, who is an assistant physicist in the Widnes laboratory of I.C.I., has been elected to the Widnes Borough Council, at a by-election, in the Labour interest.

MR. HARRY L. BENNETT, sales director of Lever Bros. (Ireland), Ltd., since 1941, has just announced his retirement. He has been with the Lever organisation for twenty-six years.

MR. H. ST. J. SOMERSET, who has been general manager of Electrolytic Zinc Company of Australia, Ltd., since 1926, has been appointed managing director, and MR. H. HEY has been appointed general manager,

DR. J. E. DRIVER, who has recently been appointed Editor of the Chemical Society's publications, took up his duties on January 1. His address for editorial business is Burlington House, Piccadilly, London, W.1.

MR. H. H. HOLLIS, chairman and managing director, Oxley Engineering Co., Ltd., has made a good recovery from his recent serious indisposition, and is now able to give part-time attention to business.

DR. J. H. HURST, technical director of Bradley & Foster, Ltd., has been appointed director of research to the Staveley Company, and the company's new central research department will be under his direction.

SIR GRAHAM CUNNINGHAM has returned to the Triplex Safety Glass Company as chairman and managing director, having retired from the post of Chief Executive and Controller General of Munitions Production at the Ministry of Supply.

DR. A. L. G. REES has been awarded the Rennie Memorial Medal for 1945 by the Australian Chemical Institute for his important contributions to the knowledge of electronic absorption spectra in solution, and to the study of solid phosphors.

Obituary

DR. WILLIAM POLLARD, M.A., D.Sc., who died on January 20 at Umberleigh, North Devon, aged 76, had been a Fellow of the Royal Institute of Chemistry since 1909.

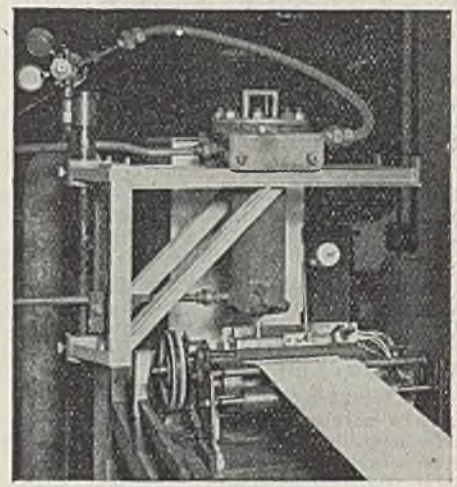
MR. DAVID HENDRY, M.C., who died on January 29 at Lenzie, Dumbartonshire, aged 52, was a director of I.C.I. (India), Ltd. He joined that company in 1929 from the Burma Agricultural Service, and was largely responsible for the development of the agricultural side of I.C.I.'s interests in India, Burma, and Ceylon. He was also an active member of the Bengal Legislative Assembly for some years.

Moisture-Proof Paper Packs

Simple New Process

PAPER manufacturers and all concerned with packaging for export will be interested in a new technique for applying polythene coatings to paper and fabrics. Films of this thermoplastic have outstanding flexibility and toughness, negligible water-absorption, high resistance to the diffusion of water vapour, and are chemically inert. They are not soluble in any of the usual acids or alkalis, and resist chemical attack. The new process has been developed by I.C.I. using grade 200 of "Alkathene," the particular brand of polythene which they manufacture.

The material is first melted at about 160°C., preferably in an inert atmosphere. After filtering, it is passed into a heated tray, from which it flows on to thoroughly dry paper or fabric. The melt is then spread by means of an adjustable doctor knife, as in the photograph below.



Spreading the Alkathene melt.

Papers and fabrics thus coated are glossy, tasteless, odourless and almost water-white. They act as water-vapour barriers under both temperate and tropical conditions. Paper with a coating weight of about 10 lb. double crown has a water-vapour permeability of approximately 8 gm./sq. m./24 hrs. when tested at 100°F. at 90 per cent. relative humidity, after creasing under a load of 6 lb. per inch of crease. Coated paper can be heat-sealed at 120-150°C. The seal is still extremely strong at a temperature as high as 100°C. Heat-sealed containers will, in fact, hold boiling water. High-frequency heat sealing cannot be used with this process.

General News——From Week to Week

The telephone service to Holland has been reopened, but it is still confined to commercial calls.

The M.A.P. has issued specification DTD922, concerning the manufacture of carbon monoxide indicator tubes, Mark III (superseding DTD/RDM6B).

Work is to be restarted on the extension of the College of Technology at Manchester; the new building, which is to cost £264,000, is expected to add one-third to the existing accommodation.

An exhibition of British chemical research, organised by Imperial Chemical Industries, Ltd., will be held at the Ballroom, Carlton Hotel, London, S.W.1, from June 3 to 15, 1946.

The Welsh Industries Fair, an annual event before the war, will be held at Cardiff from May 27 to June 1, organised by the National Industrial Development Council of Wales and Monmouthshire.

The Minister of Food announces that medicated soap containing 5 per cent. or more of tetraethylthiuram monosulphide has been added to the list of soaps which may be supplied against medical prescriptions.

The total number of persons employed in the chemicals, fats, oils and fertilisers industrial group in Eire in September last was 2672, compared with 2542 a year earlier and 3083 in September, 1939.

The Council of the Chemical Society has set up a Centenary Celebrations Executive Committee to make arrangements for the Society's centenary celebrations, due to be held in July, 1947.

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

A conference on the training of laboratory technicians will be held on February 23, at 3 p.m., at the Wellcome Research Institution, 183 Euston Road, London, N.W.1, under the auspices of the Association of Scientific Workers, the Association of University Teachers, and the British Association of Chemists.

Fellows of the Chemical Society and friends of Mr. S. E. Carr are reminded that the closing date for contributions to the S. E. Carr presentation fund is January 31, 1946. Contributions, not exceeding 10s., should be sent to Dr. D. C. Martin, general secretary, the Chemical Society, Burlington House, Piccadilly, London, W.1, and be made payable to "The S. E. Carr Fund."

The Birmingham Photographic Society has recently formed a section devoted to the application of photographic techniques to science and industry. Further information on its activities can be obtained from the acting hon. secretary, Mr. E. B. Brain, 67 Grayswood Park Road, Birmingham, 32.

At the North-East Coast Exhibition of Scientific Equipment (February 12 to 22), Thos. Firth & John Brown, Ltd., are exhibiting the range of their well-known "Hardometer" hardness testing machine, as well as micrometers showing the application of "Mitia" tungsten carbide to provide wear-resisting faces on these instruments.

The Molasses and Industrial Alcohol Control has been replaced, with effect from February 1, by a Directorate of Molasses and Industrial Alcohol under the Raw Materials Department. Mr. H. P. Coles (assistant controller) has been appointed director. Mr. T. F. A. Board (controller) and Mr. D. H. Owen-Edmunds and Mr. G. H. Duncan (assistant controllers) have been released, but will be available for advice.

At the Royal Society last Thursday a paper was presented by Mr. Hans Pettersson: "A Swedish Deep-sea Expedition" (communicated by Vice-Admiral Sir John Edgell, F.R.S.). Core-samplers of a new type have been tested, and the new technique will be used from a circumnavigating cruise leaving Göteborg early next year. The chemistry and transparency of the surface layers as well as of the water next to the bottom is to be studied.

It is believed that the lecture which is being delivered by Mr. R. E. Threlfall to the British Association of Chemists next Wednesday, is the first to be given (at any rate for many years) on the subject of Glass Tubing. Although this material is used in every laboratory and every chemical works, few chemists have accurate information about its production and the many special varieties now available. Mr. Threlfall is well known as an authority on the subject.

Foreign News

According to Munich radio, the Allied Military Government has published an order banning transactions in the shares of I. G. Farben.

Two of Belgium's leading steel concerns, the Société John Cockerill and the S. A. d'Angleur-Athus, are to be merged in the near future.

The erection of penicillin plants is planned with UNRRA's assistance in Czechoslovakia, Poland, Yugoslavia and possibly in other European countries.

British Drug Houses (Canada), Ltd., has purchased a 17-acre site in Toronto for the construction of a new plant which will approximately double the company's production facilities.

Owing to the continuance of the United States steel strike, Canada has resumed complete control of the export from the Dominion of iron and steel in all forms, including manufactured products containing iron and steel.

Spanish potash production in 1945 was 20 per cent. above the 1944 level, output amounting to 120,000 tons of K_2O. Home consumption reached 35,000 tons and about 68,000 tons have been exported, of which some 60,000 tons went to the U.K., and the remainder to Portugal.

Forthcoming Events

February 11. Textile Institute. Assembly Hall, Technical College, Keighley, 7 p.m. Mr. H. Roberts: "Synthetic Fibres."

February 11. Royal Institute of Chemistry (Leeds Area Section). Chemistry Lecture Theatre, Leeds University, 6.30 p.m. Dr. A. E. Everest: "Problems of Un-nitratable Products in Benzol and Toluol."

February 12. Chemical Society (Birmingham Secion). Chemical Lecture Theatre, Birmingham University, 4 p.m. Mr. A. R. Todd: "Synthesis in the Study of Nucleotides" (Pedler Lecture).

February 13. North-Western Fuel Luncheon Club. Engineers' Club, Albert Square, Manchester, 12.30 p.m. Dr. E. J. F. James: "Science, Education and Industry."

February 13. Royal Society of Arts. John Adam Street, Adelphi, London, W.C.2, 1.45 p.m. Professor G. I. Finch: "The Need for Scientific Research into the Prevention and Extinction of Fires."

February 13. British Association of Chemists. Gas Industries House, 1 Grosvenor Place, London, S.W.1, 6.30 p.m. Mr. R. E. Threlfall: "Glass Tubing."

February 13. Institute of Welding. Reynolds Hall, College of Technology, Manchester, 7 p.m. Mr. R. E. Doré: "Review of Modern Developments in Flame Cutting and Oxy-Acetylene Welding Technique."

February 13. Society of Chemical Industry (London Section, Food Group, and Plastics Group). Royal Institution, Albemarle Street, London, W.1, 6.30 p.m. Dr. G. L. Riddell: "Science and Packaging" (The Jubilee Memorial Lecture).

February 14. Royal Institute of Chemistry. The College, Loughborough, 7.15 p.m. Mr. F. Fairbrother: "Tracer Elements."

February 14. The Pharmaceutical Society of Great Britain. Society's House, 17 Bloomsbury Square, London, W.C.1, 7 p.m. Mr. G. A. H. Buttle: "War Experiences in Therapeutics."

February 15. The Association for Scientific Photography. I.C.I. premises, Billingham, Co. Durham, 4 p.m. Dr. A. E. I. Vickers: "Photography Applied to Physico-Chemical Research."

February 15. British Association of Chemists (Notts and Derby Section). School of Art, Green Lane, Derby, 7 p.m. Dr. H. O'Neill: "The Relation of Atomic Structure to Hardness Properties of Metals and Alloys."

February 15. Society of Chemical Industry and **Royal Institute of Chemistry** (Birmingham and Midland Sections). Birmingham and Midlands Institute, 6.30 p.m. Mr. W. T. Astbury: "The Structure and Elastic Properties of Synthetic Fibres."

February 15. Chemical Society (Glasgow Section). Large Lecture Theatre, Chemistry Department, Glasgow University, 5.15 p.m. Mr. W. A. Waters: "Some Recent Developments in the Chemistry of Free Radicals" (Tilden Lecture).

February 16. Institution of Chemical Engineers (North-Western Branch). Reynolds Hall, College of Technology, Manchester, 3 p.m. Mr. E. Woollatt: "Thermodynamics as applied to Chemical Engineering."

February 16. International Society of Leather Trades' Chemists (British Section; Manchester Group). Engineers' Club, Albert Square, Manchester, 1 p.m., lunch. 2 p.m., voting on sectional rules Mr. A. Glover: "Effluent Disposal and its Relationship to Present Legislation." Discussion, with Dr. D. Burton in the chair: (1) Function of Acids in Vegetable Tanning; (2) Constituents and Functions of Sulphated Oils.

February 19. Institution of Chemical Engineers and Chemical Engineering Group, S.C.I. Geological Society's Rooms, Burlington House, London, S.W.1, 5.30 p.m. Dr. E. T. Wilkins: "The Preparation of Clean Coal for Special Purposes."

February 20. Society of Chemical Industry (Food Group, Microbiological Panel). Chemical Society's Rooms, Burlington House, Piccadilly, London, W.1, 6.30 p.m. Dr. S. E. Jacobs: "Some Aspects of Disinfection."

February 25. Royal Society for the Prevention of Accidents (London Industrial Groups). Caxton Hall, Westminster, S.W.1, 10 a.m. to 4 p.m. Conference on the Prevention of Industrial Accidents: five short papers, with buffet luncheon and tea (inclusive fee 15s.; application form and details from the chairman, London Industrial Co-ordinating Committee, 52 Grosvenor Gardens, S.W.1).

Prices of British Chemical Products

CONDITIONS in the London general chemicals market are reported steady, with deliveries against existing contracts proceeding along satisfactory lines. Higher quotations for antimony oxide are announced following the rise in the price of the metal, but otherwise no important price changes have been reported during the past week and values throughout the market display a very firm undertone. In the soda products section, bicarbonate of soda, caustic soda and nitrate of soda are receiving a steady inquiry, while the demand for soda ash is maintained. Hyposulphite of soda continues to be taken up in fair quantities. The potash products generally are in strong demand, with acid phosphate of potash and yellow prussiate of potash receiving a brisk inquiry. Elsewhere, British-made formaldehyde is in good demand and borax and glycerine are active items. Acetic, oxalic, tartaric, and citric acids all continue to receive buyers' attention. Activity in the coal-tar products market remains steady, with the general position unaltered.

MANCHESTER.—A steady export inquiry for a wide range of both light and heavy chemical products has been a feature of operations on the Manchester market during the past week and the tendency is for overseas business to expand still further. New business on home consumption account has also been reported, users in the textile bleaching, dyeing and finishing trades being prominent in respect both of fresh bookings and of deliveries against contracts, the latter going forward in satisfactory volume also to other branches of the consuming trades. Several of the leading sections of the fertiliser trade are showing a seasonal expansion, and a good demand for home use as well as for export is reported in a number of the tar products.

GLASGOW.—In the Scottish heavy chemical trade there is no change to report from last week; the improvement shown recently has been maintained. Prices remain firm, and there is no change to record in the export situation.

Price Changes

Rises: Acetic acid; antimony oxide; lead, red and white; methylated spirit; sodium sulphide, solid.

General Chemicals

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

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

Alum.—Loose lump, £16 per ton, f.o.r.

Aluminium Sulphate.—Ex works, £11 5s. per ton d/d.

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

Ammonium Carbonate.—£37 10s. to £38 per ton d/d in 5 cwt. casks.

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

Antimony Oxide.—£110 to £117 per ton.

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

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

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

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

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

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

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

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

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

Charcoal, Lump.—£15 to £16 per ton, ex wharf. Granulated, supplies scarce.

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

Chrometan.—Crystals, 5⅝d. per lb.

Chromic Acid.—1s. 7d. per lb., less 2½%, d/d U.K.

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

Copper Oxide.—Black, powdered, about £100 per ton.

Copper Sulphate.—£32 5s. per ton, f.o.b., less 2%, in 2 cwt. bags.

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

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

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

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

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

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

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

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

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

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

Lead Acetate.—White, 52s. to 55s. per cwt. according to quantity.

Lead Nitrate.—About £47 per ton d/d in casks.

Lead, Red.—Basic prices, per ton: Genuine dry red lead, £54; rutile, £54; orange lead, £66 10s. Ground in oil: Red, £67; orange, £79. Ready-mixed lead paint: Red, £70 10s.; orange, £82 10s.

Lead, White.—Dry English, in 8-cwt. casks, £67 per ton. Ground in oil, English, in 5-cwt. casks, £78 10s. per ton.

Litharge.—1 to 2 tons, £44 10s. per ton.

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

Magnesite.—Calcined, in bags, ex works, £18 15s. to £22 15s. per ton.

Magnesium Chloride—Solid (ex wharf), £22 per ton.

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

Mercuric Chloride.—Per lb., for 2-cwt lots, 8s. 5d.; for 7 to 28-lb. lots, 8s. 11d.

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

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

Methylated Spirit.—Industrial 66° O.P. 100 gals., 3s. 1½d. per gal.; pyridinised 64° O.P. 100 gal.; 3s. 2½d. per gal.

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

Oxalic Acid.—£60 to £65 per ton for ton lots, carriage paid, in 5-cwt. casks; smaller parcels would be dearer; deliveries slow.

Paraffin Wax.—Nominal.

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

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

Potassium Bichromate. — Crystals and granular, 7⅞d. per lb.; ground, 8⅜d. per lb., for not less than 6 cwt.; 1-cwt. lots, ¼d. per lb. extra.

Potassium Carbonate.—Calcined, 98/100%, £67 5s. per ton ex store; hydrated, £61 10s. per ton.

Potassium Chlorate.—Imported powder and crystals, nominal.

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

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

Potassium Permanganate.—B.P., 1s. 8½d. per lb. for 1-cwt. lots; for 3 cwt. and upwards, 1s. 8d. per lb.; technical, £7 12s. to £8 6s. 3d. per cwt., according to quantity d/d.

Potassium Prussiate.—Yellow, nominal.

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

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

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

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

Sodium Bichromate.—Crystals, cake and powder, 6½d. per lb.; anhydrous, 7½d. per lb., net, d/d U.K. in 7-8 cwt. casks.

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

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

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

Sodium Hyposulphite.—Pea crystals (4-ton lots or more), per cwt. in kegs 24s. 3d., in bags 17s. 9d.; (ton lots) 25s. in kegs, 18s. 6d. in bags; commercial, 5-ton lots, £16 per ton carriage paid. Packing free.

Sodium Iodide.—B.P., for not less than 28 lb., 9s. 11d. per lb., for not less than 7 lb., 13s. 1d. per lb.

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

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

Sodium Nitrite.—£20 15s. per ton.

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

Sodium Phosphate.—Di-sodium, £22 per ton d/d for ton lots. Tri-sodium, £25 per ton d/d for ton lots.

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

Sodium Silicate.—£6 to £11 per ton.

Sodium Sulphate (Glauber Salt).—£4 10s. per ton d/d.

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

Sodium Sulphide. — Solid. 60/62%, spot, £19 2s. 6d. per ton. d/d, in drums: crystals, 30/32%, £12 7s. 6d. per ton, d/d, in casks.

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

Sulphur.—Per ton, ground, £15-£16.

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

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

Tin Oxide.—Nominal.

Zinc Oxide.—Maximum prices per ton for 2-ton lots, d/d: white seal, £38 15s.; green seal, £37 15s.; red seal, £36 5s.

Zinc Sulphate.—Tech., £20-£21 per ton, carriage paid, casks free.

Rubber Chemicals

Antimony Sulphide.—Golden, 1s. 2d. to 2s. 1½d. per lb. Crimson, 2s. 2d. to 2s. 6d. per lb.

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

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

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

Carbon Bisulphide.—£34 to £39 per ton, according to quality, in free returnable drums.

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

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

Chromium Oxide.—Green, 2s ped lb.

India-rubber Substitutes.—White, 6 3/16d to 10½d. per lb.; dark, 6 3/16d. to 6 15/16d. per lb.

Lithopone.—30%, £25 per ton; 60%, £31 to £32 per ton. Imported material would be dearer.

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

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

Sulphur Chloride.—7d. per lb.

Vegetable Lamp Black.—£49 per ton.

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

Plus 5% War Charge.

Nitrogen Fertilisers

Ammonium Phosphate.—Imported material, 11% nitrogen, 48% phosphoric acid, per ton d/d farmer's nearest station, £20 15s.

Ammonium Sulphate.—Per ton in 6-ton lots, d/d farmer's nearest station, in February, £10 0s. 6d., in March-June, £10 2s.

Calcium Cyanamide.—Nominal; supplies very scanty.

Concentrated Fertilisers.—Per ton d/d farmer's nearest station, I.C.I. No. 1 grade, in February, £14 16s., in March, £14 18s. 6d.

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

Sodium Nitrate.—Chilean super-refined for 6-ton lots d/d nearest station, £15 15s. per ton; granulated, over 98%, £10 14s. per ton.

Coal Tar Products

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

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

Creosote.—Home trade, 6½d. to 7d. per gal., f.o.r. maker's works. MANCHESTER, 6½d. to 9¾d. per gal.

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

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

Naphthalene.—Crude, ton lots, in sellers' bags, £7 4s. to £10 13s. per ton, according to m.p.; hot-pressed, £11 10s. to £12 14s. per ton, in bulk ex works; purified crystals, £25 15s. to £28 15s. per ton. Controlled prices.

Pitch.—Medium, soft, home trade, 70s. per ton f.o.r. suppliers' works; export trade, 95s. per ton f.o.b. suppliers' port.

Pyridine.—90/140°, 18s. per gal.; 90/160°, 13s. MANCHESTER: 14s. 6d. to 18s. 6d. per gal.

Toluol.—Pure, 3s 0½d. per gal.; 90's, 2s. 4½d. per gal. MANCHESTER: Pure, 3s. 1d. per gal. naked.

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

Wood Distillation Products

Calcium Acetate.—Brown, £21 per ton; grey, £24. MANCHESTER: Grey, £24 to £25 per ton.

Methyl Acetone.—40/50%, £56 per ton.

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

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

Wood Tar.—£5 per ton.

Intermediates and Dyes (Prices Nominal)

m-**Cresol** 98/100%.—Nominal.

o-**Cresol** 30/31° C.—Nominal.

p-**Cresol** 34/35° C.—Nominal.

Dichloraniline.—2s. 8½d. per lb.

Dinitrobenzene.—8½d. per lb.

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

p-**Nitraniline.**—2s. 5d. per lb.

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

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

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

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

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

Latest Oil Prices

LONDON.—February 6.—For the period ending March 2 (March 2 also for refined oils), per ton, naked, ex mill, works or refinery, and subject to additional charges according to package: LINSEED OIL, crude, £65. RAPESEED OIL, crude, £91. COTTONSEED OIL, crude, £52 2s. 6d.; washed, £55 5s.; refined edible, £57; refined deodorised, £58. COCONUT OIL, crude, £49; refined deodorised, £49; refined hardened deodorised, £53. PALM KERNEL OIL, crude, £48 10s.; refined deodorised, £49; refined hardened deodorised, £53. PALM OIL, refined deodorised, £53; refined hardened deodorised, £58. GROUNDNUT OIL, crude, £56 10s.; refined deodorised, £58; refined hardened deodorised, £62. WHALE OIL, crude hardened, 42 deg., £51 10s.; refined hardened, 46/48 deg., £52 10s. ACID OILS: Groundnut, £40; soya, £38; coconut and palm-kernel, £43 10s. ROSIN, 30s. 6d. to 45s. per cwt., ex store, according to grade. TURPENTINE, American, 87s. per cwt. in drums or barrels, as imported (controlled price).

The production of tung oil in Australia developed greatly after the outbreak of the war, and at present there are 600 growers, according to a U.S. report. In the fiscal year 1944-45, 66,000 lb. of nuts were taken from 100 acres in New South Wales, in comparison with 14,000 lb. from the same acreage in the preceding year. In normal times, Australia requires annually from 150,000 to 200,000 gallons of tung oil. Before the war, China was Australia's principal source of supply.

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.)

DAVEY, PAXMAN & CO., LTD., Colchester, engineers. (M., 9/2/46.) January 14, £460 mortgage to Colchester Permanent Benefit Building Society; charged on 10 and 11 and 15 to 23 (inclusive) St. Leonards Road, 9 Stanwell Terrace, 32 and 71 and 72 Hythe Hill, and 1, 2 and 3 Foundry Yard, all Colchester. *£52,480. July 3, 1945.

JOHN PRENTICE (LONDON), LTD., manufacturers of chemical and dye products. (M., 9/2/46.) January 16, £300 debentures, part of a series already registered. *—. December 26, 1944.

Satisfaction

LEVER BROTHERS & UNILEVER, LTD., London, E.C. (M.S., 9/2/46.) Satisfaction January 16 of supplemental Trust Deed registered November 1, 1932 (fully).

Company News

Fisons, Ltd., announce that, Treasury sanction having been obtained, 298,658 new ordinary shares of £1 each are being issued at 45s. per share.

Chemical and Allied Stocks and Shares

INTERNATIONAL developments had a restricting influence on stock markets earlier in the week, although the undertone was firm, and sentiment generally was aided by further gains in British Funds. The nationalisation groups remained steady with small gains in a number of colliery shares following recent declines, while under the influence of the larger Yorkshire Electric dividend, electricity supply shares moved higher. Among gas stocks, South Metropolitan responded to the unexpected increase in dividend. Home rails kept steady pending the dividends.

Prominent among shares of chemical and kindred companies has been a further sharp rise to 50s. 3d. in Borax Consolidated deferred, accompanied by further talk of American buying, and of higher dividend possibilities. As it is not the practice for the company to make an interim payment, the present price of the shares carries the whole of the distribution for the past year. The units of the Distillers Co. were good at 123s. 6d., and United Molasses have strengthened to 47s. 3d.; but following recent gains, profit-taking caused a setback to 84s. 9d. in Turner & Newall. Lever & Unilever eased to 49s. 6d., Imperial Chemical to 40s. 4½d., and British Plaster Board to 35s. 3d. Dunlop Rubber, after a further rise, reacted moderately to 54s. 6d., but were well up on balance. Fisons ordinary were 52s. 9d. "ex" rights to the new shares which changed hands at 6s. 9d. premium.

B. Laporte were higher at 84s. 4½d., and Lawes Chemical 10s. ordinary at 13s. 6d., while there was selective buying of shares recently "introduced," British Alkaloids moving up to 10s. 7½d., and G. & J. Weir to 43s. Sanitas 9 per cent. £1 preference shares were 36s. 3d., Imperial Smelting became firmer at 15s. 6d., and General Refractories 10s. ordinary have been more active up to 19s. 3d. British Oxygen at 85s. 3d., British Aluminium at 39s. 4½d., and British Match at 45s. 6d., were steady. Export trade hopes tended to strengthen textiles, Calico Printers being 20s. 4½d., Bradford Dyers 26s. 3d., and Bleachers 13s. 3d. On the other hand, British Celanese receded to 35s. 4½d., and Courtaulds to 56s. 3d. Goodlass Wall at 26s. 10½d., Pinchin Johnson at 38s. 4½d., and Lewis Berger at 123s. 9d. were good among paint shares, which were generally firm on favourable views of the industry's prospects. Steel shares were moderately higher with Hadfields 33s., Neepsend Steel 36s. 9d., and Stewarts & Lloyds 58s., while elsewhere, Thomas & Baldwins firmed up to 11s. 3d. United Steel were 25s. 6d., and Dorman Long moved up to 26s. 3d., while on reports that the company is contemplating entering the cement manufacturing industry, Barrow Hæmatite rose to 25s. Ruston & Hornsby moved up to 59s. 3d.,

and in electrical equipments, there was a rally to 30s. 3d. in Crompton Parkinson, but General Electric eased to 93s. United Glass Bottle ordinary have held firm at 76s. 3d. on the possibility of a somewhat more liberal dividend policy in view of the forthcoming redemption of the debentures. Canning Town Glass 5s. ordinary changed hands up to 12s. 6d., accompanied by talk of a possible improvement in the dividend, and Triplex Glass 10s. ordinary were better, with dealings over 40s.

British Drug Houses were 49s., Burt Boulton 25s. 6d., and Beechams deferred easier at 20s. 9d., although elsewhere, Sangers held firm at 31s. 6d. Boots Drug were 57s. 4½d., and Timothy Whites firmed up to 46s. on the debenture scheme. British Industrial Plastics 2s. shares were 6s. 7½d. Erinoid 5s. ordinary transferred up to 14s., and among other shares of companies interested in plastics, Lacrinoid Products 2s. ordinary have been more active up to close on 7s. Blythe Colour 4s. ordinary, on higher dividend possibilities, rose further to 27s. 6d. Oils failed to hold earlier gains. Anglo-Iranian being 105s. 7½d., and Shell 81s. 10½d., but speculative buying advanced Canadian Eagle Oil to 14s. 9d., while Attock Oil rallied to 55s. 3d. following an earlier sharp decline.

FOR SALE

FOR DISPOSAL.—Enquiries solicited for CYCLOHEXANOL, METHYLCYCLOHEXANOL, and similar solvents. Reply to Box No. 2260, THE CHEMICAL AGE, 154, Fleet Street, London, E.C.4.

JACKETED PANS 1 Copper 36 in. dia. by 36 in. deep.
1 C.I. 36 in. dia. by 36 in. deep.
1 M.S. 48 in. dia. by 36 in. deep
THOMPSON & SON (MILLWALL), LTD.,
60, HATCHAM ROAD, OLD KENT ROAD, S.E.15.

ONE LARGE HOPPER made of mild steel, 20 ft. dia., loading height 8 ft. 6 in., standing on six steel girders of heavy construction, in sound condition, almost unused. Can be viewed on site Dewsbury, Yorks Apply : MASON, 25, Devonshire Street, Keighley (Tel. : 4143).

MORTON, SON & WARD, LTD.,
Offer Carefully Selected Plant for Disposal.

VERTICAL Open Top Steam Jacketed **MIXING PANS**, 5 ft. dia. by 9 ft. deep; rivetted M.S. Construction, overdriven agitating gear; high pressure jacket.

M.S Open top **BOILING PAN**, 3 ft. 6 in. dia. by 3 ft. deep, flat bottom with run-off.

One M.S. Open top **BOILING PAN**, 3 ft. dia. by 2 ft. 6 in. deep, dished bottom with legs.

One M.S. Open top **BOILING PAN**, 2 ft. dia. by 1 ft. 9 in. deep.

One Copper Steam Jacketed **TILTING PAN**, 2 ft. 10 in. dia. by 3 ft. 2 in. deep, on trunnions.

One Copper Steam Jacketed **TILTING PAN**, 2 ft. dia. by 2 ft. deep.

One Copper Steam Jacketed **TILTING PAN**, 2 ft. 6 in. dia. by 1 ft. 9 in. deep.

Vertical M.S. Rivetted **AIR RECEIVER**, 3 ft. 9 in. dia. by 5 ft. high by ¾ in. plate. 100 lbs. w.p.

Two 750 gallon capacity open top welded **M.S. TANKS**, 5 ft. dia. by 6 ft. 4 in. deep by ¼ in. plate.

One 750 gallon Open top rectangular **GALVANISED TANK**, 6 ft. 8 in. by 6 ft. 8 in. by 2 ft. 8 in. deep.

One 6,750 gallon Open top M.S. Rivetted **STORAGE TANK**, 18 ft. long by 10 ft. wide by 6 ft. deep, ⅜ in. plate

Two 5,000 gallon capacity Open top welded **M.S. TANKS**, 16 ft. long by 8 ft. wide by 7 ft. deep.

Two 48 in. Broadbent all electric overdriven **HYDRO EXTRACTORS**, latest type, with oil immersed Star Delta Starters.

One Single Roll Edge **RUNNER** for Paint Grinding, 2 ft. 6 in. dia., underdriven and arranged for direct coupled motor.

WALK MILL, DOBCROSS, nr. OLDHAM.
'Phone—Saddleworth 68

100 HYDRO EXTRACTORS by leading makers from 18 in. upwards, with Safety Covers. Jacketted Steam Copper and Iron Pans. Calorifiers. Washing Machines—Gilled Pipes, etc. List sent on request. Randalls, Engineers, Barnes. Tel. : Riv. 2436.

1000 STRONG NEW WATERPROOF APRONS. To-day's value 5s. each. Clearing at 30s. dozen. Also large quantity Filter Cloths, cheap. Wilsons, Springfield Mills Preston, Lancs. Phone 2198

WANTED

EXPORTS TO SWITZERLAND. British manufacturers and exporters of chemical, pharmaceutical and metallurgical products are requested to get in contact with a Swiss importing firm of wide experience and good relations to other countries on the Continent. Representative will be in London during February and March. Dr. Max Kappeler, c/o 3, Grosvenor Square, London, W.1. Telephone : Mayfair 6751.
APECO, Zurich.

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

AUCTIONEERS, VALUERS, Etc.

EDWARD RUSHTON, SON AND KENYON (Established 1855).

Auctioneers' Valuers and Fire Loss Assessors of CHEMICAL WORKS, PLANT AND MACHINERY,

York House, 12 York Street, Manchester.

Telephone : 1937 (2 lines) Central, Manchester.

SERVICING

GRINDING, Drying, Screening and Grading of materials undertaken for the trade. Also Suppliers of Ground Silica and Fillers, etc. JAMES KENT, LTD., Millers, Fenton, Staffordshire. Telegrams : Kenmill, Stoke-on-Trent. Telephone : 4253 and 4254, Stoke-on-Trent (2 lines).

GRINDING of every description of chemical and other materials for the trade with improved mills.—THOS. HILL-JONES, LTD., "Invicta" Mills, Bow Common Lane, London, E. Telegrams : "Hill-Jones, Bochurch, London." Telephone : 3285 East

MONOMARKS. Permanent London address. Letters redirected. Confidential. 5s. p.a. Royal patronage. Write Monomark BM/MONO3C, W.C.1.

PULVERISING and grading of raw materials. DOHM LTD., 167, Victoria Street, London, S.W.1.

WORKING NOTICES

THE proprietor of British Patent No. 401,484 is prepared to licence British manufacturers to work thereunder. It relates to the fractional distillation of volatile liquids and to processes for contacting immiscible fluids of different densities. Address : Boult Wade & Tennant, 112, Hatton Garden, London, E.C.1.

THE proprietors of the Patent No. 521,240 for "Depilatory," are desirous of entering into arrangements by way of licence and otherwise on reasonable terms for the purpose of exploiting the same and ensuring its full development and practical working in this country. All communications should be addressed in the first instance, to Haseltine Lake & Co., 28, Southampton Buildings, Chancery Lane, London, W.C.2.

Printed in Great Britain by THE PRESS AT COOMBELANDS, London and Addlestone, and published by BENN BROTHERS, LTD., at Bouverie House, 154, Fleet Street, E.C.4, February 9th, 1946. Entered as Second Class Matter at the New York, U.S.A., Post Office.